Air Force Waiver Guide

"This document primarily provides guidance for waivers on trained flying class II and III personnel, and where specifically stated applies to flying class I/IA applicants and other special duty personnel. This waiver guide does not cover general military entrance, commissioning, or enlistment."

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WAIVER GUIDE
Updated: Mar 2010
Supersedes waiver guide of Mar 2007
By: Dr Dan Van Syoc
Reviewed by Col Steven Ritter, AF/SG consultant for dermatology.

CONDITION:
Acne (Acne Vulgaris) (Mar 10)

I. Overview.

Acne is a follicular disease with the principal abnormality being impaction and distention of the pilosebaceous unit. It typically appears at puberty and lessens in severity as adolescence comes to an end; it is estimated that up to 85% of all adolescents are affected. Although acne is predominately a disease of youngsters in their teens, the mean age at presentation to a physician is 24 years with 10 percent of visits for people between the ages of 35 and 44 years. Recent estimates are that roughly 33 percent of people ages 15 to 44 years are affected by acne. Adolescent acne has a male predominance, but post-adolescent disease predominately affects women.[1, 2, 3] The social, psychological, and emotional impairment that can result from a significant case of acne has been reported to be similar to that associated with epilepsy, asthma, diabetes, and arthritis.[2]

Acne is caused by interplay of four factors: excessive sebum production secondary to sebaceous gland hyperplasia; hyperkeratinization of the hair follicle which prevents normal shedding of the follicular keratinocytes and obstructing the follicle; lipid and cellular debris accumulation which encourages colonization of *Propionibacterium acnes;* and finally, inflammation.[4] Androgens play a significant role in the pathophysiology of acne. The effect is exerted mainly on the sebaceous gland; androgens have been shown to trigger sebaceous gland growth and development and to stimulate sebum production. In contrast, estrogens (particularly estradiol) tend to decrease sebum production production.[1] Other factors leading to the development of acne include cosmetics (especially the oil-based products), stress which mainly affects acne severity, and repetitive mechanical trauma leading to the development of inflammatory lesions. There has long been controversy regarding diet and acne. Some evidence exists of an association between acne and milk intake, but there is no reliable evidence to implicate chocolate ingestion with an increased prevalence or severity of acne.[3]

Acne lesions are divided into inflammatory and noninflammatory lesions: *noninflammatory*-open (blackheads) and closed (whiteheads) comedones; *inflammatory*-papules, pustules, and nodules/cysts. The primary pathologic site for acne expression is the face and less frequently the back, chest, and shoulders. At the present time there is no universal classification system for acne vulgaris. This is due to the extensive variety of clinical presentations and the varying levels of social and psychological impairment seen with the disease. A commonly used classification system divides acne into three levels: mild, moderate and severe. Mild disease is characterized by the presence of few to several papules and pustules, but no nodules. Moderate disease has several to many papules and pustules, along with a few to several nodules. Finally, in severe disease, patients have numerous or extensive papules and pustules, as well as many nodules.[3, 4]

The goals in the treatment of acne are to relieve clinical symptoms and to prevent scarring. As the extent and severity of scarring are associated with the severity and longevity of acne prior to therapy, most dermatologists strongly encourage patients to obtain early treatment.[5] After evaluation of a

patient with acne, the patient needs to be given realistic expectations regarding the timeline for improvement. The time for a microcomedo to mature is approximately eight weeks; therefore therapy must be continued beyond eight weeks to assess efficacy.[6] Patients need to receive careful instructions on the proper use of all their medications as most will be on more than one agent.

With improved understanding of the pathogenesis of acne, it is now the consensus of dermatologists that topical retinoids should be the foundation of treatment for most patients with acne as the retinoids target the microcomedo, the precursor to all acne lesions. Combining a topical retinoid with an antimicrobial agent has demonstrated significantly faster and greater clearing of lesions as opposed to antimicrobial therapy alone. Topical antimicrobial agents include benzoyl peroxide (BPO), clindamycin, and erythromycin. A change from past practices is the recommendation that oral antibiotics be used only in moderate-to-severe acne and should not be used as monotherapy. It is also important that they be discontinued as soon as possible; usually within 8 – 12 weeks. Finally, due to the chronic nature of acne, topical retinoids are now recommended for maintenance therapy due to their strong effect on the microcomedo.[7]

A major factor is the change in philosophy for oral antibiotic usage for acne is the growing concern for resistance with *P acnes*. Office-based dermatologists prescribe 8 to 9 million oral antibiotic prescriptions annually, and the number is much higher if we include prescriptions from primary care providers. The primary indication for oral antibiotics is moderate to severe inflammatory disease on the face or trunk. Monotherapy with these agents needs to be avoided; resistance is significantly reduced if topical benzoyl peroxide is used concurrently with the antibiotic. The most common agents used are the tetracycline family of drugs (tetracycline, doxycycline, and minocycline) and erythromycin. Any of these agents may cause gastrointestinal disturbance. The resistance of *P. acnes* to erythromycin approaches 50% and tetracycline inhibition by food is 46 % and with dairy intake inhibition increases to 65%. Minocycline is not approved for aviation usage secondary to an elevated incidence of vertigo and a myriad of central nervous system anomalies. Isotretinoin (Accutane®), a synthetic oral retinoid prescribed for severe nodular acne, can cause a sudden onset of decreased night vision, and is associated with corneal opacities, inflammatory bowel disease, elevated lipids, hepatotoxicity, musculoskeletal symptoms, pruritus, epistaxis, and dryness of skin, nose, and mouth. It is also highly teratogenic and requires a rigorous documentation process for any child-bearing age female.[8, 9] Therefore, isotretinoin is also not approved for aviation usage.

A final note about acne in women is important in our discussion. Polycystic ovary syndrome (PCOS) is the most common hormonal disorder in young women. Its diagnosis relies upon the presence of two out of three following criteria: oligomenorrhea or amenorrhea; hyperandrogenism evidenced by hirsutism, androgenic alopecia, and acne; and polycystic ovaries demonstrated by ultrasound. Approximately 23% to 35% of women with PCOS have acne and the majority of women with severe acne have PCOS, with rates reported to be as high as 83%. Women patients need to be carefully evaluated to rule out PCOS and may require oral contraceptive treatment.[1] Hormonal therapies are used in women only and include estrogen-containing oral contraceptives and spironolactone. Spironolactone is not an approved medication. Oral contraceptives low in androgenic progestin (e.g. Ortho tri-cyclen®, Yasmin®) are preferred.

II. Aeromedical Concerns.

The main concerns are interference with the wear of protective aviation equipment; exacerbation of acne due to rubbing, pressure, and/or exposure to hot and humid environments; psychological factors;

use of acne medications that are incompatible with flying duties; and extended grounding due to a difficult or prolonged treatment course. Lesions on the face may interfere with mask or respirator seal and helmet wear (chin straps). Lesions on the shoulder, chest, and back may cause discomfort and distraction when wearing restraint or parachute harnesses or with prolonged sitting. Repeated or prolonged rubbing or pressure against the skin can produce or exacerbate an eruption (mechanical acne) with striking inflammation.

III. Waiver Consideration.

Acne is not mentioned specifically in AFI 48-123, but is covered under this statement: "Any chronic skin disorder, which is severe enough to cause recurrent grounding from flying duties, or is aggravated by, or interferes with, the wearing of military equipment." Treatment with approved topical agents does not require a waiver. The local flight surgeon must confirm, however, there are no adverse effects and the disease itself does not interfere with use of aviation equipment or safe mission completion. Systemic maintenance agents such as oral erythromycin, tetracycline, and trimethoprim-sulfamethoxazole require a waiver (doxycycline, if used as monotherapy, does not require a waiver for acne). They are compatible with flying once it is confirmed that side effects are absent or acceptable in severity. Isotretinoin therapy is not compatible with flying duties and would require prolonged grounding (usually 20 weeks) if used when clinically indicated. In addition, waiver will not be considered for acne treated with minocycline. Therapy with oral contraceptives may be considered for women. In rare cases severe nodulocystic acne or scarring may require a categorical waiver to avoid routine use of a helmet or mask.

Table 1: Waiver potential for acne

Flying Class (FC)	**Acne Treatment**	**Waiver Potential Waiver Authority**
I/IA	Topical treatment – topical retinoids (tretinoi adapalene, tazarotene), benzoyl peroxide, salicylic acid, azelaic acid, topical antibiotics (clindamycin, erythromycin, sulfacetamide-sulfur)	N/A
	Oral contraceptive (female only)	Yes AETC
	Oral antibiotics - tetracycline, erythromycin, doxycycline, and trimethoprim-sulfamethoxazole.*†	Yes AETC
II#	As above	Yes MAJCOM
IIU	As above	Yes AFMSA
III#	As above	Yes MAJCOM

*Remember that minocycline is not approved for flying duties.
#Initial FC II FS and initial FC III require certification by AETC
† No waiver (any flying class) is necessary for doxycycline if used for monotherapy for acne

AIMWTS review in Jan 2010 resulted in a total of 685 Air Force aviators with a diagnosis of acne. There were 67 FC I/IA cases, 312 FC II cases, 306 FC III cases and none list as FC IIU or RPA. There were a total of 18 disqualifications; 9 were FC I/IA, 2 were FC II, and 7 were FC III. None of the disqualified cases resulted from the acne diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary for acne should include the following:
A. History of acne problem, age at onset of problem, extent and location(s) of lesions, and a description of current and past therapy - all medications including dosage, and frequency, and side effects. In adult women, need to address menstrual regularity and presence or absence of hirsutism.
B. Comments addressing interference with use of aviation equipment.
C. Dermatology consult if individual has recalcitrant moderate to severe inflammatory or severe/nodulocystic acne.

ICD 9 code for acne	
706.1	Other acne

V. References.

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WAIVER GUIDE
Updated: Aug 09
Supersedes Waiver Guide of Mar 00
By: Richard J. Serkowski (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Acoustic Neuroma (Aug 09)

I. Overview.

Acoustic neuroma (AN), also known as acoustic schwannoma, acoustic neurinoma, vestibular schwannoma, and vestibular neurilemoma, is a benign Schwann cell derived tumor commonly arising from the inferior vestibular branch of the eighth cranial nerve. These tumors account for approximately 8 percent of intracranial tumors in adults and 80 to 90 percent of all cerebellopontine angle (CPA) tumors. The overall incidence of symptomatic AN is about 1:100,000 , and appears to be increasing, possibly due to the incidental diagnosis of asymptomatic lesions with the widespread use of magnetic resonance imaging (MRI) and computed tomography[1, 2]. Symptoms associated with AN are typically associated with cranial nerve involvement, cerebellar compression, and tumor progression. One large study revealed that the acoustic nerve was involved in almost all cases, with the vestibular, trigeminal and facial nerves involved less frequently[3]. The median age at diagnosis is approximately 50 years[2]. The tumors are unilateral in more than 90 percent of cases[4], affecting the right and left sides with equal frequency. Bilateral AN is primarily limited to patients with autosomal dominant neurofibromatosis type 2 (NF-2). Any patient over 18 years of age who has a unilateral AN and another neurologic tumor in the brain or spine should be screened for NF-2.

The aviator with asymmetric hearing loss should be evaluated for AN. The individual is often unaware of any hearing deficit and many of the cases seen at the ACS were discovered by observing changes in the annual audiogram.

AN has a variable natural history as illustrated by serial imaging studies. The average growth rate is 2 mm/year[5], but rates as high as 25 mm/year have been described[6]. However, up to 40 percent of tumors overall and a higher percentage of small tumors show no growth or even shrink on serial imaging studies[5, 7]. There is no predictive relation between growth rate and tumor size at presentation. Symptoms associated with AN are due to cranial nerve involvement, cerebellar compression, and tumor progression. In a series of 1,000 acoustic neuroma cases treated at a single institution, the acoustic nerve was involved in almost all cases (95%) presenting with hearing loss and tinnitus. This was followed by the vestibular nerve (61%) associated with unsteadiness while walking and the trigeminal nerve (17%) presenting with facial numbness (paresthesia), hypesthesia, and pain. Finally, least involved was the facial nerve (6%) which may present with facial paresis and, less often, taste disturbances[8]. Direct extension of the tumor to surrounding anatomic structures may induce ataxia (brainstem), or involve the functions of the lower cranial nerves (IX, X, and XI), leading to dysarthria, dysphagia, aspiration, and hoarseness.

Once the diagnosis of an acoustic neuroma has been established with a thorough history/physical examination, audiometry, vestibular testing and imaging, three major treatment options are currently available: 1) observation, 2) surgery, and 3) radiation therapy. Pharmacotherapy has yet to be proven beneficial; however, research with Cox-2 inhibitors (OSU-03012 and OSU-HDAC-42) at Ohio State University show potential for tumor control and regression.

Tumor growth rate typically falls within the range of slow (0.02cm/yr) or medium (0.2cm/yr). Patients may elect observation, especially if they have minimum symptoms. Obviously, tumors that are removed when they are small offer better outcomes.

With technologic advances, operative mortality has been reduced to less than 1% at high volume centers for this benign but potentially fatal tumor. Complete tumor removal can be accomplished in most patients (depending on tumor size) and there is rare chance for recurrence[9]. The likelihood of surgical morbidity, which includes hearing loss, facial weakness, and vestibular disturbances, depends upon tumor size. Facial nerve function can be preserved in most patients even with large tumors, and serviceable hearing can be preserved in many patients[3, 10, 11]. However, only rarely does hearing improve after acoustic tumor surgery.

Finally, most widely touted are the varieties of radiation therapy options offered to AN patients. Over 10,000 AN patients have been treated worldwide by radiation. These may be delivered by gamma knife ($Cobalt^{60}$) or via linear accelerators. Furthermore, the treatment may be further modified by fractionation and by reducing tumor radiation dose from 16 Gy to 12-13 Gy. Fractionation appears to decrease risk of injury to other cranial nerves. Though all tumor sizes may be treated, smaller, non-cystic tumors tend to do better. While it is presumed that the tumor observed is an AN, other lesions such as neurosarcoidosis have been known to mimic these tumors. Radiated tumors tend to swell/expand at 6 to 24 months. Hearing loss post-radiation generally is less than with that of surgery. Imbalance may be seen in 5-10% of patients and facial palsy in less than 1%. However, the biggest drawback of radiation therapy is the small but not insignificant risk of malignancy, which is currently estimated at 1:100,000. Also, some tumors fail to respond to radiation and continue to grow. Those requiring surgery tend to have poorer cranial nerve outcomes due to operating in an irradiated field. Finally, these patients will probably require lifelong follow-up.

II. Aeromedical Concerns.

Cochlear and vestibular symptoms are of obvious importance in the aviator. Hearing loss and tinnitus impact communications, while vertigo and disequilibrium may affect control of the aircraft. Because of the wide range of progressive and sometimes abrupt symptomatology, conservative observation therapy is not consistent with safe performance of cockpit duties. All post-operative or post-radiation vestibular compensation symptoms need to be resolved prior to waiver consideration and any hearing loss needs to be stabilized and well documented by competent audiology services. An in-flight hearing evaluation will most likely be required prior to clearing an aviator for flying duties.

III. Waiver Considerations.

Acoustic neuroma is not specifically addressed in AFI 48-123, but can be covered under several other headings that include: “history of surgery involving the middle ear, excluding cholesteatoma”; “any conditions that interfere with the auditory or vestibular functions”; “hearing loss greater than H-1 profile, or asymmetric hearing loss, requires work-up by an audiologist (audiology evaluation for initial waiver and waiver renewals must have been accomplished within 12 months of submission to waiver authority); and “history of tumor involving the brain or its coverings”. Waivers are required for H-3 hearing loss or greater. Waiver requests may be submitted six months after successful treatment of the AN provided any post-treatment sequelae are within acceptable respective flying-class limits. The tumor must have been unilateral, and there must be complete resolution of vertigo post-treatment. Residual cranial nerve deficits should allow full ocular movements without tracking deficits or strabismus, and allow for acceptable protective mask sealing. ENT and neurology consultations are required for waiver consideration (also audiology if hearing deficit occurs). Confirmation of tumor pathology is requested with invasive surgical cases, and MRI with follow-up is needed in cases treated non-invasively, since acoustic neuromas have characteristic findings on MRI.

Table 1: Waiver potential after AN treatment.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Completely resected AN with some retained functional hearing and no other sequelae	No AETC	No
	Completely resected AN or radiotherapy with extra CN-VIII involvement with/without retained functional hearing	No AETC	No
II (pilot)	Completely resected AN or radiotherapy with some retained functional hearing and no other sequelae	Maybe*# AFMOA	Yes
	Completely resected AN or radiotherapy with extra CN-VIII involvement with/without retained functional hearing	Maybe*# AFMOA	Yes
II (non-pilot) and III	Completely resected AN or radiotherapy with some retained functional hearing and no other sequelae	Maybe*# MAJCOM	Yes
	Completely resected AN or radiotherapy with extra CN-VIII involvement with/without retained functional hearing	Maybe*# MAJCOM	Yes

* Must be at least 6 months after definitive treatment and no aeromedically significant new or residual symptoms.
# No indefinite waivers.

Review of AIMWTS cases through Jul 2009 showed 17 cases of AN; 0 FC I/IA, 14 FC II, 3 FC III. All but one case was granted a waiver. One FC III aviator was disqualified due to residual extremity weakness and facial nerve weakness. Five of the FC II cases (all pilots) were granted a FC IIC waiver which stated they were not to be assigned to any aircraft requiring stereoacusis. Of the 17 cases, 2 were treated stereotactic with radiation therapy and no surgery, 12 were treated with surgery alone, one was treated initially with surgery and later with radiation therapy and two had small lesions and had had no surgery at the time of the most recent AMS. One pilot had the diagnosis of an acoustic hamartoma which is similar to an acoustic neuroma in location and treatment.

Aeromedical Consultation Service (ACS) experience is increasing, with seven aircrew having been evaluated or being evaluated at the ACS for AN since the last Waiver Guide update in 2000. ACS waivers have been granted in approximately 50% cumulatively, and 67% (2/3) of cases since 2000. All those disqualified had aeromedically significant residual neurological deficits. Of note, the usual time from initial substandard hearing waiver to AN diagnosis was between 3-6 years.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for acoustic neuroma should include the following:

A. History – symptoms, hearing exams prior to treatment, treatment course, post-surgical vertigo symptoms and how resolved.

B. Physical – most recent audiogram and eye exam with emphasis on eye tracking.

C. Surgical and pathology reports.

D. ENT consultation report; may also include neurology or neurosurgery.

E. Reports from any imaging studies pre- and post-surgery.

F. Tumor board report, military or civilian, if applicable.

G. Medical evaluation board results.

The aeromedical summary of waiver renewal of acoustic neuroma should include the following:

A. History – brief summary of current status to include operational impact(s) since last waiver.

B. Physical – audiogram.

C. ENT consultation report.

ICD 9 Codes for Acoustic Neuroma	
225.1	Benign Neoplasm of Cranial Nerves
388.5	Disorders of Acoustic Nerve

Waiver guide reviewed by Col David Schall (RAM 83/Otolaryngologist and Neuro-Otologist)

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WAIVER GUIDE
Updated: Feb 2011
Supersedes Waiver Guide of Nov 2007
By: LTC Mark McPherson (RAM XI) and Dr. Daniel Van Syoc
Reviewed by Col (sel) Kent McDonald, chief of Neuropsychiatry Branch at the ACS

CONDITION:
Adjustment Disorders (Feb 11)

I. Overview.

Adjustment disorders are characterized by the development of clinically significant emotional or behavioral symptoms in response to an identifiable psychosocial stressor or stressors. Typically, the stressor involves a financial issue, a medical illness, or a relationship problem.[1] These symptoms are diagnostically significant (distinguishing them from V Codes for Occupational Problem, Partner Relational Problem, etc) if the distress is in excess of what would normally be expected from exposure to the stressor or there is significant impairment in social or occupational functioning. Symptoms associated with bereavement however for the death of a loved one are not classified as an adjustment disorder unless the symptoms are very severe (socially/occupationally impairing) or last longer than expected. Then an adjustment disorder or a mood disorder should be considered. Adjustment disorders may be either acute or chronic. An acute adjustment disorder must begin within three months of the onset of a stressor and resolve within six months of the termination of the stressor or its consequences. Chronic adjustment disorders are characterized by the persistence of symptoms for six months or longer in response to an enduring stressor (e.g. disabling medical condition) or its consequences (e.g. financial or emotional difficulties resulting from a divorce). Stressors may be a single event or there may be multiple stressors. Stressors may be recurrent or continuous. If the disturbance meets the criteria for another Axis I disorder or is an exacerbation of a preexisting Axis I or II disorder, the diagnosis of adjustment disorder should not be used.[2]

DSM IV Criteria[2]
1. Behavioral or emotional symptoms must develop in response to an identifiable event(s) and occur within three months of the onset of that event(s)/stressor(s).
2. These behaviors or symptoms must be clinically significant as evidenced by at least one of the following:
a. After exposure to the event(s)/stressor(s), the behavioral or emotional symptoms seem in excess of what would be normally expected.
b. Significant social, functioning, or occupational impairment.
3. The disturbance does not meet the criteria for another specific Axis I disorder or is not part of a preexisting Axis I or Axis II disorder.
4. The behavioral or emotional symptoms do not represent bereavement.
5. Once the event(s)/stressor(s) has terminated, the symptoms do not last more than additional 6 months.
Acute: Last less than six months.
Chronic: Last for six months or longer. By definition the disturbance cannot last longer than six months. Only use the chronic specifier if the disturbance is in response to a chronic event(s)/stressor(s).

Adjustment disorder is used in psychiatry, but is more typically seen in primary care settings, and has an estimated incidence of 5-21% in psychiatric consultation services for adults.[1, 3, 4] Early interventions with psychotherapy to strengthen coping mechanisms and short-term pharmacotherapy have been shown to promote recovery.[5, 6] Delay in treatment can lead to progression of symptoms to a more severe Axis I diagnosis.[4, 7] Adjustment disorders tend to resolve and only 17-21% ever develop into a chronic course, major depression, or personality disorder.[3, 4, 8] A study in college students noted that a substantial number of students in the first year met adjustment disorder criteria.[9]

There has been little systematic study of adjustment disorder treatment. Psychotherapy is the mainstay of treatment for adjustment disorders.[10, 11] Psychotherapeutic treatment of adjustment disorder enables reduction of the stressor, enhanced coping with the stressor that cannot be reduced or eliminated and establishment of a support system to maximize adaptation.[12] Specific treatment interventions include supportive psychological approaches, cognitive-behavioral, and psychodynamic interventions. Short term treatment may be adequate for many individuals; however more extended treatment may be appropriate in situations in which individual characteristics predispose the individual to stress intolerance.[1] There are very few systematic clinical trials assessing the efficacy of pharmacologic interventions for adjustment disorders. The judicious use of medications to treat specific symptoms associated with adjustment disorders, typically antidepressants and anxiolytics, may be helpful. Surveys of prescribing habits of office-based physicians show significant increase in prescriptions for antidepressants, particular SSRIs.[1] Some studies have found SSRIs in the primary care setting are very effective for adjustment disorder with depressed mood.[5]

There is debate in the literature regarding assessment of adjustment disorder with depressed mood and an overlap of Major Depressive Disorder, therefore history and careful diagnosis are very important.[4]

II. Aeromedical Concerns.

Adjustment disorders are one of the most common psychiatric diagnoses among aviators. These disorders are commonly associated with functional impairment resulting from decreased concentration, depression, anxiety, inattention, decreased working/short-term memory, insomnia, fatigue, temporary changes in social relationships and problems with decision making. These impairments are all incompatible with aviation duties.

The FAA, Transport Canada, Australia and the US Army have policies allowing very selected aviators to return to fly.[13-15] In 2004 the Aerospace Medical association published a position paper advocating the study of SSRI use in specially selected aviator populations.[8]

III. Waiver Considerations.

Adjustment disorders are specifically disqualifying for flying classes I/IA, II, III, and IIU. For ATC/GBC and SMOD personnel, adjustment disorder is not a specifically disqualifying condition, but AFI 48-123 states that any personality disorder or mental condition that may render the individual unable to perform controller duties or space and missile operations crew duties is disqualifying and would therefore require a waiver. Both ATC/GBC and SMOD personnel need to be evaluated closely for any medication usage before consideration for waiver. Adjustment

disorders that result in fear of flying or controlling are not considered a medical diagnosis and are handled administratively.

If the DSM-IV-TR diagnostic criteria for adjustment disorder are met, then aviators should be placed DNIF until the disturbance is resolved. If the disorder resolves within 60 days the aviator is placed back on flying status and no waiver is required. If the disorder persists beyond 60 days the aviator is disqualified and a waiver is required. An evaluation by a qualified mental health professional is required prior to waiver consideration. There is no mandated recovery period before waiver application, except a one-year period after resolution for FC I/IA applicants and other untrained aircrew applicants. The period of remission for trained aircrew should be of such length that the flight surgeon and mental health consultant perceive with confidence that the aviator will not suffer a clinically significant recurrence.

Finally, certain psychiatric disorders render an individual unsuited for duty, rather than unfit, and are subject to administrative separation (IAW AFI 36-3208, para 5.11). Adjustment disorders may fall under this provision if there is unsatisfactory duty performance.

Table 1: Waiver potential for adjustment disorder**

Flying Class (FC)	**Waiver Potential** **Waiver Authority**
I/IA	Yes†* AETC
II	Yes†* MAJCOM
IIU	Yes†* AFMSA
III	Yes†* MAJCOM
ATC/GBC	Maybe*** MAJCOM
SMOD	Yes*** AFSPC or GSC

† Waiver will not be considered until one-year after resolution for FC I/IA and untrained aircrew.
* Waiver is likely if the stressors are resolved, the individual has demonstrated good coping skills, is on no disqualifying medications, and the adjustment disorder has clearly resolved.
** ACS review or consultation is at the discretion of the waiver authority.
*** ATC/GBC and SMOD personnel with Adjustment Disorder are evaluated bases on how the condition affects their ability to continue performing their assigned duties.

Review of AIMWTS data through November 2010 revealed 688 cases of adjustment disorder. Of that total, 31 were FC I/IA (12 disqualifications), 152 were FC II (48 disqualifications), 322 were FC III (149 disqualifications), 15 were FC IIU (9 disqualifications), 122 were ATC/GBC (92 disqualifications), and 46 were SMOD cases (13 disqualifications). Almost all of the disqualifications were due to the diagnosis of adjustment disorder.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for adjustment disorder should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History with special attention to symptoms, frequency, duration, treatment, precipitating factors, action taken to mitigate recurrence and any social, occupational, administrative or legal problems associated with the case.
C. Copies of psychiatric evaluation and treatment summary (within 3 months of package submission).
D. Letters from the aviator's squadron commander or operations officer and treating psychiatrist or psychologist supporting or refuting a return to flying status.

The aeromedical summary for waiver renewal for adjustment disorder should include the following:
A. Interval history and any changes in the aviator's condition with special emphasis on the mental health of the individual.
B. Copies of any applicable evaluations.

ICD-9-CM for adjustment disorders	
309.0	Adjustment disorder with depressed mood
309.24	Adjustment disorder with anxiety
309.28	Adjustment disorder with mixed anxiety and depressed mood
309.3	Adjustment disorder with disturbance of conduct
309.4	Adjustment disorder with mixed disturbance of emotions and conduct
309.9	Adjustment disorder – unspecified.

V. References.

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WAIVER GUIDE
Updated: May 2010
Supersedes Waiver Guide of Aug 2006
By: Maj Ray Clydesdale (RAM X) and Dr Dan Van Syoc
Reviewed by Col (sel) Kent McDonald, psychiatrist and chief of the ACS Neuropsychiatry Branch

CONDITION:
Alcohol Abuse and Dependence (May 10)

I. Overview.

In alcohol abuse, alcohol consumption significantly impairs social, interpersonal, and/or occupational functioning. Alcohol dependence involves a pattern of repeated self-administration that usually results in tolerance, withdrawal, and compulsive drinking behavior. These disorders commonly develop between the ages of 20 and 40, and along with alcohol misuse are among the most commonly seen psychiatric issues encountered in aerospace medicine. Current psychiatric guidelines per DSM-IV-TR give criteria for diagnoses of alcohol dependence (303.90) and alcohol abuse (305.0) that colloquially define alcohol related problems.

Alcohol use disorders are difficult to detect and there is no one objective parameter that can be used to make the diagnosis. Therefore a flight surgeon must be aware of and watchful for circumstances which can signal their presence, e.g., presence of alcohol on the breath or an elevated blood alcohol level during duty hours, an alcohol-related incident, such as a DUI or domestic incident, insomnia, hypertension, vague GI problems, and frequent minor injuries. Laboratory abnormalities such as elevations of MCV, GGT, ALT, AST, uric acid, triglycerides, or increased carbohydrate deficient transferrin (CDT) may be present. Chronic depression, irritability, and anxiety may indicate the presence of an alcohol use disorder, especially when they represent a change from a flyer's normal personality. Objective screening tests (CAGE questionnaire, MAST, AUDIT, and McAndrew) are available for use by the flight surgeon or through the Mental Health Clinic. Recently the National Institute of Alcohol Abuse and Alcoholism has developed a single-question test for primary care doctors to replace longer questionnaires. This question asks, "How many times in the past year have you had (for men) 5 or more drinks or (for women) 4 or more drinks in a single day?" None of these make or confirm the diagnosis, but they can help evaluate the presence, extent, and severity of alcohol use problems.

Whenever a flight surgeon suspects that any Air Force member has an alcohol problem he or she is required by AFI 44-121 to inform that member's commander, who must then take certain steps, including referral for an Alcohol & Drug Abuse Prevention & Treatment (ADAPT) Program evaluation. The risk for alcohol withdrawal must also be assessed immediately. Along with the usual medical evaluation, the workup should include an assessment for other psychiatric disorders, such as major depression, anxiety disorders, and personality disorders, for which alcoholics are at increased risk. Another substance use disorder and antisocial personality disorder (associated in young men with alcohol dependence) are the most common co-morbid diagnoses.

Recidivism is a primary concern for flight surgeons when dealing with aviators and alcohol. Roughly one-quarter of alcohol abuse patients demonstrate relapse at 3 years, while alcohol dependence patients have demonstrated relapse rates of 41% at 2 years. Abstinence from alcohol is the preferred modality for preventing relapse in aviators. Abstinence has been associated with a

lower risk for relapse when compared to low risk drinking. Some studies have shown that limited drinkers were four times more likely to relapse to unacceptable drinking levels than were those who reported total abstinence.

By 2013, DSM-V will replace the current DSM-IV-TR. Alcohol Abuse and Dependence diagnoses will be merged into a single diagnosis with graded clinical severity: Alcohol-Use Disorder (moderate & severe). The new diagnosis will combine existing criteria from both Alcohol Abuse and Dependence. Unfortunately, Alcohol Abuse and Dependence are used interchangeably in waiver submissions. Since Alcohol Abuse and Dependence have the same aeromedical waiver criteria, the merging of the diagnoses in DSM-V should be seamless to local flight surgeons and facilitate better waiver data management.

II. Aeromedical Concerns.

A continuum exists ranging from normal social use of alcohol, through non-diagnosable alcohol misuse of aeromedical concern, to diagnosable alcoholism. As an alcohol problem progresses it often causes problems first at home, then in the social environment, and performance in the cockpit may be the last area to be noticed. One of the more vital roles of the flight surgeon is involvement with the squadron aircrew in their off-duty time and, in particular, participation in social and recreational activities where the use of alcohol often occurs.

Alcohol misuse presents hazards to aviation because of both acute and chronic effects on cognitive and physical performance. Acute alcohol intoxication and hangover, which can cause impairment in cognition, judgment, coordination, and impaired G-tolerance and nystagmus, are obviously incompatible with flying. Similarly alcohol withdrawal is a threat to flight safety due to anxiety, tremor, and the possibility of arrhythmia. Further, subtle cognitive impairment, manifesting as slowed reaction time, inattentiveness, difficulty in monitoring multiple sensory inputs, and difficulty making rapid shifts of attention from one stimulus to another, can occur after low doses of alcohol which would not cause intoxication. After moderate alcohol consumption, impairments can persist for many hours after the blood alcohol level has returned to zero and well beyond the 12-hour ‘bottle-to-throttle’ guidelines. Positional alcohol nystagmus, indicating impairment in vestibular function, can occur under G-load up to 48 hours after alcohol consumption. Heavy drinkers are at risk for arrhythmias ("holiday heart") for several days after drinking.

III. Waiver Considerations.

Alcohol abuse and dependence are disqualifying for all classes of aviation in the US Air Force, to include FC IIU. These conditions may be waived by MAJCOM/SGPA for a period of no greater than three years.

Table 1: Waiver potential for alcohol abuse or dependence.

Flying Class (FC)	Waiver Potential† Waiver Authority	ACS review/evaluation
I/IA	Maybe AETC	Maybe*
II and III, untrained	Maybe AETC	Maybe*
II and III, trained	Yes MAJCOM	Maybe*
IIU	Yes AFMSA	Maybe*
GBC/ATC	Yes MAJCOM	Maybe*
SMOD	Yes AFSPC	Maybe*

† All aviators with a history of alcohol abuse or dependence must remain abstinent, provide documentation of successful treatment and after-care follow-up, and must not take any psychiatric medications.
*ACS evaluation or review is at the discretion of the waiver authority.

The majority of aviator waiver recommendations for alcohol related diagnoses are managed through base and command level interaction; ACS in-person evaluation is seldom required. Review of AIMWTS data in Feb 2010 showed 344 individuals requesting waivers for alcohol abuse and 217 individuals requesting waivers for alcohol dependence, for a total of 561 aviator cases. There were 24 FC I/IA cases, 159 FC II cases, and 378 FC III cases. Within the FC II category, 6 were initial certification cases, and within the FC III category, 87 were for initial certification. Of the 24 FC I/IA cases, 14 were disqualified with the most recent AMS; of the 159 FC II cases, 31 were disqualified with the most recent AMS; and of the 378 FC III cases, 122 were disqualified with the most recent AMS. Many of the aviators in the pool of 561 had multiple aeromedical summaries for alcohol-related diagnoses. There were some who were disqualified and later waived, some waived and later disqualified, and a few who were disqualified, waived and then disqualified again.

IV. Information Required for Waiver Submission.

These conditions may be waived by MAJCOM/SGPA for a period no greater than three years. In order to be considered for waiver, three conditions must be met: 1) individual must have successfully completed treatment (defined below) as determined and documented by the MTF Alcohol & Drug Abuse Prevention & Treatment (ADAPT) program treatment team; 2) the individual must comply with post-treatment aftercare program requirements (also defined below). Flight surgeon participation in both the ADAPT treatment team meetings and aftercare follow up is required; and 3) the individual must have a positive attitude and unqualified acknowledgement of his/her alcohol disorder.

Treatment Program Requirements: Individuals will have successfully completed treatment when the following conditions are met: 1) They meet the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for early full remission of substance dependence or no longer meet diagnostic criteria for substance abuse; 2) The treatment team determines, based on DSM criteria, individual's progress towards agreed-upon goals and/or issues as stated in the treatment plan; and 3) They remain abstinent without the need for medication.

Post-treatment Aftercare Program Requirements: 1) The individual must remain abstinent without the need for medication: 2) document participation in an organized substance use aftercare program (e.g., Alcoholics Anonymous-(AA), or other program approved by the MTF ADAPT Program Manager), and 3) meet with the designated professionals for the following specific timeframes:

Table 2: Post-treatment Aftercare Requirements

Professional/Meetings	**First Year**	**Second/Third Year**	**Fourth Year**
Flight Surgeon	Monthly	Quarterly	Annually
ADAPT	Monthly	Monthly	N/A
Psychiatrist, Psychologist, or Social Worker	Annually	Annually	N/A
Organized Alcohol Aftercare Program	3x weekly	1x weekly	Recommended (not required)

Notes:

1. The flight surgeon has primary responsibility for collecting and submitting the required documentation for waiver submission. The ADAPT representative documents substance use aftercare program attendance. Temporary modification of aftercare program requirements because of operational demands must be documented by the flight surgeon.

2. Initial waiver may be requested after ―treatment program completion and successful completion of 90 days in the post-treatment aftercare program.

3. Unsatisfactory Progress in Aftercare Program: Failure of a member to acknowledge his/her alcohol problem, to abstain from alcohol, or to comply with all aftercare requirements is medically disqualifying. The following pertain to any individual who fails to remain abstinent or otherwise not comply with all aftercare program requirements: Ground the member and arrange for re-evaluation by flight surgeon and ADAPT provider to determine potential for re-treatment. If member is determined to have potential for re-treatment, follow the initial waiver and aftercare program processes. If member is determined not to have potential for re-treatment, an AMS must be submitted for permanent disqualification. A second waiver request for substance use disorder may be considered in accordance with initial waiver requirements, but requested no sooner than 12 months from the last date that non-compliance with the post-treatment aftercare program was documented. Second waiver requests are considered on a case-by-case basis only, and waiver authority for these individuals is AFMSA/SG3P.

4. As part of the waiver package, the individual states in writing that they understand the waiver is valid, only if total abstinence from substance is maintained, and that a verifiable break in

abstinence, once the waiver period has begun, is considered medically disqualifying. This written statement, kept in the medical records, must be accomplished at the initial waiver request, and re-accomplished each time a waiver renewal is requested.

5. ACS evaluation is not routinely requested in cases of alcohol use disorders, but such an evaluation may be requested through the MAJCOM if an aviator's flight surgeon and/or commander desire it, particularly for a second opinion. In such cases, a summary of all evaluations (ADAPT Program, medical, and Life Skills) done during the initial workup, a report from a mental health evaluation done within three months of waiver package submission documenting the absence of co-morbid psychiatric pathology and cognitive impairment (e.g. WAIS-R), an aeromedical summary containing salient laboratory values, and required aftercare documentation should be submitted.

The aeromedical summary for <u>initial waiver</u> for alcohol abuse or alcohol dependence should include the following:
A. Aeromedical summary containing a physical and 2 sets of laboratory values (BAT, CBC with MCV, GGT, SGOT, SGPT, triglycerides, and CDT). Labs should be collected at treatment initiation and just before waiver submission. The summary should also address work performance, peer relationships, family and marital relationships, psychosocial stressors, attitude toward recovery, abstinence, AA or other approved alcohol recovery program attendance, and mental status examination.
B. Copy of alcoholism treatment program summary (first time only).
C. ADAPT statements documenting aftercare and AA or other approved alcohol recovery program attendance.
D. Copy of annual psychiatrist/psychologist examination while in aftercare.
E. Letter of recommendation from individual's commanding officer.
F. Copy of signed abstinence letter (Initial and renewal waiver requests must have a signed abstinence statement included as an AIMWTS attachment). In the abstinence letter, the individual states in writing that he or she understands that, if granted, the waiver is valid only if total abstinence from alcohol is maintained. A verifiable break in abstinence once the waiver period has begun is medically disqualifying. The abstinence letter should be signed and dated immediately upon the individual expressing intent to return to flying status.

Note: There is no formal waiver provision for FC I/IA and initial FC II or FC IIU. If the waiver authority deems it appropriate, a waiver may be considered on a case by case basis only.

The aeromedical summary for <u>waiver renewal</u> for alcohol abuse or alcohol dependence should include the following:
A. Aeromedical Summary - interim history since last waiver.
B. Flight surgeon summary of any interim alcohol-related therapy to include ADAPT and laboratory results as above drawn at time of AMS.
C. Consultations from any providers evaluating member for alcohol problems or assessing them for history of same.
D. Copy of signed abstinence letter (Initial and renewal waiver requests must have a signed abstinence statement included as an AIMWTS attachment). In the abstinence letter, the individual states in writing that he or she understands that, if granted, the waiver is valid only if total abstinence from alcohol is maintained. A verifiable break in abstinence once the waiver period has begun is medically disqualifying. The abstinence letter should be signed and dated immediately upon the individual expressing intent to return to flying status.

ICD 9 codes for alcohol abuse and dependence	
305	Alcohol Abuse
303.9	Alcohol Dependence

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WAIVER GUIDE
Updated: Feb 2010
Supersedes Waiver Guide of Nov 2006
By: LtCol Valerie Johnson (RAM 10) and Dr Dan Van Syoc

CONDITION:
Allergic Rhinitis (Feb 10)

I. Overview.

Allergic rhinitis is usually considered a relatively minor health condition. However, it can result in major adverse effects in aviators in light of the unique environmental and physical stresses of flight. It is the most common of allergic disorders, affecting an estimated 20 to 40 million people in the United States and up to 30% of adults worldwide[1, 2]. For the average person, allergic rhinitis is a nuisance; for aircrew it can be a serious and potentially fatal condition. For the period from 1980 to 1981, allergic rhinitis represented 2% of disqualifying defects in a study of 304 USAF aircrew removed from flying status and 9% of disqualifications in the 20-29 year age group[3]. A similar study in the US Army aviation corps demonstrated a 2.2% rejection rate for initial flying training and 0.8% disqualification of trained aviators[4]. Additionally, in a population of US Army female aviator applicants between 1987 and 1990, 4.1% were disqualified due to allergic rhinitis[5]. Qualified aircrew can also be adversely affected by allergic rhinitis; the condition can diminish active flying operations and readiness through temporary flying duty restrictions. One study at a US Coast Guard air station found 5.7% of total days restricted attributed to allergic causes (allergic rhinitis and asthma)[6]. Currently, the modes of therapy acceptable for flying duty (intranasal steroids and mast-cell stabilizers, some second-generation antihistamines, leukotriene modifier [montelukast] and immunotherapy) are generally effective. However, the actual impact of allergic rhinitis on mission effectiveness in terms of temporary flying duty restriction is unknown.

Allergic rhinitis often occurs seasonally in direct response to elevated airborne pollens but can also exist perennially. A family history of allergies is often present. The symptoms of common "hay fever" include nasal pruritus, congestion, rhinorrhea, sneezing, eye irritation and pruritus, and coughing. Clinical findings include edematous or inflamed nasal mucosa, increased nasal secretion (which is typically clear), and conjunctival edema and erythema. Difficult cases may require skin tests to allergens and examination of nasal secretions for eosinophilia. However, in most cases the appropriate diagnosis can be made on the basis of a careful medical history, thorough clinical exam, and a documented response to appropriate therapeutic intervention. The differential diagnosis includes viral upper respiratory infection (URI), non-allergic rhinitis, sinusitis and side effects of medications including ovarian hormones and nonsteroidal anti-inflammatory agents. Abuse of decongestant nasal sprays and anatomic deformity should also be excluded as a cause of chronic congestion and obstruction. In cases of prolonged or moderate to severe symptoms a formal allergy consultation may be appropriate.[1, 2, 7]

Topical drug therapy for mild to moderate symptoms of allergic rhinitis consists of intranasal delivery of topical steroids or cromolyn sodium. The steroids act as local anti-inflammatory agents and cromolyn stabilizes mast cells. These agents are very effective but may take several days to reach the desired effect. Intranasal steroids are widely accepted as the most effective and preferred first-line treatment for allergic rhinitis. Oral antihistamines are another choice for acute and chronic control of allergic rhinitis. Antihistamines competitively inhibit binding of histamine to H_1

receptors. Fexofenadine (Allegra®), or loratadine (Claritin®) (10mg dose only) are the only aeromedically approved second-generation antihistamines. Because these medications are larger molecules they do not cross the blood-brain barrier and are considered non-sedating antihistamines. Loratadine at doses higher then 10mg per day can cross the blood-brain barrier and is therefore not approved at these doses for use in USAF aviators. Montelukast (Singulair®) has shown modest control of allergic rhinitis and is a safe drug. If a patient responds poorly to nasal spray, antihistamines or montelukast, immunotherapy may then be considered. Immunotherapy carries a higher risk of serious adverse reaction and the initiation and maintenance of treatment are more complicated than with nasal spray or antihistamine.[8, 9, 10]

II. Aeromedical Concerns.

Potential hazards include: ear and sinus barotrauma with potential in-flight incapacitation; airway compromise; discomfort and distraction; reduced sense of smell; and possible use of easily accessible, unauthorized over the counter medication. Symptomatic allergies with sneezing could be a particular hazard in high speed, low level flight. Barotrauma as well as infectious complications can lead to prolonged periods of flying restriction, reducing operational effectiveness and mission effectiveness.

Antihistamines may adversely influence cognition and performance; hence, ground testing prior to acceptance for operational use is required[11]. Idiosyncratic reactions need to be excluded for any selected mode of therapy. Additionally, symptomatic control should be achieved. Because of the risk of an allergic reaction to an immunotherapy injection, the flyer should remain in the physician's office for approximately 30 minutes post-injection. DNIF is required until potential idiosyncratic reaction is ruled out and adequate control is maintained before submission for a waiver. Once a waiver has been granted a 4-hour verbal DNIF is required for aircrew after each injection. DNIF is not required for ground operations. Aircrew will not deploy on immunotherapy.

	DNIF Duration
	Rule out idiosyncratic reaction and ensure all symptoms are resolved
Claritin	Minimum 72 hours
Allegra	Minimum 72 hours
Nasal Steroids	Time required for symptom control
Cromolyn Sodium	Time required for symptom control
Montelukast	Time required for symptom control
Immunotherapy	Symptom control and 4hr verbal DNIF after each injection

III. Waiver Consideration.

Historically, the waiver approval rate for allergic rhinitis has exceeded 99%. The AFMOA Policy Letter, "Nasal Steroids and Nasal Cromolyn Sodium Use in Aviators", dated May 2001, approved the use of topical nasal steroids or cromolyn for the treatment of mild allergic, non-allergic or vasomotor rhinitis without a waiver[12]. The length of DNIF is dictated by the time required for control of underlying symptoms. In July 2004, the HQ USAF/SGOP Policy Letter, "Medication Changes for Aviators and Special Duty Personnel", approved the use of loratadine (Claritin®) or fexofenadine (Allegra®) for the treatment of mild allergic rhinitis without a waiver[13]. A minimum of 72 hours as a ground trial at initiation of therapy to ensure adequate symptom control and to exclude idiosyncratic reactions is required. Loratadine is limited to a maximum dosage of 10 mg per day. In Sep 2006, the ACS released a memorandum for AFMOA in support of the leukotriene modifier, montelukast, for use in allergic rhinitis. However, despite its favorable safety profile, local waiver delegation was not recommended because its primary indication is for asthma[14].

IAW AFI 48-123, a waiver is required for FC II, IIU and III duties for allergic rhinitis unless it is mild in degree. For seasonal cases only requiring approved antihistamines, montelukast, or nasal steroids, a waiver is not required. A waiver for medical therapy is necessary only for the use of immunotherapy (desensitization) and these will not be indefinite.

A verified history of allergic, non-allergic and vasomotor rhinitis after age 12, unless symptoms are mild and controlled by a single approved medication, is disqualifying for FC I/IA. Therefore, a waiver is required for FC I and IA duties for allergic rhinitis successfully treated with one of the following: an approved second-generation antihistamines, topical medications, montelukast or immunotherapy.

The use of Claritin-D® or Allegra-D® is not approved for flying duties.

Table 1: Waiver potential for allergic rhinitis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation or Review
I/IA*#	Allergic Rhinitis	Yes α AETC	At the request of AETC
II*#	Allergic Rhinitis	Yes MAJCOM	At the request of MAJCOM
IIU*#	Allergic Rhinitis	Yes AFMSA	At the request of AFMSA
III*#	Allergic Rhinitis	Yes MAJCOM	At the request of MAJCOM

α No requirement for FCI/IA waiver for allergic rhinitis or history of same after age 12, history of completed immunotherapy for allergic rhinitis, if symptoms are mild and controlled on a single approved medication.
*All medication usage must be in accordance with the most recent Air Force Approved Aircrew Medications list.
Indefinite waiver appropriate for all cases except those requiring immunotherapy or montelukast.

A review of AIMWTS in October 2009 revealed 1,049 submitted cases with a history of allergic rhinitis. There were 169 FC I cases, 478 FC II cases and 402 FC III cases. There were a total of 54 disqualifications. Of those disqualified, 14 (26%) were trained assets. None of the disqualifications were due to the allergic rhinitis but rather some other medical or administrative condition.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Aeromedical summary for initial waiver for allergic rhinitis should include the following:
A. History of symptoms: dates, treatments (to include any possible skin testing and allergy shots) and effect of symptoms on everyday life and job.
B. Physical examination with emphasis on ears, nose, eyes, pharynx and lungs.
C. Use of an approved treatment.

- montelukast (waiver required for FC I, IA, II, IIU and III**)**
- immunotherapy (waiver required for FC I, IA, II, IIU and III)

D. Consultation report from allergy provider. If the history is remote (no symptoms for at least one year), it is reasonable to only require a good synopsis of the problem.
E. Documentation that symptoms greatly improved or resolved on therapy and that there are no side effects from therapy.

Aeromedical summary for waiver renewal for allergic rhinitis should include the following:
A. Interval history since last waiver submittal; document impact of AR on everyday life and job.
B. Physical examination as above
C. Consultation report from allergy provider.

ICD 9 code for Allergic Rhinitis	
477	Allergic Rhinitis

Reviewed by LtCol Charles N Webb, AF/SG consultant for Allergy/Immunology.

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WAIVER GUIDE
Updated: Jun 2012
Supersedes Waiver Guide of Dec 2008
By: Dr Dan Van Syoc
Reviewed by Col Erika Struble, AF/SG consultant for Hematology/Oncology

CONDITION:
Anemia/Blood Loss/Bone Marrow Donation (Jun 12)

I. Overview.

Anemia is a common problem affecting much of the world's population, especially in developing countries.[1] It is one of the common problems in outpatient medicine; it was the primary diagnosis in 5.5 million patients in 2006.[2] It is defined simply as a decrease in the individual's hemoglobin from their baseline.[3] In most cases, anemia is defined more specifically as a value more than 2 standard deviations below the mean. This equates to hemoglobin < 13.5 g/dL or a hematocrit < 41.0 in men, and <12.0 g/dL and < 36.0 for women.[4] Half of all cases worldwide are due to iron deficiency, particularly in the very young, those with poor nutrition, and women of childbearing age.[5] For American women ages 20-49, the prevalence is estimated to be as high as 11%.[11] Other less common etiologies include hemoglobinopathies, abnormal red cell membranes, and disturbed B_{12} or folate absorption.[6]

Blood loss can be caused by internal or external hemorrhage as well as blood donation. Occult bleeding can be difficult to evaluate in many people. Other causes of iron deficiency include decreased iron absorption, certain foods and medications, celiac disease, and other more uncommon causes such as intravascular hemolysis and pulmonary hemosiderosis.[7] Aside from hemorrhage, cases of anemia can be categorized as either hypoproliferative (impaired blood cell production) or hyperproliferative (hemolytic).[8] Blood donation is a common practice and is, in fact, promoted to the general and military populations through programs sponsored by the American Red Cross and Armed Services Blood Program. If an aircrew member is interested in platelet or plasma donation, it needs to be noted that this procedure (apheresis) can involve up to 800 ml in volume loss. As there is also some risk of hypocalcemia with this procedure, the member needs to be in a DNIF status for 72 hours after completion of the apheresis.

Iron deficiency anemia is theoretically simple to treat with medicinal iron supplementation. There are three available iron salts and these can be administered in via tablet or elixir. Absorption of the iron inhibited or enhanced by patient variables such as gastric acidity and use of other medications such as antacids. More recent studies on iron supplementation are stressing the importance of patient participation in their own care by helping their provider to identify a tolerable dose and dosing schedule.[9]

Bone marrow donation is also known as Stem Cell Harvest or Peripheral Blood Stem Cell Harvest. Civilians and military members may volunteer to donate bone marrow for either matched relatives or donor matches through the National Marrow Donor Program or C.W. Bill Young Department of Defense Marrow Donor Program (for more information, go to www.dodmarrow.org/ or www.dodmarrow.org/Pages/about/about_program.htm).

II. Aeromedical Concerns.

Irrespective of the cause, anemia or blood volume loss can reduce tissue oxygenation and compromise organ function manifesting as fatigue, generalized weakness, decreased stamina, lightheadedness, chest pain, and decreased Gz tolerance. Physical exertion and hypoxia can further compromise function and overwhelm the body's capacity to compensate for the anemia. In younger patients, these symptoms may not be recognized until the hemoglobin is less than 7 or 8 g/dL[3]. More elderly patients may recognize these symptoms at hemoglobin levels of 9 to 11 g/dL while patients with chronic disease or gradual loss of red cell mass may report being asymptomatic at levels down to 5 to 6 g/dL. These clinical observations are based on patient data usually at low altitudes without extreme occupational exposures or duties.

For a patient with any baseline hemoglobin level, the above-noted symptoms will be more pronounced in the setting of acute blood loss, particularly if it is accompanied by loss of intravascular blood volume. A patient may tolerate up to 20% of acute blood volume loss with no cardiovascular compromise.[10] In a recent study, it was found that the body replaces blood volume at an average of 36 days following a 550 cc whole blood donation.[11] One study compared the changes in cardiovascular parameters and symptoms between donors who underwent sham, 1-unit, and 2-unit blood donations.[12] There were no statistically significant differences between the groups. Nonetheless, it is still important to ensure that aviators do not exhibit any signs or symptoms of anemia. As a result, acute blood loss between 200-400ml (including blood donation) requires grounding for at least 72 hours. When the flyer is clinically stable and otherwise fit for returning to flying duties, there is no reason to get labs following blood loss less than 400 ml or blood donation. As long as the flyer is feeling well, there is almost never a need to visit the FSO before resuming aviation duties.

Bone marrow (Stem Cell) donation is a more involved process than blood donation. Marrow may be donated via two methods. The first method involves actual harvest of stem cells from the donor bone marrow. In this method, patients are admitted to the hospital and may stay anywhere from 8 to 36 hours.[13] Marrow is collected from the posterior-superior iliac spines or the sternum. The most common post-procedure symptoms include pain at the donor site (77%), fatigue (38%), nausea (25%), vomiting requiring intravenous medications (8%), and fever (5%). In order to accelerate recovery, some patients will choose to have autologous blood transfusions, but the overwhelming majority of patients never need a transfusion of any kind after donating bone marrow. Most women and some men also take oral iron replacement upon discharge. Pain resolves, on average, in 5.5 days with a range of 1 to 25 days. Full recovery of pre-procedure hemoglobin levels was observed at 3 months for males and 1 month for females. The authors noted that more females took iron supplementation than males in that study.

A second technique of bone marrow stem cell collection is peripheral blood stem cell (PBSC) apheresis.[5] PBSC apheresis is accomplished in an outpatient setting. With this collection method, the donor is given granulocyte colony-stimulating factors (GCSF) approximately one week before the collection. Once the donor's WBC count is sufficiently raised, stem cells are harvested from either an IV placed in the donor's arms or through a central catheter placed in the chest wall. The collection, similar in nature to a platelet donation, can usually be completed in 1-2 apheresis settings. The donor has minimal discomfort with this procedure and the side effects are limited to those of the GCSF administration. There is no prolonged anemia or recovery. The donor may have an elevated WBC for a few weeks following the donation.

Fliers who donate bone marrow should be DNIF until the following parameters have been met:

- surgical site has healed
- they deny any distracting pain
- stable follow-up hematocrit is above 32

Oral iron supplements are compatible with flying status after successful ground testing. Iron injections may be administered to flying personnel while they are DNIF. No waiver is required following bone marrow donation.

III. Waiver Consideration.

Anemia is disqualifying for all FC I/IA, II, and III individuals, as well as all ATC/GBC personnel. For RPA personnel, symptomatic anemia would be disqualifying for duties; mild/asymptomatic anemia may be considered for waiver. For SMOD personnel, anemia is disqualifying if it is symptomatic or is of a hemolytic variety. Evaluations are recommended for hematocrit values below 40% in men and 35% in women. The exact nature of the work-up should be guided by a thorough history and physical but typically should include a complete blood cell count with red blood cell indices, peripheral smear, and reticulocyte count. Results from these may indicate the need for evaluation of iron or B_{12} stores, hemoglobin electrophoresis, or possibly bone marrow biopsy. AFI 48-123 also addresses the issue of platelet donation which would also apply to plasma donation; loss of 200 cc or more of blood is disqualifying for at least 72 hours. Platelet pheresis is disqualifying for 72 hours. For FC IIU personnel, follow the 8-hour restriction guidelines for GBC personnel as outlined in AFI 48-123, 6.46.11.2.

Table 1: Waiver potential for anemia*

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS review/evaluation**
I/IA Untrained II/III/ATC	Yes AETC	Maybe+
II/III	Yes MAJCOM	Maybe+
ATC/GBC	Yes MAJCOM	No
SMOD	Yes AFSPC or GSC	No

*anemia excluding thalassemia and sickle cell
+ACS review appropriate for any situation that needs further explanation or that the waiver authority wishes to have reviewed.

AIMWITS search in March 2012 revealed a total of 827 cases of anemia with an aeromedical disposition; there were a total of 57 disqualifications in this group. Breakdown of the cases was as follows: 65 FC I/IA cases (5 disqualifications), 95 FC II cases (10 disqualifications), 437 FC III cases (33 disqualifications), 226 ATC/GBC cases (9 disqualifications) and 4 SMOD cases (0 disqualifications). Most of the FC III disqualifications were initial exams and the majority of the rest of the cases were disqualified for a diagnosis other than anemia.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Unless the waiver is for a chronic condition, most of these waivers would be expected to be indefinite.

The AMS for an anemia waiver (initial or renewal) should include the following:
A. Complete history of the anemia event to include all treatments.
B. Current labs to include complete blood cell count with red blood cell indices, peripheral smear, and reticulocyte count.
C. Any consultation reports and special studies as applicable.

ICD9 Codes for Anemia, Blood Loss, and Marrow Donations	
280	Iron Deficiency Anemia
281	Other deficiency anemias
282	Hereditary hemolytic anemias
283	Acquired hemolytic anemias
284	Aplastic anemia & other bone marrow failure syndromes
285	Other and unspecified anemias

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WAIVER GUIDE
Updated: June 09
Supersedes Waiver Guide of Mar 99
By: LtCol Bradford J Williams (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Ankylosing Spondylitis (Jun 09)

I. Overview.

Ankylosing spondylitis (AS), the most common of the spondyloarthritides, is a chronic inflammatory disease principally involving the hips and axial skeleton. The name for the disorder is derived from the Greek root "ankylos", which means bent or crooked and "spondylos", which refers to a vertebra. The term "ankylosis" therefore refers to a fibrous or bony bridging of joints. In the spine this includes bridging of one or more intervertebral discs[1]. AS typically has an insidious onset, can have extra-articular manifestations, and is diagnosed based on clinical suspicion supported by imaging techniques and associated human leukocyte antigen HLA-B27[2]. It also must be differentiated from other types of seronegative spondyloarthropathies, systemic inflammatory arthritis, as well as mechanical and degenerative causes of back pain.

AS commonly affects young adults as evidenced by the peak age of onset being 20 to 30 years. The male to female ratio is approximately 2 to 3:1. Among Caucasians, the estimated prevalence rate of AS, as defined by the modified New York criteria, ranges from 68 per 100,000 population older than 20 years in the Netherlands, to 197 per 100,000 in the United States[3]. In the general population, AS is likely to develop in about 1% to 2% of HLA-B27–positive adults who have a disease-associated B27 subtype, although there may be regional or geographic differences. For example, in northern Norway, AS may develop in 6.7% of HLA-B27–positive people[4]. The disease is much more common among HLA-B27–positive, first-degree relatives. Of HLA-B27–positive AS patients, roughly 10% to 30% of them have signs or symptoms of AS[3]. The prevalence of AS in working adults with back pain of greater than three weeks duration was 4.6% in one study[5]. Thus, if the patient has at least one first degree relative with AS and given that the patient is positive for HLA-B27, a presumptive diagnosis of AS is reasonable.

AS can also present with the nonspecific symptoms of low-grade fever, fatigue and weight loss. Non-skeletal involvement frequently occurs, including acute anterior uveitis; neurologic symptoms resulting from fractured spine, atlantoaxial subluxation, cauda equina syndrome and costovertebral rigidity; aortic regurgitation; IgA nephropathy and secondary amyloidosis; ileal and colonic mucosal ulcerations; and osteopenia[7].

<u>Diagnosis and Treatment</u>:

Because AS has an insidious onset, the diagnosis is based on a high index of clinical suspicion and supported with a judicious use of imaging, laboratory testing along with a therapeutic trial of NSAIDs. Signs and symptoms suggestive of inflammatory back pain include: onset prior to age 40, insidious onset, symptoms persisting longer than three months, morning stiffness, and improvement with exercise. The presence of four of the five above has a sensitivity and specificity of up to 75 percent[6].

Range of Motion (ROM) Measurement:

Assessment of ROM of the lumbar spine is a key clinical finding. The modified Schober test is one accepted method to assess lumbar spine ROM by measuring the forward flexion of the spine in a patient with suspected AS. The test is performed with the patient standing erect; a mark is made over the spinous process of the 5th lumbar vertebra or the imaginary line joining the posterior superior iliac spine and another mark is made 10 centimeters above this mark in the midline. In a patient with no lumbar spine motility abnormalities, the measured distance between the two points should increase by 5 cm when the patient bends forward to touch his toes while keeping the knees locked. The severity of cervical flexion deformity can be assessed using the Flesche test. While the patient is standing erect, the heels and buttock are placed against the wall. The patient is instructed to extend his neck in order to touch the wall. The distance between the occiput and the wall is a measure of the degree of cervical flexion deformity[8]. In addition, assessment of chest wall expansion, loss of cervical lordosis, sacroiliac joint tenderness, hip and peripheral joint involvement are important indicators of range of motion abnormalities.

Serological Testing:

Testing for C-reactive protein and HLA-B27 can help to support the clinical picture, but caution is advised as these tests should not be used as screening tests, that is, the value of either positive or negative results is only realized when the test is applied in the appropriate clinical setting. A history of chronic, inflammatory low back stiffness, elevated ESR, positive C-reactive protein with a positive HLA-B27 in an otherwise healthy young male with a familial history of inflammatory back stiffness supports a diagnosis of AS[7]. The finding of a negative HLA-B27 in the same clinical setting reduces the likelihood of AS to 1 in 20 (5%). Likewise, the indiscriminate use of additional serologic assays (i.e. "the rheumatology lab panel"), in search of alternative diagnoses, is further discouraged. Serologic studies must be carefully chosen based on the constellation of the presenting history and physical exam features.

Imaging Studies:

A CT of the sacroiliac (SI) joints will visualize bony changes better than plain radiographs; it will not detect early acute inflammatory changes in the bone marrow and it exposes the patient to a relatively high dose of gonadal radiation. Ultrasound is not currently recommended for the evaluation of AS[5]. Plain films can be used to follow clinical progression[8]. Though AS usually manifests as a spinal disease, chronic changes in peripheral joints can occur in about 25 percent of patients. In the presence of chronic, inflammatory back symptoms and a physical exam consistent with the same, screening plain radiographs of the SI joints and lumbosacral spine are recommended.

Treatment:

The use of NSAIDs and physical therapy are the mainstays of treatment in AS. This approach is both therapeutic and diagnostic. The goal of treatment is to provide symptomatic relief, restore function, prevent joint damage and spinal fusion, minimize extra-spinal and extra-articular disease, and prevent complications of spinal disease. The majority of AS patients using NSAIDs experience relief of symptoms. Regardless of the NSAID used, the maximum dose is usually required, taken daily for at least two weeks, and the NSAID must be on the list of approved medications for aviators[9]. Anti-TNF-alpha agents can also be used in patients with a firm clinical diagnosis of AS

with moderate to severe spinal disease who have not responded to NSAIDs[3, 12]. In advanced cases surgery may be required such as total hip replacement and/or spinal or cervical fusion[1]. Smoking cessation is recommended due to the detrimental effect COPD can have on the restrictive lung disease secondary to limited costovertebral joint motility[9].

II. Aeromedical Concerns.

In aviators with AS, cramped cockpit conditions for prolonged periods may be poorly tolerated. There may be functional limitations in all aircraft, especially in high performance aircraft and flying in typical cockpits may exacerbate eventual disability. Typical AS symptoms are incompatible with ejection and special duty that would require parachute qualification or other skill sets that may subject the service member to impact forces. The cervical and lumbosacral limitations of AS may also interfere with emergency ground egress and can limit vision due to restricted neck motion. Concomitant uveitis/iritis occurs in up to 25% of cases. The development of most of the extra-articular manifestations in AS are disqualifying, and chronic treatment with NSAIDs and tumor necrosis factor alpha antagonists is disqualifying, but can be considered for a waiver on a case-by-case basis.

III. Waiver Consideration.

AS is disqualifying for all classes of flying.

Table 1 – Waiver Potential for AS for FC I/IA, FC II and FC III[6]

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	AS, with or without extra articular disease	No AETC	No
II	AS, without extra articular involvement	Maybe*+ MAJCOM	Yes
	AS with extra articular involvement	Maybe*+ MAJCOM	Yes
III	AS, without extra articular involvement	Maybe*+ MAJCOM	Yes
	AS with extra articular involvement	Maybe*+ MAJCOM	Yes

* Waiver possible with documentation of treatment and resolution of symptoms.
+ MEB required first if individual experiences occupational limitations or absences from duty because of recurrence of symptoms.

Review of AIMWTS through mid January 2009 revealed a total 13 cases of AS submitted for consideration of a waiver. There were no 0 FC I/IA cases, seven FC II and six FC III cases. Of the 13 cases, eight were approved for a waiver. Five of the cases were disqualified for AS or AS with complications of AS. In the FC II category, three were disqualified and in the FC III category, two were disqualified.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver should include:
A. Detailed history: onset, time course, joints and/or extra-articular involvement, extra-articular manifestations, medication and side effects and activity level. Also discuss fully any other diagnoses requiring a waiver.
B. Physical exam: joints; extra-articular tissues involved, eyes, kidneys, and heart.
C. Rheumatology consult report.
D. Ophthalmology/optometry consult if eyes involved.
E. Laboratory: complete blood count (CBC), comprehensive metabolic panel (because of NSAID use), HLA B-27 serology, urinalysis, erythrocyte sedimentation rate (ESR)/C-reactive protein (CRP).
F. Radiographs: baseline of involved levels of spine to include SI joints (Ferguson views).
G. Current echocardiogram and cardiology consult if cardiac valves involved.
I. Medical evaluation board results, if required.

The aeromedical summary for waiver renewal should include:
A. Interim history.
B. Physical exam: thorough exam to include any extra-articular involved sites.
C. Rheumatology consult report.
D. Echocardiogram if indicated.

ICD-9 Code for Ankylosing Spondylitis	
720.0	Ankylosing Spondylitis

Reviewed by AF/SG Consultant for Rheumatology, Col William Venanzi and LtCol Juan Garza, staff Rheumatologist at WHMC.

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WAIVER GUIDE
Initial Version: Mar 2010
By: Capt Ryan Davis and LtCol Richard Rubin (ACS Staff) and Dr Dan Van Syoc
Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

CONDITION:
Anterior Ischemic Optic Neuropathy (AION) (Mar 10)

I. Overview

Anterior ischemic optic neuropathy (AION), which presents with acute, painless visual loss, is the most common acute optic nerve event after age 45 and can result in degradation of visual acuity, visual field, stereopsis, and color vision.[1] AION is divided into arteritic (A-AION) and non-arteritic (NA-AION) anterior ischemic optic neuropathy, depending on the pathogenesis. A-AION is caused by temporal arteritis (giant-cell arteritis), and is characterized by inflammation of medium to large arteries. NA-AION is characterized by optic disc ischemia (hypoxia), associated with small vessel disease, and can be exacerbated by elevated intraocular pressure (IOP) and/or decreased perfusion pressure.

The distinction between A-AION and NA-AION is important, because A-AION is an ocular emergency, requiring emergent intravenous corticosteroid administration and referral to an ophthalmologist to prevent permanent sequelae and contralateral vision loss. As A-AION is a disease primarily in individuals over the age of 65, this waiver guide will restrict discussion of AION to NA-AION.

Table 1 - Arteritic vs. Non-arteritic Ischemic Optic Neuropathy

	A-AION	**NA-AION**
Age	≥65 years	≥45 years
Sex	Female > Male	Female = Male
Other Symptoms	Jaw claudication, scalp tenderness, headache	None
Visual acuity	<20/100 in >60% of cases	>20/100 in >60% of cases
Disc findings	Pale, edematous; normal cup	Pale or initially hyperemic and edematous; small cup
Erythrocyte Sedimentation Rate (ESR)	Often elevated (Mean, 70 mm/hr)	Usually normal (Mean, 20-40 mm/hr)
Fluorescein Angiography	Disc and choroid delay	Disc delay only
Natural history	Rarely improve; fellow eye 54-95%	16%-42.7% improve; fellow eye 12%-19%
Treatment	Systemic steroids	None proven.

Adapted from American Academy of Ophthalmology, Basic and Clinical Science Course. Neuro-Ophthalmology. 2007-2008 and Handbook of Treatment in Neuro-ophthalmology 1997.

Hayreh (2009) defined ocular blood flow as the perfusion pressure divided by the resistance to flow, where the perfusion pressure is calculated by subtracting the intraocular pressure from the mean blood pressure. Ocular nerve head blood flow is intrinsically dependent on three factors: blood pressure, IOP, and the resistance to blood flow. Any change in one of these factors can lead to

hypoperfusion of the disc and NA-AION. Nocturnal hypotension is thought to be a significant contributing factor, as 73% of patients report noticing the visual loss upon awakening in the morning.[2] However, any condition that decreases ocular blood flow, including a sharp rise in IOP or transient drop in perfusion pressure, can precipitate NA-AION. Phosphodiesterase inhibitors have been implicated in some cases of NA-AION, probably due to their systemic hypotensive effects, but a definitive causal link has yet to be made.[3, 4] Nonarteritic anterior and posterior ischemic optic neuropathies have been described following surgical cases in which the systolic blood pressure was deliberately maintained between 85 and 100 mm Hg for prolonged periods to reduce blood loss, such as during spinal surgeries.[5]

A significant risk factor for NA-AION is a small, crowded optic disc, the so-called "disc-at-risk."[2,6] Hyperopia has also been mentioned as a possible risk factor for the development of NA-AION. This is presumably due to a smaller scleral canal associated with optic nerve head crowding in the hyperopic eye.[7] It is believed that a congenitally small disc may predispose individuals to NA-AION by crowding all the nerve axons into a smaller space, which results in less of an ability to compensate for decreased perfusion pressure, axonal swelling, and interruption of axoplasmic flow.[2, 8] Whereas a normal sized disc and cup might be more capable of accommodating swollen axons without causing secondary compression of adjacent axons and capillaries, swollen axons in a congenitally small disc, with little or no cupping, is believed to secondarily compress intervening capillaries supplying the nerve head and adjacent axons leading to a vicious cycle of ischemia and disruption of axoplasmic flow.[2] Other risk factors for NA-AION include arterial hypertension, nocturnal arterial hypotension, sleep apnea, diabetes mellitus, ischemic heart disease, hyperlipidemia, smoking, atherosclerosis and arteriosclerosis.[9, 10] In addition to the conditions associated with small vessel arteriosclerosis, small vessel vasculitis and hyperviscosity syndromes, such as systemic lupus erythematosis or antiphospholipid syndromes, can be a risk factor. The reason that NA-AION does not typically occur earlier in life, despite the presence of a "disc-at-risk," is that small vessel disease generally does not significantly develop until after middle age. Thus, NA-AION occurring in a younger person should look for the less common causes such as small vessel vasculitis or hyperviscosity syndromes.

Fellow eye involvement occurs in 14.7% of patients after being diagnosed with unilateral NA-AION with a median follow-up of 5.1 years.[11] This is in contrast to 54%-95% of fellow eye involvement in A-AION.[6]

Acute elevations in intraocular pressure can initiate the cycle of ischemia in NA-AION. This elevation can be due to angle-closure glaucoma or as a side effect from ocular medications, notably topical steroids. Complications from ocular steroid use have been clearly outlined. Review of the literature reveals that 18-40% of individuals in the general population are "steroid-responders" and experience acute elevation of IOP's after several weeks of topical ocular steroid use.[12, 13] This percentage increases to 46-92% in patients previously diagnosed with primary open-angle glaucoma.[13] Overall, 12-25% of refractive surgery patients have increased IOP measurements of 24 mm Hg or greater if topical steroids are used post-operatively.[14] It is believed that IOP increases because of steroid induced morphologic and functional changes in the trabecular meshwork.[12] Any visual changes in patients on topical ocular steroids should be thoroughly evaluated by an ophthalmologist emergently, with pressure reduction medications initiated if so indicated.

The etiology of NA-ION makes it susceptible to risks associated with the aviation environment. Currently, there are no known studies documenting an increased risk in aircrew with a "disc-at-risk," but there have been cases seen at the ACS of "discs-at-risk" becoming ischemic from relative hypoxia at altitude, suspected DCS, and with high gravitational forces.[15, 16] Due to the theoretical risk associated with repeated exposure to high gravitational forces and depressurized cabin environments on NA-AION susceptible nerves, restriction to flying non-high performance aircraft and to cabin altitudes of less than 8000 feet is usually recommended. (Note: Recurrence of NA-AION in a previously affected eye is uncommon, but can occur when the initial ischemic event resulted in minimal damage, most often when visual acuity remains normal).

Currently there are limited therapeutic options for NA-AION. IOP reduction can prevent further damage to the optic nerve, especially if the NA-AION is due to acutely elevated pressures. Systemic corticosteroid therapy has recently been shown to increase the probability of visual acuity and visual field recovery in NA-AION affected eyes (well-controlled prospective data on oral versus IV corticosteroids are lacking at this time).[17] However, past treatment recommendations, based on initially promising studies, have often been shown to be controversial. For example, surgical decompression was shown to not be effective and may in fact have detrimental effects on patients.[18] Levo-dopa was also suggested to improve visual recovery, but follow-up studies have not uniformly found treatment benefit. Although aspirin is commonly given to reduce the risk of fellow eye involvement, risk reduction remains controversial.[10, 19] Hyperbaric oxygen has been proposed as a potential treatment, but one study found no improvement in those treated for acute NA-AION.[20] There has been suggestion that neuro-protective agents theoretically may help. However, all these proposed treatments have never been uniformly proven, and in fact, may have deleterious side effects.

II. Aeromedical Concerns

The primary aeromedical concerns with anterior ischemic optic neuropathy are final visual acuity, permanent visual field deficits, loss of stereopsis, and other permanent visual sequelae. Even if vision is adequately restored, the underlying systemic conditions may pose potential serious risks to safe flight. Therefore, investigation of any underlying causes or risk factors is critical to both management and aeromedical disposition.

III. Waiver Considerations

Both non-arteritic and arteritic anterior ischemic optic neuropathies are disqualifying for FC I, IA, II, IIU, and III duties. AFI 48-123 states that the following are disqualifying for aviation service: "Optic neuropathy." An ACS evaluation is required for all initial waivers for anterior ischemic optic neuropathy. The probability of waiver approval is dependent on the final visual acuity, visual field and absence of other significant pathology or complications. Any underlying contributing pathology must also be waiverable for the individual to be returned to flight status. For waiver renewals, ACS review is required. Depending on the results of local work-up, an ACS evaluation may be required prior to waiver renewal.

Table 2: Anterior Ischemic Optic Neuropathy

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	AION resolved without residua	No AETC	No
	AION with residual visual defects	No AETC	No
II	AION resolved without residua	Yes# MAJCOM	Yes
	AION with residual visual defects	Maybe*# MAJCOM	Yes
IIU	AION resolved without residua	Yes# AFMSA	Yes
	AION with residual visual defects	Maybe*# AFMSA	Yes
III	AION resolved without residua	Yes# MAJCOM	Yes
	AION with residual visual defects	Maybe*# MAJCOM	Yes

*Waivers may be considered in aviators with residual visual defects after complete evaluation at the ACS.
#No indefinite waivers.

AIMWTS review in Dec 2009 revealed a total of 12 cases. There were no FC I/IA cases, 9 FC II cases, 1 FC IIU case, and 2 FC III cases. Three cases resulted in a disqualification: two FC II cases and 1 FC III case. Each was disqualified for progressive or recurrent disease.

IV. Information Required for Waiver Submission.

Waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for an initial waiver for AION should include:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History of disease, including treatment modalities attempted.
C. Full ophthalmology exam to include best corrected visual acuities at distance and near, Humphrey visual field 30-2 testing for each eye, stereopsis testing using the OVT (if substandard stereopsis is present, include all tests found in AFI 48-123), and examination of fellow eye with pertinent findings.
D. Any relevant laboratory work-up performed.
E. Diagnostic imaging of the nerve head and peripapillary region; e.g. optic disc photos, optical coherence tomography, etc.

F. Consultation report(s) from all treating eye care specialists.

The aeromedical summary for a waiver renewal for AION should include:

A. Interim history since last waiver and ACS visit.
B. Ongoing treatment modalities.
C. Full ophthalmology exam to include items as noted above.

ICD 9 code for AION	
377.41	Ischemic Optic Neuropathy

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Aug 2007
By: Lt Col Bill Mueller, HQ/AETC Pilot-Physician and Dr. Dan Van Syoc

CONDITION:
Anthropometrics (Short Stature, Excessive Height, Weight, and Other Body Measurements) (Mar 11)

I. Overview.

In March 2003, the Chief of Staff of the Air Force (CSAF) announced a new process to manage CSAF Exception to Policy (ETP) requests for anthropometric waivers. As a result, individuals who do not meet AFI 48-123 anthropometric standards can apply for a categorical waiver to enter flight training. Such categorical waivers would be limited to those aircraft in which the candidate met 'functional fit' and 'safe-escape' standards. The criteria for 'functional fit' would be based on an Air Force Research Lab (AFRL) cockpit anthropometric survey performed in 1997 of all USAF aircraft. The decision for 'safe-escape' would be based on ejection-seat design criteria. The CSAF designated AETC/CC, in coordination with AETC/SG, as the waiver authority for all anthropometric waivers. AETC/CC has delegated this waiver authority to the A2/3/10 Director of Intelligence, Operations, and Nuclear Integration. Standing height, sitting height, and nude body weight are the screening measurements required for all initial Flying Class (FC) I, IA, II and III physicals to determine the need for further anthropometric clearance.

<u>STANDING HEIGHT and SITTING HEIGHT</u>:

For initial FC I/IA, II and III, the standing-height limits are 64-77 inches. If outside this range, the applicant does not meet standing-height standards and may be considered for an anthropometric waiver. FC I applicants have a sitting height requirement of 34-40 inches, while initial FC IA and II applicants have a sitting height requirement of 33-40 inches. If outside this range, the applicant does not meet sitting height standards and may be considered for an anthropometric waiver.

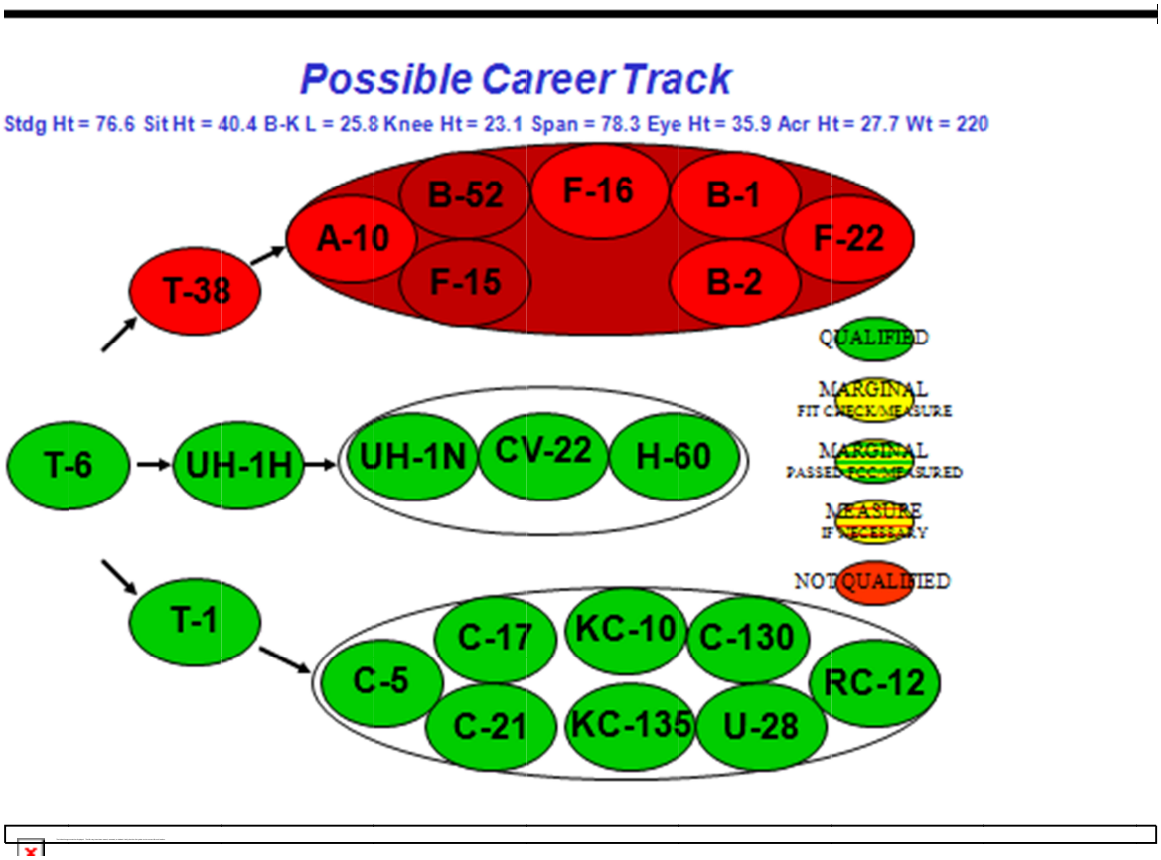
For FC I applicants seeking an anthropometric waiver, eight cardinal anthropometric measurements must be performed at either the USAFA or the Medical Flight Screening (MFS) clinic at USAFSAM. These measurements include: standing height, sitting height, buttock-knee-length, sitting knee height, arm span, sitting eye height, acromial height, and functional reach. These measurements are forwarded to AETC/A3FM and AETC/SGPA for consideration of waiver potential. AETC/SGPA ensures that an aeromedical summary containing the above-mentioned cardinal measurements is entered into AIMWTS. AETC/A3FM enters the cardinal measurements into a Pilot Accommodation Study (PASS) computer program, which derives its data from the above mentioned AFRL study. The PASS program determines "functional fit" for all USAF aircraft as either "safe", "marginal", or "unsafe". Candidates with "marginal" fits can be considered for a "Functional Cockpit Check "(FCC) to determine whether they are capable of meeting physical standards in an actual cockpit.

After receiving any necessary FCC's, AETC/A3FM will make one of three possible waiver recommendations: unconditionally qualified, conditionally qualified for certain aircraft, or

disqualified. This waiver recommendation is coordinated through AETC/SG before final approval from AETC/A2/3/10.

The T-38 is the most restrictive aircraft in the inventory. Since the T-38 is the pipeline aircraft to all fighters and bombers, many categorical anthropometric waivers exclude fighters and bombers (see Figure 1).

Figure 1



For aircrew whose duties could be in an ejection seat aircraft (e.g. F-15E weapons system navigator, flight surgeon, aerial photographer, test flight engineer), sitting height, butt-knee length and weight (discussed in WEIGHT section) must meet the minimum safe ejection seat requirements listed in Table 1. If outside these standards, then a waiver will not be approved for ejection-seat aircraft.

Table 1 – Ejection Seat Safe Escape Standards

MAXIMUM VALUES (inches) *(Minimum sitting height for all ejection seat aircraft is 33")*			
Aircraft	**Butt-Knee Length**	**Sitting Height**	**Weight Limits**
T-6	27.9	41.5	103-245
T-38	30.8	40	103-240
A-10	26.7	43.6	103-245
F-15	27.2	44.1	103-245
F-16	27.1	39.7	103-245
F-22	27.9	43.4	103-245
F-117	28.2	43.5	103-245
B-1	28	44.4	103-245
B-2	30.6	55.3	103-245
B-52	28.4	53	103-245

WEIGHT:

As of the 1 Jul 10 release of AFI 36-2905 (Air Force Fitness Program) there is no longer specific weight criteria which apply to all Air Force members. However, weight criteria do exist for safe-escape standards from ejection-seat aircraft. Specifically, nude body weight must be between 103 and 245 lbs (240 lbs for the T-38). Trained aircrew in ejection seat aircraft who fall outside these limits are placed on DNIF status until they meet standards.

An individual who does not meet weight standards should be evaluated for primary medical causes of the weight gain/loss. If the evaluation rules out a pathologic cause, effective weight control may be obtained by an adequate dietary and physical exercise programs. The Health and Wellness Center (HAWC) is a source for nutrition and physical fitness education as well as behavior modification.

Trained ejection seat aircraft aircrew who do not meet weight standards can be considered for reassignment to a non-ejection seat aircraft. This process is managed by the operational chain of command and does not include a medical waiver for weight.

II. Aeromedical Concerns.

Height and weight extremes are concerns for functional fit and ejection. Functional fit takes into account the aircrew's angle of view over the nose of the aircraft and the ability to reach and actuate all controls. Improper functional fit due to anthropometric limitations can result in the inability to control the aircraft during certain phases of flight. During ejection, excessive height may be associated with increased neck and flail injuries because of positioning to accommodate the individual in the cockpit. Weight and stature also affects the center-of-gravity (CG) specifications of the ejection seat. The thrust mechanisms for ejection act behind the CG of the manned ejection seat. Therefore, low-weight can result in abnormal forward-pitch and interfere man-seat separation

and the parachute-opening sequence. Excessive weight alters the seat-aircraft separation sequence and the CG-parameters designed for the seat.

III. Waiver Considerations.

A waiver is required if the following values are exceeded on the initial flying class physical. There are no anthropometric standards for ATC/GBC and SMOD personnel. FC IIU personnel are required to meet FC II standards.

Table 2: Waiver potential for anthropometric issues

Condition	**FC I**	**FC IA, initial II, and initial III**	**Waiver Potential Waiver Authority**
Height	<64 inches or >77 inches	<64 inches or >77 inches*	Possible‡ AETC/A2/3/10
Sitting height	<34 inches or >40 inches	<33 inches or >40 inches (for initial FC IA and II)	Possible‡ AETC/A2/3/10
Weight and buttock-knee	If outside values of Table 1.	If outside values of Table 1.†	No waiver potential for FC-I and IA. Waiver to fly non-ejection seat aircraft only for all others. AETC/A2/3/10

* Weapons controllers/directors, combat control, pararescue and air battle managers do not require anthropometric waivers).
† Required for fighter track UNT, flight surgeons and any aircrew whose primary duties are in ejection seat aircraft.
‡ FC I waiver eligibility depends on functional fit and safe-escape criteria. FC IA, II, and III waiver eligibility depends on safe-escape criteria only.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

An aeromedical summary for anthropometric waivers should include the following:
A. Required anthropometric measurements for the applicable flying class physical.
B. If weight less than minimum standard, then weight history, review of systems, physical exam and appropriate laboratory work up to determine no disqualifying cause.

V. References.

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WAIVER GUIDE
Updated: Ju1 2011
Supersedes Waiver Guide of Jul 2007
By: Dr. Dan Van Syoc
Reviewed by Col Kent McDonald, ACS Neuropsychiatry branch chief.

CONDITION:
Anxiety Disorders (Jul 11)

I. Overview.

Anxiety disorders are the most prevalent mental health problem in the United States, and are associated with marked distress and functional impairments in multiple domains.[1] These disorders are generally characterized by fear/apprehension, obsessions, fear of loss of control, and physiological symptoms severe enough to interfere with social or occupational functioning.[2] Anxiety is seen in many other psychiatric disorders, but in its benign form, is part of normal emotional experience. Symptomatic anxiety can be constant or nearly so, as in generalized anxiety disorder, or episodic. Episodic spells of anxiety can come on without warning or provocation, as in panic disorder, or predictably in certain situations, as in simple or social phobia. In this case, efforts to avoid the anxiety-provoking stimulus can drastically impact the victim's lifestyle. In obsessive-compulsive disorder, the anxiety can lead to bizarre, ritualized behavior. Acute stress disorder (ASD) and posttraumatic stress disorder (PTSD) are classified as anxiety disorders and involve varied responses of hypervigiliance, hyperarousal, re-experiencing, and avoidance following exposure to extreme or life threatening traumatic stress which persist and may become disabling. PTSD and ASD are discussed separately in the PTSD waiver guide.

<u>Panic Disorder:</u>
The life time prevalence of panic disorder in the US is approximately 4.7% with a female to male ratio of 2 to 1. The first attack usually occurs in late adolescence or the twenties; however later onsets, up to thirties are not uncommon. Panic disorder is characterized by sudden onset of intense apprehension, fear, or terror and by the abrupt development of specific somatic, cognitive and affective symptoms (e.g. chest pain, tachycardia, headaches, dizziness, faintness epigastric pain, shortness of breath, intense fear, fear of going crazy, irrational impulse to run). Symptoms generally last 5 to 15 minutes, rarely up to an hour. Panic attacks often occur at times of significant life stress. The most common complication of panic disorder is agoraphobia, typified by fear of leaving home for the market place or other locations outside the home. Treatment is two fold. The first objective is aimed at interrupting panic attacks with short acting benzodiazepines or instituting cognitive behavioral techniques to prevent a full panic attack. The second is preventing future attacks with the use of long acting benzodiazepines, antidepressants and/or cognitive-behavior therapy. In most cases, panic disorder is a recurrent or chronic disease and few experience complete resolution.[1, 3]

Generalized Anxiety Disorder:

Generalized anxiety disorder (GAD) is the most common anxiety disorder in primary care.[4] The onset of GAD is usually before the age of 25 years and the life time prevalence is 5% with a female to male ratio of 2 to 1.[5] GAD is characterized by excessive worry and anxiety that are difficult to control and cause significant distress and impairment out of proportion to the actual likelihood or impact of the feared situational stressors. It is chronic, with symptoms waxing and waning over time and in response to situational stressors.[6] Also somatic symptoms (e.g. fatigue, muscle tension memory loss, insomnia, indigestion, cramping) are common. Major depression is the most common coexisting psychiatric illness, occurring in almost two-thirds of individuals with this disorder.[5] Panic disorders occur in one fourth of individuals with generalized anxiety disorder and alcohol abuse in more than one-third. Other conditions that may be associated with stress (e.g., irritable bowel syndrome, headaches) may accompany generalized anxiety. Selective serotonin-reuptake inhibitors (SSRIs) and serotonin-norepinephrine-reuptake inhibitors (SNRIs) have largely replaced tricyclic antidepressants and benzodiazepines as first line pharmacologic treatment. Treatment duration is usually 6-12 months. Cognitive behavioral therapy is also used as treatment either alone or in combination with drug therapy.[4]

Specific Phobia:

A phobia is an excessive and unreasonable degree of fear triggered either by exposure to or anticipation of a specific object or circumstance. People with specific phobias realize that their level of fear is excessive, but they still try to avoid any exposure to the object or circumstance. Onset of illness is heralded by the first time the individual experiences the characteristic irrational anxiety. Often, a precipitant may be apparent. Common among the phobias are fears of snakes, spiders, air travel, train travel, being in closed spaces, heights, darkness and storms. On approaching the phobic object the individual experiences extreme anxiety, often accompanied by autonomic arousal such as tachycardia, tremor, diaphoresis and piloerection. Blood-injury phobia appears different from the other phobias. Individuals first have anxiety, tachycardia and hypertension then a parasympathetic response occurs with a drop in blood pressure resulting in "vaso-vagal" syncope. The later the age of onset the more chronic the phobia tends to be; in many cases lifelong. Specific phobias may co-occur with other anxiety, mood, and substance related disorders. For example, in the general population, rates of co-occurrence with other disorders range from 50 to 80%. Predisposing factors to a specific phobia include traumatic events, unexpected panic attacks, and information transmission (e.g. repeated warnings about the dangers of a specific event or situation). Phobias that result from exposure to a traumatic event tend to be particularly acute in their onset. Cognitive behavioral therapy is probably the most effective treatment modality for specific phobias.[7]

Social Anxiety Disorder:

Social anxiety disorder (SAD), also known as social phobia, has a lifetime prevalence rate of 5% to 12%. It is more common in women, but an approximately equal number of men and women seek treatment for the condition.[8] The fundamental characteristic of SAD is a marked and persistent fear of situations that involve performance, evaluation, or potential scrutiny by others. People with SAD fear that they will act in way or show anxiety symptoms that will be embarrassing or humiliating, or that may result in negative evaluation by others.[1] Onset is from late childhood to early adulthood. The generalized subtype is characterized by fears that span multiple situations such as answering questions in class and asking others out for dates. The nongeneralized or circumscribed subtype is characterized by a fear of acting ineptly or foolishly in only very circumscribed situations such as public speaking or choking when eating in public.[9] SAD appears to be chronic and is often co-

morbid with other psychiatric conditions such as other anxiety, mood, or substance related disorders. Common associated features include hypersensitivity to criticism, negative evaluation, or rejection, difficulty being assertive, low self-esteem, or feeling of inferiority. Treatment for the generalized subtype includes SSRIs, venlafaxine, clonazepam, MAOIs, gabapentin and cognitive-behavioral therapy. Discontinuation of pharmacotherapy after 5 to 12 months has resulted in relapse rates of 20 to 60% during follow-up periods of 3 to 6 months.[8] Treatment for the circumscribed subtype is propranolol and psychotherapy involving desensitization.

Obsessive-Compulsive Disorder (OCD):
OCD can be a particularly disabling disorder. The lifetime prevalence is 2 to 3%, equally in female and male. A current hot topic in psychiatry is whether or not to categorized OCD as an anxiety disorder.[10] OCD occurs in adolescent or early adult years, after age 40 very rare. Majority of individuals have obsessions and compulsions; less than 25% have only obsessions and only 5% have only compulsions. Obsessions may manifest as recurrent irrational, unwanted, egodystonic thoughts, ideas, images, impulses, fears or doubts. Compulsions are irresistible impulses or rituals a person feels compelled to perform such as feeling compelled to touch, to count, to check, to have everything symmetrically arranged or to repeatedly wash their hands. Avoidant and hypochondriacal behaviors or concerns often co-occur with symptoms of OCD. The complications of OCD are usually related to the time and energy consumed by the obsessions and/or compulsions. Usually OCD has a waxing and waning course. A 40-year Swedish study demonstrated that OCD is a chronic persistent disorder in almost 40% of patients and many of the others show gradual improvement over time; complete recovery occurs in only about 20% of cases.[3] Treatment is behavior therapy, cognitive therapy or serotonergic medication (clomipramine) or SSRIs.

Three terms that relate specifically to anxiety and flying, manifestations of apprehension (MOA), fear of flying (FOF), and phobic fear of flying (specific phobia in DSM-IV-TR) are used in aerospace medicine. MOA and FOF are used to denote a non-phobic fear based on uneasiness, lack of motivation, feelings of inadequacy, rational decision, life circumstance, etc.; MOA is used with student aviators and FOF for rated aviators. Both MOA and FOF are handled administratively by the commander (often in the context of a flying evaluation board or the SUPT/UNT equivalent). A mental health consultation is helpful to clarify the issues in MOA and FOF. An increasingly recognized problem in the ATC/GBC community is fear of controlling. These cases are almost always handled administratively just as is fear of flying.

Phobic fear of flying is a true phobia, often involving only flying, though the symptoms can spread to other areas of life if not treated. Phobic fear of flying is handled like the other anxiety disorders; by medical disqualification, referral to mental health for evaluation and treatment, and then returned to flying when the disorder is resolved. Persistence of anxiety symptoms despite adequate treatment or a reluctance to enter treatment should raise questions about the aviator's motivation to fly.

II. Aeromedical Concerns.

Many of the emotional and behavioral manifestations of anxiety disorders can interfere with flying safety and mission completion. Severe anxiety can markedly impair the ability to focus and concentrate on the task at hand. Trembling may diminish ability to manipulate controls. Palpitations, sensations of shortness-of-breath, chest pain, nausea, and dizziness, for example, may be significantly distracting. Some of the more severe symptoms of anxiety, such as those seen in panic disorder (overwhelming anxiety, derealization, and fear of losing control) may be acutely

incapacitating. Anxiety is often a factor in depression and psychosomatic complaints as well as being associated with substance misuse, particularly alcohol. In particular, clinical levels of situational or chronic anxiety raise concerns regarding an aviator's emotional stamina and resilience needed to manage the inherent dangers and rigors associated with flying, especially during austere and deployed conditions. It should also be noted that anxiety stemming from a chronically high operational tempo, large workload, and accumulating life stressors may manifest itself as low motivation to fly. The aeromedical disposition of flight personnel diagnosed with an anxiety disorder depends on the specific category of the disorder and phase of the illness.[12]

III. Waiver Considerations.

For trained FCII, FC IIU, FIII, and ATC/GBC personnel, a diagnosis of anxiety is disqualifying for continued duty and would require a waiver to continue in their assigned duties. A waiver may be requested once the aviator has completed treatment successfully, and has remained asymptomatic without medications for six months. For SMOD personnel, retention standards per AFI 48-123 would also necessitate a waiver. For untrained personnel, a waiver will be considered only in cases with a well-defined precipitating factor(s) which are unlikely to recur. It is important to note that non-phobic fear of flying (trained aviator) and manifestations of apprehension (untrained aviator) are treated as an administrative rather than a medical matter.

Table 1: Waiver potential for anxiety disorders

Flying Class (FC)	**Waiver Potential** **Waiver Authority**
I/IA	Maybe† AETC
II	Yes* MAJCOM
IIU	Yes* AFMSA
III	Yes* MAJCOM
GBC	Yes* MAJCOM
SMOD	Yes* AFSPC or GSC

† Waiver only likely in well-defined identifiable precipitating factors which are unlikely to reoccur.
* Waivers for untrained individuals with history of anxiety disorders are unlikely, unless demonstrated remission for several years or in well-defined identifiable precipitating factors which are unlikely to reoccur.

AIMWTS review in Jun 2011 revealed a total of 651 cases with a diagnosis of an anxiety-related disorder. 499 of these cases resulted in a disqualification disposition (77%). Breakdown resulted in 17 FC I/IA cases (11 disqualifications), 92 FC II cases (49 disqualifications), 255 FC III cases (194 disqualifications), 3 FC IIU cases (1 disqualification), 237 ATC/GBC cases (217 disqualifications), and 47 SMOD cases (27 disqualifications). Of interest, the large number of ATC/GBC cases resulted from numerous early disqualifications due to fear of controlling (as noted above, these cases need to be handled administratively).

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for an anxiety disorder should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History of condition with special attention to symptoms, frequency, duration, treatment (including all medications), precipitating factors, action taken to mitigate recurrence, and any social, occupational, or administrative problems.
C. Mental health evaluation (recent - within 3 months of package submission).
D. A letter from the aviator's commander supporting a return to flying status (if the recommendation is for a waiver).

The aeromedical summary for waiver renewal for an anxiety disorder should include the following:
A. Interval history and any changes in the aviator's condition with special emphasis on the mental health of the individual.
B. Copies of any applicable evaluations.

ICD 9 codes for anxiety disorders	
300.00	Anxiety Disorder Not Otherwise Specified
300.01	Panic Disorder Without Agoraphobia
300.02	Generalized Anxiety Disorder
300.21	Panic Disorder With Agoraphobia
300.22	Agoraphobia Without History of Panic Disorder
300.23	Social Phobia (Social Anxiety Disorder)
300.29	Specific Phobia (*formerly* Simple Phobia)
300.3	Obsessive-compulsive disorder
293.84	Anxiety Disorder Due to a General Medical Condition
292.89	Substance-Induced Anxiety Disorder (substance specific codes in Substance Related Disorders)

V. References.

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WAIVER GUIDE
Updated: Oct 2010
Supersedes Waiver Guide of Sep 2007
By: Dr Dan Van Syoc
Reviewed by Dr. William Kruyer, chief cardiologist at the ACS

CONDITION:
Aortic Insufficiency/Regurgitation (Oct 10)

I. Overview.

This waiver guide primarily addresses aortic insufficiency (AI) (aortic regurgitation) with a normal, three-leaflet aortic valve. Bicuspid aortic valve is included in the waiver considerations section for completeness; bicuspid aortic valve is discussed in more detail in its own separate waiver guide. AI, particularly in its milder forms, is usually asymptomatic for decades due to the compensation of the left ventricle to the volume overload produced by this condition. Symptoms generally do not become clinically apparent until some degree of left ventricular (LV) failure has occurred, usually after the fourth decade of life. AI is therefore most commonly associated with symptoms related to left ventricular failure, (e.g., exertional dyspnea, orthopnea, fatigue, and paroxysmal nocturnal dyspnea). Symptoms of angina are rare in the absence of coronary artery disease. The severity of AI is graded on a 1-4 scale of trace, mild, moderate and severe. Trace AI is considered to be a physiologically normal variant in the absence of an accompanying AI murmur and with a structurally normal three-leaflet valve. The natural progression of AI varies based on symptoms and LV dysfunction as listed below. There is very little published data on the natural history of the progression of AI, particularly the mild to moderate types. This table reflects outcomes based on preexisting severe AI.

Table 1: Natural History of Severe Aortic Insufficiency (Bonow)

Asymptomatic patients with normal LV systolic function	
• Progression to symptoms and /or LV dysfunction	<6%/year
• Progression to asymptomatic LV dysfunction	<3.5%/year
• Sudden death	<0.2%/year
Asymptomatic patients with LV systolic dysfunction	
• Progression to cardiac symptoms	>25%/year
Symptomatic patients	
• Mortality rate	>10%/year

Although there is a low likelihood of patients developing asymptomatic LV dysfunction, more than one fourth of the patients who die or develop systolic dysfunction will do so prior to the onset of any warning symptoms.

In a clinical population, AI is caused by aortic root or leaflet pathology. Root pathology is most commonly caused by dilatation associated with hypertension and aging. Other root pathologies include Marfan's syndrome, aortic dissection, ankylosing spondylitis and syphilis. Leaflet pathologies include infective endocarditis, bicuspid aortic valve and rheumatic heart disease. In the aviator population, the most common etiologies will be idiopathic AI with normal aortic valve and root, AI with idiopathic aortic root dilation and bicuspid aortic valve.

Theoretical concerns exist that extreme athletic activity or isometric exercise, or activities which include a significant component of such exercise, may promote progression of this condition and should therefore be discouraged. Examples of such activities would include the anti-G straining maneuver, weight lifting, and sprint running. Published guidelines for athletes with AI restrict activities for those with the moderate and severe types. Therefore, moderate AI and asymptomatic severe AI that does not meet guidelines criteria for surgery are restricted to FC IIA. Symptomatic severe AI and severe AI meeting guidelines criteria for surgery are disqualifying and waiver is not recommended. Moderate to severe AI should be followed closely, preferably by a cardiologist, for development of criteria for surgical intervention and to address the need for vasodilator therapy. Medications to reduce afterload, such as ACE inhibitors and nifedipine, have documented clinical benefit in chronic AI, including delaying the need for surgery and improvement of surgical outcome. The use of approved ACE inhibitors and nifedipine is therefore acceptable in aviators with asymptomatic moderate and severe AI.[7] Treatment for AI should always include adequate therapy for hypertension, to decrease afterload.

An echocardiogram with Doppler flow study easily diagnoses AI and is the mainstay of severity assessment. In addition, left ventricular function and chamber size impact the assessment of the severity of disease.

In early 2007, the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[9] Subsequently endocarditis prophylaxis was recommended only for specified high risk groups, and only for dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Such common conditions no longer recommended for endocarditis prophylaxis include, but are not limited to, mitral valve prolapse, bicuspid aortic valve, mitral or aortic regurgitation with normal valve (e.g. primary mitral regurgitation) and uncorrected small defects of the atrial and ventricular septum.

II. Aeromedical Concerns.

Aeromedical concerns include: related symptoms such as exertional dyspnea, orthopnea and paroxysmal nocturnal dyspnea. Also the progression of AI to severe grade and the impact of the anti-G straining maneuver or isometric/dynamic exercise on the degree of AI which could result in reduced cardiac output and hypoperfusion of the brain, and any requirement for medical therapy, such as vasodilators are important concerns for aircrew with AI.

III. Waiver Consideration.

AFI 48-123 states that any AI greater than trace is disqualifying for all flying classes. For FC IIU and ATC/GBC personnel, symptomatic valvular heart disease is disqualifying as is asymptomatic valvular disease graded moderate or worse. Aortic disease (or any valvular disease) is disqualifying for SMOD personnel (per Chapter 5, retention standards).

The ACS considers trace AI, without the murmur of AI and in the presence of a structurally normal three-leaflet valve, to be a normal variant and therefore qualifying for all classes of flying duties. ACS review of the echocardiogram is required to confirm that AI is trace and that aortic valve pathology (e.g. bicuspid valve) is not present. Mild or greater AI is disqualifying for all classes of flying duties and ACS review/evaluation is required for waiver consideration. ACS evaluation may be required, depending on the flying class or for specific concerns in an individual case. FC I and IA will only be waiver eligible for mild or less AI; any greater AI is not waiver eligible. All FC II and FC III personnel require ACS review/evaluation for waiver consideration. ACS re-evaluations will be performed at 1-3 year intervals, depending on the degree of AI and other related conditions such as chamber dilation, left ventricular function and left ventricular hypertrophy. As discussed above, the use of approved ACE inhibitors or nifedipine for afterload reduction is acceptable in aviators with asymptomatic moderate or severe AI.[3] Waiver may be considered after surgery; please refer to the "Valve Surgery – Replacement or Repair" waiver guide. Table 2 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties.

Table 2: Summary of waiver potential and required ACS evaluation for degrees of AI in aircrew.

Degree of Aortic Insufficiency (AI)	Condition	Flying Class	Waiver Potential/ Waiver Authority	Required ACS Review and/or ACS Evaluation
Trace	Trileaflet aortic valve	Qualifying for all classes	Not required (Normal variant)	ACS review to confirm
	Bicuspid aortic valve (BAV)	FC I/IA	Yes AETC	ACS evaluation.
		FC II	Yes MAJCOM	ACS evaluation
Mild	Trileaflet or BAV***	FC I/IA	Yes AETC	ACS evaluation.
		FC II/III	Yes MAJCOM	ACS evaluation
Moderate	Trileaflet or BAV	FC I/IA	No AETC	ACS review to confirm
		FC IIA	Yes* AFMSA	ACS evaluation
		FC III (low performance only)	Yes* MAJCOM	ACS evaluation
		FC IIU	Yes** AFMSA	ACS review
		ATC/GBC	Yes MAJCOM	ACS review
		SMOD	Yes AFSPC	ACS review
Severe – asymptomatic and nonsurgical per guidelines	Trileaflet or BAV	FC IIA only	Maybe* MAJCOM	ACS evaluation
		FC III (low performance only)	Maybe* MAJCOM	ACS evaluation
		FC IIU	Yes** AFMSA	ACS review
		ATC/GBC	Yes MAJCOM	ACS review
		SMOD	Yes AFSPC	
Severe – symptomatic or surgical per guidelines†	Trileaflet or BAV	FC II/III	No MAJCOM	ACS review
		FC IIU	Maybe** AFMSA	ACS review
		ATC/GBC	Maybe MAJCOM	ACS review
		SMOD	Maybe AFSPC	ACS review

* Waiver in untrained FC II and III unlikely.
† Medical evaluation board (MEB) required.
**AETC is the certification authority for initial FC IIU duties
*** FC IIU and ATC/GBC waivers for mild disease are very likely to be approved.

AIMWITS search in September 2010 revealed a total of 241 individuals with a submitted aeromedical summary with a diagnosis of aortic insufficiency. Of that total, there were 33 FC I/IA cases (8 disqualifications), 156 FC II cases (16 disqualifications), 44 FC II cases (5 disqualifications), 1 FC IIU case which was disqualified, 2 ATC cases (with 1 disqualification), and 5 SMOD cases (with 0 disqualifications). Further breakdown revealed a total of 82 cases without the concurrent diagnosis of BAV. There were 7 FC I/IA cases (4 disqualifications), 58 FC II cases (6 disqualifications), 13 FC III cases without any disqualifications, and 4 SMOD cases without any disqualifications. There were no FC IIU or ATC/GBC cases in the non-BAV category.

IV. Information Required for Waiver Submission.

Aeromedical Consultation Service (ACS) evaluation is required for all classes of flying duties for AI. No additional studies are routinely required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for waiver consideration for AI.

The aeromedical summary for initial waiver for AI should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
C. Copy of the local echo report and videotape or CD copy of the echo documenting AI. (Notes 1 and 2)
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)
E. Additional local cardiac testing is not routinely required but may be requested in individual cases.

The aeromedical summary of waiver renewal of AI [ACS follow-up evaluations] should include the following:

A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD 9 code(s) for aortic insufficiency/regurgitation	
395.1	Rheumatic aortic regurgitation
395.2	Rheumatic aortic stenosis with aortic regurgitation
395.9	Other and unspecified rheumatic aortic diseases
424.1	Aortic valve disorders
746.4	Congenital insufficiency of aortic valve

V. References.

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WAIVER GUIDE
Updated: Oct 2010
Supersedes Waiver Guide of Sep 2007
By: Dr Dan Van Syoc
Reviewed by Dr. William Kruyer, chief cardiologist at the ACS

CONDITION:
Aortic Valve Stenosis (Oct 10)

I. Overview.

Aortic stenosis (AS) usually occurs at the level of the aortic valve. Supravalvular and subvalvular forms of AS exist but are unusual congenital defects unlikely to present as a new diagnosis in an adult military aviator/aircrew. These would be addressed aeromedically on a case-by-case basis. Valvular AS has several causes. In older adults the most common is senile AS, an aging-related calcifying, degenerative process. In the military aviator/aircrew population the most common cause will be associated bicuspid aortic valve. AS is still unusual in military aviator/aircrew with bicuspid aortic valve because this complication usually occurs in middle-aged or older patients.[3, 4]

While the diagnosis may be suspected by careful auscultation, AS is primarily an echocardiographic (echo) diagnosis. On echo AS is graded by a combination of mean pressure gradient across the stenotic valve and calculated valve area. Grading categories are mild, mild-to-moderate, moderate and severe.[1, 2, 3, 4]

In early 2007, the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[5] Subsequently endocarditis prophylaxis was recommended only for specified high risk groups, and only for dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Such common conditions no longer recommended for endocarditis prophylaxis include, but are not limited to, mitral valve prolapse, bicuspid aortic valve, mitral or aortic regurgitation with normal valve (e.g. primary mitral regurgitation) and uncorrected small defects of the atrial and ventricular septum.

II. Aeromedical Concerns.

Aeromedical concerns for AS include progression to significant stenosis and requirement for aortic valve replacement or repair. The prognosis of mild AS is good and essentially normal for at least five years after diagnosis. Once AS has progressed to moderate or severe, aeromedical and clinical concerns also include sudden cardiac death, syncope, angina and dyspnea. Angina may occur in the absence of significant coronary atherosclerosis while dyspnea may appear as a result of left ventricular dysfunction. Event rates are 5% and 10% per year for asymptomatic and symptomatic moderate AS, respectively. Event rates are considerably higher for severe AS. Mild-to-moderate AS has normal expected event rates for 1-3 years, but represents AS that is likely progressing toward moderate and later severe AS. At this level of stenosis, maintenance of normal cardiac

output under +Gz load is a potential aeromedical concern, prompting restriction from high performance flying duties.[3]

III. Waiver Consideration.

AFI 48-123 states that any degree of valvular stenosis is disqualifying for all flying classes. For FC IIU and ATC/GBC personnel, symptomatic valvular heart disease is disqualifying as is asymptomatic valvular disease graded moderate or worse. Aortic disease (or any valvular disease) is not listed as disqualifying for SMOD personnel.

Table 1 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties. Waiver may be considered after surgery; please refer to the "Valve Surgery – Replacement or Repair" waiver guide.

Initially, waiver will typically be valid for one year with ACS re-evaluation required for waiver renewal consideration. If AS is mild and appears stable after several ACS evaluations, waiver renewal may be extended to two to three years upon recommendation by the ACS. Waiver for mild-to-moderate AS will be valid for one year.

Table 1: Summary of Degree of Aortic Stenosis and ACS Requirements.

Associated Levels of Aortic Stenosis (AS)	Flying Class	Waiver Potential Waiver Authority	Required ACS Review and/or ACS Evaluation
Mild AS	FC I/IA	No AETC	ACS review to confirm
	FC II and FC III	Yes MAJCOM	ACS evaluation
	FC IIU**	Yes AFMSA	ACS review to confirm
	ATC/GBC	Yes MAJCOM	ACS review to confirm
Mild-to-moderate AS	FC IIA (low G- aircraft)	Yes AFMSA	ACS evaluation
	FC III (low G- aircraft)	Yes MAJCOM	ACS evaluation
	FC IIU**		ACS review to confirm
	ATC/GBC	Yes AFMSA Yes MAJCOM	ACS review to confirm
≥ Moderate AS*	FCI/IA, II, III	No	ACS review to confirm
	FC IIU**	Maybe AFMSA	ACS review to confirm
	ATC/GBC	Maybe MAJCOM	ACS review to confirm

* Medical evaluation board (MEB) required.
** AETC is the certification authority for initial FC IIU applicants.

AIMWITS search in September 2010 revealed a total of 17 individuals with a submitted AMS for the diagnosis of AS. There were 9 FC II cases, six FC III cases and 1 FC IIU case. A total of 7 received a disqualification disposition: 4 were FC II, 2 were FC III and the one FC IIU case was also disqualified. All disqualified cases had either advanced AS or AI or a combination of both.

IV. Information Required for Waiver Submission.

Aeromedical Consultation Service (ACS) evaluation is required for waiver consideration for all classes of flying duties with AS. No additional studies are routinely required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required non-flying observation period for waiver consideration for AS.

The aeromedical summary for initial waiver for AS (initial ACS evaluation) should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
C. Copy of the local echo report and videotape or CD copy of the echo documenting BAV. (Notes 1 and 2)
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)
E. Additional local cardiac testing is not routinely required but may be requested in individual cases.

The aeromedical summary of waiver renewal of AS [ACS follow-up evaluations] should include the following:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD 9 code(s) for Aortic Stenosis	
424.10	Aortic valve disorders
395.0	Rheumatic aortic stenosis
396.0	Mitral valve stenosis & aortic valve stenosis

V. References.

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WAIVER GUIDE
Updated: Mar 2012
Supersedes Waiver Guide of May 2008
By: Col John Lynch (RAM 12) and Dr Dan Van Syoc
Reviewed by Maj Joshua Sill, ACS Pulmonologist

CONDITION:
Asthma (Mar 2012)

I. Overview.

Although it is unlikely that asthma has ever been a rare disorder, over the past twenty years the prevalence has increased by roughly 40%. The mortality rate from asthma has increased by a similar proportion. Numerous hypotheses have been advanced to explain the rise in prevalence, such as decreased air exchange in energy-efficient buildings, or decreased childhood infections resulting in an upregulation of IgE-mediated immunity, but no consensus exists. Given the concurrent rise in mortality, and the fact that asthma as a cause of death is rarely confused with any other etiology, and the fact that the increase in prevalence has been documented in numerous countries, the increase in prevalence is unlikely to be an artifact of inconsistent diagnostic criteria.[1-5]

That being said, variations in diagnostic criteria do affect epidemiologic studies of asthma. For such a common disease, it has been surprisingly difficult to agree on a definition. In clinical practice, inconsistent criteria have resulted in a great deal of variability in applying the diagnosis. Asthma has also had more than its share of euphemistic alternative diagnoses, including reactive airways disease, reactive bronchitis, and others. Asthma is a chronic disorder of the airways that is complex and characterized by variable and recurring airflow obstruction, bronchial hyperresponsiveness, and underlying inflammation. The interaction of these features of asthma determines the clinical manifestations, the severity of asthma and the response to treatment.[6] Excluded from this definition would be airway inflammation that complicates other structural lung diseases, or that results from serious insults, such as toxins or significant infections (e.g., smoke inhalation, industrial accidents, influenza). The qualification that the infection should be significant is important, albeit difficult to delimit; to give an example, six weeks of persistent cough following a common rhinovirus infection should raise a suspicion for asthma, and if this is a recurring pattern, the diagnosis is probable. Prolonged symptoms after viral infection are considerably more common in children, as discussed below.

With the understanding that diagnostic criteria vary, current asthma prevalence is estimated to be 8.2% of the U.S. population (24.6 million people); within population subgroups it tends to be higher among females, children, persons of non-Hispanic black and Puerto Rican ethnicity, persons with family income below the poverty level, and those residing in the Northeast and Midwest regions of the U.S.[7] Consideration of secondary etiologic factors is important, since mitigation of those factors may allow better or (rarely) complete control. Asthma often shows an atopic association, particularly with allergic rhinitis, and treatment of allergic rhinitis with immunotherapy may lead to marked improvement in asthmatic symptoms. In the absence of allergic rhinitis, immunotherapy in an attempt to directly control asthma is rarely of value. Avoidance of allergens would seem to be an obvious recommendation in atopic cases, but this is rarely practical, particularly in military environments. On occasion, a specific avoidable precipitating factor is identified by history or skin testing, and can be successfully avoided. Animal, particularly cat, allergy is the most common

example whereby avoidance may succeed in controlling asthma. Chronic rhinitis may be accompanied by sinusitis and, anecdotally, treatment of chronic sinusitis has occasionally resulted in better control of asthma. There is also an association of asthma with gastroesophageal reflux, but it is unclear which is cause and which is effect, since pressure excursions within the thorax and abdomen may predispose to reflux. Acid suppression with proton pump inhibitors rarely leads to clinical improvement, and most reviews have failed to support a role for reflux in asthma pathogenesis. However in rare instances, reflux with nocturnal aspiration of gastric secretions may mimic asthma. As opposed to etiologic factors, exacerbating factors are often easy to identify; while these may be idiosyncratic to the individual, attacks are commonly precipitated by exercise in cold, dry air, by exposure to pollutants (e.g., exhaust fumes), or by viral respiratory infections.

Exacerbation of chronic or intermittent asthma by exercise is an extremely common symptom, reported by 70-90% of asthmatics; since it is well documented that many individuals fail to symptomatically differentiate asthma from normal exertional breathlessness, even this percentage may be an underestimate.[8, 9] In addition to exercise exacerbating bronchospasm in established asthma, there is a separate phenomenon of solitary exercise-induced bronchospasm (EIB). Unfortunately, published reports of EIB often fail to separate the two conditions, making interpretation of results difficult in those studies. Solitary EIB appears to be due to airway hyperosmolarity induced by hyperpnea and free water loss, and/or cooling and subsequent rewarming of the airways. There are no published reports of death from solitary EIB. In contrast, asthmatic deaths as a result of exercise in those with established asthma are well documented.[10] Solitary EIB occurs in recreational as well as high school and collegiate athletes; the prevalence is significant, typically affecting about 9-12% of children in athletic programs.[11] This percentage is based on results of post-exercise spirometry; many did not have significant symptoms. The phenomenon has been best studied in professional athletes. Endurance sports have a higher risk than intermittent activities. Among cross-country runners in one study, 14% of those without a history of asthma showed objective evidence of EIB.[9] The greatest risk involves winter sports, which is consistent with the likely mechanism of EIB. Screening of the 1998 Winter Olympic Team using sport-specific challenge showed an overall rate of EIB of 23%, with cross-country skiing showing a prevalence of 50%. Another study found a 35% prevalence of solitary EIB in figure skaters.[12] Unlike the case in established asthma, inflammation is generally not believed to play a role in solitary EIB, though endurance athletes in winter sports may actually show inflammatory changes on histopathology.[13]

The major symptoms of asthma include wheezing, shortness of breath, chest tightness, and cough. Both clinical experience and studies have shown that subjective reporting of symptoms does not correlate well with severity of obstruction. Patients tend to adapt to chronic airflow obstruction, so that symptoms correlate better with the rate of fall of FEV1 during an attack, rather than with the absolute degree of obstruction. Spirometry utilizing the forced vital capacity maneuver is the standard method for measuring obstruction. Proper technique and adequate effort by the individual are crucial. In the past, a ratio of FEV1/FVC less than 0.75 was used to define the presence of airflow obstruction. However, the normal range of FEV1 can vary significantly, depending on race, age, gender, and anthropomorphic measurements. Population based studies of normal individuals have been used to create algorithms that take these factors into account. Modern pulmonary function testing equipment utilizes these algorithms to predict a normal range for spirometric testing. Airway obstruction is defined as a FEV1/FVC ratio lower than the predicted range for the individual patient. The FEV1 is used to gauge the severity of the obstruction. Reversible airway obstruction is defined as an increase of at least12% and 200 ml in FEV1, after treatment with an

inhaled bronchodilator. A 12% relative and 200 ml absolute change in FEV1 over time (an interval that may be anywhere from minutes to months) can also indicate reversible obstruction. A post-bronchodilator study may also be useful in those with low-normal airflows who have a suspicious history; even if the FEV1/FVC falls within the normal range, a 12% and 200 ml improvement in FEV1 indicates reversible obstruction. Whether the finding of reversible obstruction signifies asthma depends on the clinical setting. Bronchospasm may complicate airway inflammation from any of a number of etiologies. Serious respiratory infections such as influenza are often accompanied by airway inflammation that may persist for weeks, and the presence of reversible airflow obstruction during this period would not equate to asthma. Airflow obstruction is often a feature of other chronic diseases involving the airways (e.g., chronic obstructive pulmonary disease, bronchiectasis), and when the obstructive pathophysiology involves inflammation, the airflow obstruction may be at least partially reversible.

Children are prone to asthma. As many as a third will have symptoms compatible with asthma at some point, most often in the early pre-school years. Some of these cases represent a prolonged response to viral bronchiolitis, in particular from respiratory syncytial virus; this is especially true in infancy. The longer that symptoms persist, the more likely that the problem truly represents asthma. For childhood asthma, age shows a clear association with asthma prevalence. In the British 1958 cohort, of 880 subjects with asthma during preschool years, 50% still wheezed at age 7, 18% at age 11, 10% at ages 16 and 23.[14]

Selection of aircrew for military aviation is complicated by the fact that many asthmatics who become free of symptoms in early adolescence will suffer relapse in their twenties or early thirties. In the British 1958 study noted earlier, after reaching a nadir in late adolescence and the early twenties, the percentage of those with active wheezing rose to 27% by age 33. In general, about 30-35% of remitted childhood asthmatics will relapse. Numerous natural history studies have attempted to correlate a variety of factors (e.g., childhood pet exposure) to the risk of persistence or relapse of asthma, but results have been contradictory. Cofactors that have correlated in reasonably consistent fashion to the risk of relapse have included a history of atopy and the frequency and severity of attacks in childhood, but since the risk of relapse is only about one and a half times the background risk, neither factor is a particularly useful predictor. Furthermore, even when pediatric medical records are reasonably complete, it is surprisingly difficult except in the most severe cases to quantify frequency or severity of childhood asthma. Remission at a very early age is associated with less risk of subsequent asthma, in that those with wheezing confined to infancy, i.e., less than two years old, have been shown to be at no greater risk of adult relapse than those who never wheezed.[15]

A number of studies have shown that airway inflammation and/or hyperreactivity frequently persist in adolescents who have clinically remitted.[16, 17, 18] Regardless of whether disease activity has been measured by elevated eosinophils in bronchoalveolar lavage, abnormal endobronchial histopathology, or positive methacholine challenge testing, anywhere from a quarter to two-thirds of those in apparent remission have evidence of continued subclinical activity. Not unreasonably, this has led to a perception that bronchoprovocation testing of individuals in remission could identify those at greater risk of later relapse. Reasonable or not, the perception has proven to be incorrect. The prevalence of methacholine reactivity from childhood to adulthood has been shown to simply mirror the prevalence of asthma; many of those who show normal reactivity in their early twenties show a recurrence of reactivity at a later age.[19] A study of allergic rhinitis patients showed no difference in the risk of developing asthma between those with positive and negative

bronchoprovocation tests.[20] Most convincingly, in a recent publication from the data in the Dunedin (New Zealand) cohort, of 58 subjects in their mid-teens with remission of childhood asthma and negative methacholine challenge testing, 33% subsequently relapsed by age 26, consistent with historical rates of relapse.[21] Those with positive bronchoprovocation testing showed a slightly greater risk of relapse, but that group numbered only six individuals, of whom three relapsed. Broncho-provocation testing appears to be of no value in predicting relapse in remitted childhood asthmatics.

Medications employed to treat asthma are generally classified as controller, rescue, or, in the case of EIB, prophylactic therapy.[22] Rescue therapy primarily consists of a variety of short-acting beta-agonists (SABA) delivered via inhalation; in addition to the fact that these agents have a number of cardiac and neurologic adverse effects, the need for a SABA generally signifies asthma that is not under control. However, prophylactic use prior to exercising in those with solitary EIB does not indicate a similar lack of control, and within certain limits outlined below, such use is waiverable. Use of albuterol fifteen minutes before exertion generally confers protection for about four hours. Among controller medications, inhaled corticosteroids (ICS) are the mainstay of asthma therapy. They have been shown to control disease and reduce the number of exacerbations. It is very important that patients understand that these are slow-acting medications; while some benefit is apparent as early as a week or two, continued improvement may be seen for up to twelve months. Adverse effects are usually local, consisting of pharyngeal candidiasis (thrush), which is generally avoidable by rinsing and gargling after inhalation, and a smaller risk of dysphonia. At high doses, some suppression of the hypothalamic-pituitary-adrenal (HPA) axis may occur. Leukotriene modifiers (leukotriene receptor antagonist), including montelukast (Singulair® and Montelo-10®), zafirlukast (Accolate®) and zileutin (Zyflo®) have very few adverse effects, though it is generally less effective than inhaled steroids. Nonetheless, some patients respond well, and it can be useful as add-on therapy to allow reduction of inhaled steroid dose to avoid HPA axis suppression. It reaches maximal effect within about a day of therapy, and doses higher than 10 mg are of no additional value. Cromolyn sodium is nearly devoid of adverse effects, but is rarely efficacious in adults.

Other medications are not compatible with USAF aviation. Long-acting beta-agonists (LABA) such as salmeterol (Serevent®, contained in Advair®) and formoterol (Foradil®, contained in Combivent®) have been in vogue in recent years. They are generally classified as controllers, though suppressor is a better term, since they fail to address the underlying inflammatory process. Administering a LABA twice a day differs little, if at all, from plying a patient every four hours with a SABA and are not to be used as monotherapy for long-term asthma control. As with SABAs, tolerance with LABAs is a real problem, and concerns about cardiac and neurologic adverse effects are similar. The tolerance problem is best illustrated with EIB; not only does regular use of a SABA or LABA result in less prophylactic efficacy prior to exercise, and a sluggish response to rescue bronchodilation, but such use also typically results in the occurrence of more severe EIB. Furthermore, prospective data have shown use of salmeterol is associated with increased mortality, echoing the experience with isoproterenol and fenoterol in previous decades. For this reason, the Food and Drug Administration has published an advisory, and salmeterol is not recommended as first-line therapy. The possible mechanisms behind the increase in asthma mortality with salmeterol are direct toxicity, tolerance, delay in seeking help, and decreased use of inhaled corticosteroids.[23] While the study cited was performed using salmeterol, there is little reason to assume other LABAs would be any different. Theophylline has a very narrow therapeutic window, and is associated with highly significant adverse effects such as cardiac arrhythmias and seizures. Systemic steroid therapy is complicated by serious adverse effects with either acute or

chronic use, and within a few weeks of therapy the HPA axis is effectively suppressed. Furthermore, the fact that the individual needs systemic steroid therapy denotes a severe degree of asthma.

II. Aeromedical Concerns.

Severity of obstruction and presence/absence of symptoms are clearly important, but the principal aeromedical concern is the risk of serious bronchospasm in response to minor insults. Since breathing cold, dry air, or exposure to smoke, fumes or pressure breathing can provoke asthma attacks, the danger of incapacitating bronchospasm is real. In particular, exercise in cold, dry air is one of the most consistent provocative stimuli, whether for established asthma or for solitary EIB. Thus, high-performance aviation is not recommended for either condition. Additionally, military aviation concerns include lack of available care in austere locations. This typically results in deployability restrictions.

III. Waiver Consideration.

Any type of asthma or history of asthma is disqualifying for flying duties in flying class (FC) I/IA, II/IIU, III, ATC/GBC or SMOD personnel. Although data supports lowering the age of waiverable childhood asthma, current policy makers agree to leave the policy as it has been for the past several years. History of childhood asthma prior to the 13th birthday is waiverable; after age 12 (after the 13th birthday) waiver is not granted on initial flying physicals. Asthma and solitary EIB may be waivered for FC IIC (no routine use of aviator mask) and FC III after ACS review. The diagnosis of solitary EIB will only be entertained if no evidence of established asthma is present, and SABA should only have been used for prophylaxis. Use of more than three metered-dose inhalers per year is suspicious for utilization as rescue treatment.

Since ICS and montelukast both show efficacy for exercise-induced symptoms in established asthma, use of SABA should not be necessary. The sole exception would be a flare associated with a respiratory infection, during which the aviator should be DNIF. If such a flare occurs, the individual should remain DNIF for one week after stopping use of SABA, to allow the inflammatory process to resolve. In the ACS's experience, asthmatics who require rescue inhaler use, even rarely, typically fail their methacholine challenge tests and are not granted waivers. For this reason, it is of paramount importance for the local flight surgeon to make sure the patient's asthma is under excellent control, prior to submitting a waiver application.

Table 1: Waiver potential for asthma and EIB.

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority	ACS evaluation required
I/IA	History of childhood asthma ≤12 (before 13th birthday)	Yes AETC	No
	History of asthma after age 12 (≥13) and/or asthma/exercise-induced bronchospasm controlled on any medication	No AETC	No
II/IIU/III	Initial FC II/IIU, history of childhood asthma ≤12-years-old	Yes AETC	No
	Initial FC II/IIU, history of childhood asthma ≥13-years-old	No AETC	No
	Solitary exercise-induced bronchospasm (prophylaxed with albuterol*)	Yes# MAJCOM	Yes
	Asthma controlled on inhaled corticosteroids +/- montelukast or cromolyn	Yes **# AFMSA	Yes†
	Asthma treated with beta-agonists‡, theophylline, systemic corticosteroids	No AFMSA	No
ATC/GBC SMOD$	Initial, history of childhood asthma ≤12-years-old	Yes*** MAJCOM	No
	Initial, history of childhood asthma ≥13-years-old	No MAJCOM	No
	Solitary exercise-induced bronchospasm (prophylaxed with albuterol*)	Yes MAJCOM	Yes
	Asthma controlled on inhaled corticosteroids +/- montelukast or cromolyn	Yes MAJCOM	Yes†
	Asthma treated with beta-agonists‡, theophylline, systemic corticosteroids	No MAJCOM	No

* Use of more than three metered-dose inhalers per year is suspicious for utilization as rescue treatment.
† ACS evaluation will normally include methacholine challenge testing to assess sufficiency of therapy.
‡ Combination agents containing LABA and inhaled corticosteroid (Advair®, Combivent®) are not waiverable.
** No routine use of aviator mask
*** Waiver is unlikely for untrained personnel.
# For FC II, a FC IIC waiver may be considered with AFMSA being the waiver authority.
$ Waiver authority for all SMOD personnel is AFSPC or GSC.

A review of AIMWTS in Jan 2012 showed 745 cases of asthma including history of asthma in FCI/IA, II/IIU, III flyers along with ATC/GBC and SMOD. The aeromedical summaries (244) for all disqualified (184) and 60 randomly selected cases were reviewed. Of the 184 asthma cases disqualified, 15 were FCI/IA, 31 were FC II, 1 was FC IIU, 78 were FC III, 11 were ATC/GBC and 8 were SMOD. Of the 184 disqualified asthma cases, 177 were disqualified for the asthma [e.g. controlled on non-waiverable medications (Advair®, albuterol), not well controlled, childhood asthma after age 12] and the other seven were disqualified for other medical conditions. Of the 60 randomly selected approved waivers, 47 were for history of childhood asthma, the other 13 were for asthma controlled on medications (8), exercise-induced asthma (2), and asthma induced by preventable triggers [cat, dog, horse] (3).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for solitary exercised induced bronchospasm (EIB) should include:
A. Detailed chronology of asthmatic episodes, provocative factors, emergency room visits and treatment.
B. Rate of utilization of metered-dose inhalers.
C. Results of all (minimum of three) spirometry studies (FEV1, FVC, and FEV/FEC) (Note 1).
D. Internal medicine or pulmonary consult.
E. Medical evaluation board (MEB) results.

Note 1: At a minimum, three separate studies should be submitted, with at least a week interval between the studies. At least one study should include post-bronchodilator spirometry, regardless of whether baseline spirometry is "within normal limits." Where symptoms are classic for EIB, exercise challenge is not required to establish the diagnosis.

The aeromedical summary for asthma should include:
A. Detailed chronology of asthmatic episodes, provocative factors, emergency room visits and treatment.
B. Results of all spirometry. Should also include results of spirometry with pre and post bronchodilator after three months on current therapy [ICS (note 2) +/- montelukast (possibly cromolyn)].
C. Internal medicine or pulmonary consult.

D. Allergy consult if individual also has allergic rhinitis.
E. MEB results, if complete.

Note 2: The choice of ICS is probably irrelevant, though some research suggests fluticasone may cause more HPA axis suppression on an equipotent dose compared with budesonide and others. Regardless of the ICS used, it is important to use the lowest dose necessary to achieve control.

Note 3: Bronchoprovocation is not recommended as part of the waiver submission process, ACS may accomplish testing during ACS evaluation.

ICD9 Codes for Asthma	
493.0	Extrinsic asthma
493.1	Intrinsic asthma
493.2	Chronic obstructive asthma
493.3	Other forms of asthma (exercised induced, cough variant)
493.9	Asthma, unspecified

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WAIVER GUIDE
Updated: Aug 2011
Supersedes waiver guide of Aug 2008
By: Dr. Dan Van Syoc
Reviewed by Maj Eddie Davenport, ACS chief cardiologist

CONDITION:
Atrial Fibrillation and Atrial Flutter (Aug 11)

I. Overview.

The aeromedical disposition of atrial fibrillation (AF) associated with underlying disease should be guided by policies for the underlying disease [e.g., hypertension, hyperthyroidism, congestive heart failure, valvular heart disease, cardiomyopathy], with the AF considered a complication or endpoint. This waiver guide addresses lone AF, a misleading term in the cardiac literature which would be better termed idiopathic AF. Lone (or idiopathic) AF is defined as AF without structural heart disease, hyperthyroidism or hypertension in patients under age 60 at presentation. Lone AF may occur as a single isolated episode, recurrent paroxysmal events or chronically persistent AF. AF encountered in the military aircrew population will usually be lone AF that is converted spontaneously or by medical intervention within 24 hours. Single idiopathic episode often has an identifiable precipitating cause, such as acute abuse of alcohol and /or stimulants (holiday heart syndrome).

Atrial flutter rarely occurs as an isolated rhythm; it is usually associated with atrial fibrillation. Again this waiver guide addresses idiopathic atrial flutter, not associated with an underlying disease. The atrial rate of atrial flutter is about 300 beats per minute. Typically there is physiologic AV block of 4:1, 3:1 or 2:1, yielding a ventricular rate of about 75, 100 or 150 beats per minute, respectively. However, 1:1 conduction with a ventricular rate of about 300 beats per minute is possible, especially in young, healthy subjects. With expected resting ventricular rates up to 150 beats per minute, persistent or frequent atrial flutter requires AV node blocking medication for ventricular rate control.

Initial treatment of AF or atrial flutter depends on individual's clinical status with the objectives being to slow the ventricular rate and/or restore sinus rhythm. Medications and/or cardioversion may be used. In cases of lone AF, after sinus rhythm is restored, one month of prophylactic therapy with beta blocker, calcium channel blocker or digitalis preparation maybe used to suppress short-term recurrence of AF, without delaying the waiver process. A history of cardioversion or short-term use of antiarrhythmic medications does not preclude waiver.

Medications and/or radiofrequency ablation are used for long term management of paroxysmal and chronic AF and atrial flutter. Paroxysmal and chronic AF often require chronic treatment with an atrioventricular (AV) node blocking medication, such as a beta blocker, calcium channel blocker or digitalis for ventricular rate control. Dihydropyridine calcium channel blockers used to treat hypertension in aircrew (such as Procardia XL® and Adalat CC®) are not effective for AV node blockade. The beta blocker, atenolol, is the only AV node blocking agent currently approved for aircrew. Atrial flutter can also be treated with AV node blocking medication, but control is often difficult to achieve. Both AF and atrial flutter may also be treated by radiofrequency ablation. Ablation of atrial flutter is very low risk, technically simple and essentially over 90% successful.

Radiofrequency ablation for AF is 70 to 85% effective in individuals with paroxysmal AF and 50 to 70% in individuals with chronic AF.[3] Aeromedical guidelines for ablation of AF and atrial flutter are discussed in a separate waiver guide, Radiofrequency Ablation (RFA) of Tachyarrhythmias.

II. Aeromedical Concerns.

Clinical and aeromedical concerns for lone AF and atrial flutter include hemodynamic instability and exercise tolerance, thromboembolic risk and requirement for chronic medication to maintain sinus rhythm or to control ventricular rate. Loss of atrial contribution to cardiac output, loss of atrioventricular synchrony, and rapid ventricular rate response may impair cardiac performance, especially during exertion, resulting in hemodynamic symptoms or reduced exercise capacity. This reduced exercise capacity has operational implications, especially for pilots in high performance aircraft. AV blocking medication may be required – without such the ventricular rate response of AF during exertion may quickly increase to the range of 220-250 beats per minute. AV blockade with a beta blocker, by suppressing heart rate and blood pressure response, adds to the concern regarding +Gz tolerance. Published guidelines regarding the management of AF advise that beta blockers are safe and effective for long-term control of ventricular rate response at rest and during exercise.

Clinical literature typically reports cardiac event rates less than 1% per year for lone AF, whether a single event, paroxysmal or chronic. Previously, waivers for AF were limited to an isolated episode without hemodynamic symptoms. In order to better define the natural history of lone AF in a young and otherwise healthy population and refine waiver policy, the Aeromedical Consultation Service (ACS) reviewed its experience with AF in aircrew. From 1957 to 1993, 300 male aircrew were evaluated for AF approximately 6 months after the initial AF episode. Two hundred thirty-four of the 300 (78%) were found to have lone AF. Events considered were hemodynamic symptoms, cerebral ischemic events, and sudden cardiac death. The arrhythmic event rate prior to age 60 was low (0.4% per year) and the likelihood of a cerebral ischemic event before age 60 without chronic AF was minimal (none in this review). Of those initially presenting with an isolated episode of AF, 63% had no recurrence, 36% developed paroxysmal AF and 1% developed chronic AF. Of those presenting initially with paroxysmal AF, 15% subsequently developed chronic AF.

III. Waiver Considerations.

History of AF and/or atrial flutter is disqualifying for flying class (FC) I/IA, II and III. For retention purposes, any type of atrial fibrillation or atrial flutter, unless single episode of atrial fibrillation clearly associated with a reversible cause is disqualifying. Therefore, FC IIU, ATC/GBC, and SMOD personnel also require a waiver for either AF or atrial flutter. Any history of catheter ablation is also disqualifying for all flying classes and is addressed in a separate waiver guide; Radiofrequency Ablation (RFA) of Tachyarrhythmias. If hyperthyroidism is determined to be the cause of the AF, waiver may be considered per policy after correction of the hyperthyroidism, therefore the Hyperthyroidism waiver guide needs to be considered in those cases.

Table 1: Atrial fibrillation (lone), atrial flutter and waiver potential.

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Atrial fibrillation, single episode, without hemodynamic symptoms, no medications, and "holiday heart" scenario.	Maybe AETC	Yes
	All other atrial fibrillation episodes, with or without hemodynamic symptoms.	No AETC	No
	Atrial flutter, with or without hemodynamic symptoms.	No AETC	No
II/III IIU**	Atrial fibrillation, single episode, without hemodynamic symptoms, no medications.	Yes†$ MAJCOM	Yes
	Atrial flutter with successful radiofrequency ablation and/or atrial fibrillation, paroxysmal or chronic, without hemodynamic symptoms, with or without atenolol, with or without radiofrequency ablation.	Maybe#+$ AFMSA	Yes
	Atrial flutter, without successful radiofrequency ablation and/or atrial fibrillation with hemodynamic symptoms.	No MAJCOM	No
ATC/GBC	Atrial fibrillation, single episode, without hemodynamic symptoms, no medications.	Yes MAJCOM	No
	Atrial flutter with successful radiofrequency ablation and/or atrial fibrillation, paroxysmal or chronic, without hemodynamic symptoms, with or without atenolol, with or without radiofrequency ablation.	Yes MAJCOM	No
	Atrial flutter, without successful radiofrequency ablation and/or atrial fibrillation with hemodynamic symptoms.	No MAJCOM	No
SMOD	Atrial fibrillation, single episode, without hemodynamic symptoms, no medications.	Yes AFSPC or GSC	
	Atrial flutter with successful radiofrequency ablation and/or atrial fibrillation, paroxysmal or chronic, without hemodynamic symptoms, with or without atenolol, with or without radiofrequency ablation.	Yes AFSPC or GSC	
	Atrial flutter, without successful radiofrequency ablation and/or atrial fibrillation with hemodynamic symptoms.	No AFSPC or GSC	

† Waiver for single episode AF should not be submitted until at least 3 months after conversion to sinus rhythm, including a minimum of two months off antiarrhythmic medications. There is a

minimum 3 months observation before submitting waiver for paroxysmal and chronic atrial fibrillation.
$ For untrained FC II individuals waiver is unlikely and for untrained FC III individuals waiver will be considered on a case by case basis.
# In cases of paroxysmal and chronic atrial fibrillation treated with or without atenolol, waiver will be restricted to low performance aircraft (IIA) and in case of pilots, with another qualified pilot at redundant controls (IIC).
+ If treated with radiofrequency ablation, see *Radiofrequency Ablation (RFA) of Tachyarrhythmias* waiver guide for further guidance.
* In cases of paroxysmal and chronic atrial fibrillation treated with or without atenolol, FC III individuals are restricted to low performance aircraft.
**AFMSA remains the waiver authority for all FC IIU cases.

Review of AIMWTS through July 2011 revealed 175 cases of atrial fibrillation/flutter; one FC I, 110 FC II, 2 FC IIU, 51 FC III, 4 ATC/GBC, and 7 SMOD. There were 23 disqualified cases: 1 FC I, 14 FC II, 7 FC III, and 1 SMOD. Of the total of 23 disqualified cases, 14 were disqualified for something other than atrial fibrillation or atrial flutter. Ten cases were for atrial flutter (some also were atrial fibrillation) and 13 cases were status post ablation with an additional 2 cases status post MAZE procedure.

IV. Information Required for Waiver Submission.

The aeromedical summary for <u>initial waiver</u> for single episode of atrial fibrillation converted to sinus rhythm should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, blood pressure, medications, and activity level.
B. Cardiology consult.
C. Electrocardiogram (ECG) during atrial fibrillation and after conversion to sinus rhythm.
D. Report and videotape/CD copy of echocardiogram to the ACS, study performed after conversion to sinus rhythm. (Notes 1 and 2)
E. Thyroid function test (TSH).
F. Report and representative tracings of Holter monitor performed in the final month of DNIF observation.
G. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

The aeromedical summary for <u>initial waiver</u> for paroxysmal or chronic atrial fibrillation or atrial flutter should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, blood pressure, medications, and activity level.
B. Cardiology consult.
C. Electrocardiogram (ECG).
D. Report and videotape/CD copy of echocardiogram to the ACS. (Notes 1 and 2)
E. Thyroid function test (TSH).
F. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

The aeromedical summary for waiver renewal should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 Codes for atrial fibrillation and flutter	
427.31	Atrial fibrillation
427.32	Atrial flutter

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WAIVER GUIDE
Updated: Sep 2011
Supersedes waiver guide of Jun 2008
By: Dr. Dan Van Syoc
Reviewed by Maj Eddie Davenport, chief ACS cardiologist

CONDITION:
Atrioventricular Conduction Disturbances (Sep 11)

I. Overview.

Atrioventricular (AV) conduction disturbances include first degree AV block, Mobitz I second degree AV block (Wenckebach), Mobitz II second degree AV block and third degree AV block (complete heart block). In most electrocardiogram (ECG) textbooks, first degree AV block is defined as PR interval >0.20 seconds. Based on research from the Aeromedical Consultation Service's (ACS's) early aviator databases, the ECG Library has for decades defined first degree AV block as PR interval >0.22 seconds.

First degree AV block is common in athletes and other fit people such as aircrew. If the airman is asymptomatic without evidence of structural heart disease, there should be no limitations for flying or flying training.[1] Second degree AV block is separated in Mobitz types I and II. Type I block (Wenckebach) is when there is progressive delay between atrial and ventricular contraction with the eventual dropped beat. In most cases, Mobitz type I block does not produce any symptoms and further evaluation is normally not indicated.[2] Mobitz I second degree AV block has long been considered a normal variant and as such required no further evaluation. It usually occurs during sleep and is thus more likely seen on a Holter monitor during sleep rather than on a 12-lead ECG performed while awake. In Mobitz type II block, as with type I block, there is a dropped beat. In type II block, though, the PR interval is unchanged prior to the dropped beat. The site of involvement for type II block is normally below the AV node rather than at the AV node as is seen with type I block and first degree AV block. Location below the AV node puts the patient at a considerable risk for progression to complete heart block (third degree heart block).[3] In third degree AV block, the atrial and ventricular rates are totally independent of each other.

First degree AV block and Mobitz I AV block have been reported on ECG in 0.6% and 0.004% of aviators, respectively.[4] In this population these two findings are usually normal variants related to increased baseline vagal tone, especially in physically active individuals. Presentations due to underlying heart disease would be very unusual in our population, but should be considered in appropriate clinical scenarios. The site of the conduction delay is most commonly in the AV node. Exercise reduces vagal tone and typically reverses these two blocks. First degree AV block previously required a "hopogram" (exercise in place to increase heart rate) for evaluation. In 1999, the USAF Central ECG Library reviewed its database of 72 hopograms done for first degree AV block. No cases of AV conduction system disease were found. Consequently, hopogram is no longer routinely required and first degree AV block is considered to be a normal variant.

Mobitz II second degree AV block and third degree AV block have been reported on ECG in 0.003% and 0.004% of aviators, respectively.[5] They generally are recommended for permanent pacemaker placement due to their bradycardia-related symptoms.[4] They are not compatible with continued flying status and are also disqualifying for retention in the military.

II. Aeromedical Concerns.

Aeromedical evaluation is usually not indicated for first degree AV block and Mobitz I AV block, but the USAF Central ECG Library/ACS may request further local evaluation for unusual individual cases, such as first degree AV block with marked PR prolongation (usually >0.30 seconds), first appearance of either of these two blocks at an older age (usually >40 years), or frequent Mobitz I on an ECG or other tracing, especially while awake. Mobitz II second degree AV block is at risk for continued and advanced AV block. Both Mobitz II second degree AV block and third degree AV block are at risk for sudden death, syncope, bradycardia-related hemodynamic symptoms and heart failure.

III. Waiver Considerations.

As noted above, first degree AV block and Mobitz I second degree AV block are generally considered normal variants and as such do not require a waiver. If further testing is requested by the ECG Library/ACS for unusual individual cases, aeromedical disposition will be guided by the findings. Since these are normally incidental findings on routine ECGs, DNIF of the aircrew member is not required for further work-up unless specifically recommended by the ACS. Few aviators with Mobitz II second degree AV block or third degree AV block are seen at the ACS because the recommendation for permanent cardiac pacing and the risk of hemodynamic symptoms is not compatible with flying status. Waiver for these two diagnoses is unlikely. All of the above is also applicable for FC IIU personnel. For ATC/GBC and SMOD personnel, retention standards which state that symptomatic or asymptomatic second degree Type II or third degree atrioventricular block, or symptomatic second degree Type I atrioventricular block are disqualifying. The exception is atrioventricular blocks which are clearly associated with a reversible cause.

Table 1: Waiver potential for AV conduction disturbances.

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	Yes#
	Mobitz II second degree AV block and third degree (complete) block	No AETC	Yes#
II/IIU, including untrained	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	Yes*
	Mobitz II second degree AV block and third degree (complete) block	No AFMSA	Yes*
III, including untrained	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	No (certifying authority for initial physicals may send to ECG Library)
	Mobitz II second degree AV block and third degree (complete) block	No MAJCOM	Yes
ATC/GBC	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	No
	Mobitz II second degree AV block and third degree (complete) block	No MAJCOM	No
SMOD	First degree AV block and Mobitz I second degree AV block (Wenckebach)	Not required - qualified	No
	Mobitz II second degree AV block and third degree (complete) block	No AFSPC or GSC	No

ECG Library is reviewing all FC I/IA ECGs (USAFA, USAFSAM and AD sent by HQ AETC).
* ECG Library would review; all cardiac studies on FC II individuals are required to be sent to ECG library for review.

A review of AIMWTS through Jul 2011 revealed 20 cases of AV conduction disturbances: 1 FC I/IA, 8 FC II, 10 FC III, and 1 ATC/GBC. Of the 20 cases, 4 were disqualified; 2 FC II and 2 FC

III. Two of the disqualified cases were for Mobitz type II, one for multiple medical problems and one for vision-related issues. Many of the cases granted waiver were for first degree AV block or Mobitz I second degree AV block.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary should contain the following information for waiver for Mobitz II second degree block, third degree (complete) block or if ECG library identifies abnormal first degree block or Mobitz I second degree block requiring waiver:
A. Complete history and physical exam – to include description of symptoms (negative included), medications/treatment, and activity level.
B. Cardiology consult. (Not required in abnormal first degree block or Mobitz I second degree block, if ECG library does not request.)
C. Electrocardiogram (ECG).
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 Codes for AV conduction disturbances	
426.0	Atrioventricular block, complete
426.11	First degree atrioventricular block
426.12	Mobitz (type) II atrioventricular block
426.13	Mobitz (type) I [Wenckebach] atrioventricular block

V. References.

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WAIVER GUIDE
Updated: Feb 09
By: Dr. Dan Van Syoc

CONDITION:
Attention-Deficit Hyperactivity Disorder (ADHD) (Feb 09)

I. Overview.

Attention deficit-hyperactivity disorder (ADHD) is characterized by disturbance of attention relative to the inability to marshal and sustain attention, modulate activity level, and moderate impulsive actions. Three types of ADHD can be diagnosed: combined inattentive, hyperactive, and impulsive (about 80% of all patients); predominately inattentive (about 10-15%); and predominately hyperactive and impulsive (about 5%). Treating providers need to be aware that behaviors of ADHD may overlap or coexist with other mental health conditions[1]. The classic triad of ADHD symptoms includes inattention and distractibility, impulsivity, and hyperactivity. While these symptoms are typical in childhood, many adults do not exhibit the full triad. Other symptom clusters typically affect adults with ADHD. Common complaints include: confusion or trouble thinking; depression or low self-esteem; difficulty maintaining a job; excessive moodiness or irritability; forgetfulness or memory difficulties; lack of organization; marital or relationship discord; poor discipline or procrastination; and underachievement, as manifested by performing below intellectual competency at work or school. The diagnosis of adult ADHD should not be made without a history that began in childhood, usually before the age of seven[2, 3].

Until the past couple of decades, little thought was given to adult manifestations of ADHD. Clinicians now realize this disorder, once believed to "burn out" in adolescence, can persist into adulthood. Both genetic and environmental factors are undoubtedly important in the etiology of this disorder[4]. ADHD is thought to affect an estimated 3% to 11% of children in North America. In childhood, boys outnumber girls by as much as 10 to 1, but the disorder seems to persist in a higher proportion of girls, and by adulthood the ratio of men to women approximates 1 to 1. It is also probable that many young females manifest this disorder in ways that do not create the level of concern to parents and teachers as do boys. Most current estimates put the prevalence of ADHD in adults at 1% to 3%, with persistence of childhood disease into adult years at 30 to 70%[5]. Typical childhood symptoms are likely to present in adult years as poor time management, trouble initiating and completing tasks, trouble with multitasking, procrastination, and avoiding activities that demand adult attention[2]. Many of these symptoms are common to normals, but the diagnosis is made when the symptoms interfere with school/work/relationships and activities of daily living.

However, the more subtle learning and cognitive inefficiencies that can degrade performance under the demands of military flying may not be detected or recognized in prior non-flying pursuits. As it is unlikely that an initial flight applicant or rated aviator would self-identify as suffering from attention deficit disorder, the clinician must have a high index of suspicion for this disorder. The flight surgeon or clinician who suspects ADHD must attempt to establish a retrospective childhood diagnosis. Diagnostic skepticism is warranted in the context of a referral for poor performance when there is no prior history of cognitive problems. Since the diagnosis of ADHD is a clinical one, a comprehensive interview plus careful neuropsychological testing are important diagnostic procedures.

Treatment of ADHD in adults is similar to that of children, although the results in adults are much less predictable than in children. The mainstay of treatment in both groups is pharmacologic treatment with stimulants, which have demonstrated a clinically and statistically significant effect on reducing ADHD symptoms, although some trials have shown that 30% to 50% of adult subjects either do not respond or have adverse effects. There has been some recent success with non-stimulant medication, particularly atomoxetine[3]. Others believe that the issue with many "non-responding" adults is that they are probably underdosed[6]. Non-pharmacologic treatment of ADHD in adults has not been studied. However, it is accepted that psychological treatment (often in a group setting) can improve patients' lives by teaching them how to structure their environment and improve their organizational skills, how to improve social skills and relationships, and how to manage mood lability.

II. Aeromedical Concerns.

Features associated with ADHD in adults could have a negative impact in the aviation environment, and could cause one to be found unfit for flying duties. Typically, significant problems will become manifest well before an individual is considered as an applicant for aviation service, and the individual will not be considered suitable for flying duties on the basis of aptitude or poor performance on other screening tests. Accurate diagnosis is critical and the flight surgeon always needs to be attentive to details when dealing with these cases. As many parents, teachers, and pediatricians "jump to the diagnosis" of ADHD, we need to be diligent with historical analysis when these cases come across our desk.

The confirmed diagnosis in a trained aviator is unusual. In such cases, it needs to be stressed that the aviator's behavior must be sufficiently inappropriate for their age, as well as be excessive, long-term, and pervasive[5]. Complaints may come to the attention of the flight surgeon through the reports of spouses, supervisors, colleagues or other aircrew. Severity and nature of the disorder should be documented. In addition, psychiatric diagnoses made during childhood are occasionally found to be unsubstantiated in light of a careful, accurate history. This is particularly true if the service member has had no symptoms since early childhood.

A confirmed diagnosis of ADHD is disqualifying for all classes of flying. Additionally, treatment with stimulant medications for ADHD is incompatible with flying. Further, ADHD can put retention in the military at risk and these members may need to meet a Medical Evaluation Board. If treatment with medication is required for adequate duty performance, referral to the unit commander for determination of administrative disposition is appropriate. The commander may seek administrative separation based on impaired performance or allow for continued duty if the value to the unit outweighs risks of requiring medication. If treatment with medication is not required for adequate duty performance, the member remains suited for continued military service."

III. Waiver Considerations.

ADHD is disqualifying for all classes of flying in the US Air Force: If an applicant for initial training with a possible past history of ADHD has successfully met the following accession criteria, a waiver is not necessary:

A. Has not required an Individualized Education Program or work accommodations since the age of 14.

B. There is no history of comorbid mental disorders.
C. Has never taken more than a single daily dosage of medication or has not been prescribed medication for this condition for more than 12 cumulative months after the age of 14.
D. During periods off of medication after the age of 14, the applicant has been able to maintain at least a 2.0 grade point average without accommodations.
E. Documentation from the applicant's prescribing provider that continued medication is not required for acceptable occupational or work performance.
F. Applicant is required to enter service and pass Service-specific training periods with no prescribed medication for ADHD.

Waiver may be considered for aircrew with a history of ADHD, providing they are symptom free, have not manifested a degradation of their performance of aircrew duties, and have the ability to function without 'need' for medication for at least a year.

Table 1. Waiver potential for ADHD for FC I/IA, II and III.

Flying Class (FC)	**Waiver Potential Waiver Authority**	**ACS review/evaluation**
I/IA	Maybe** AETC	Maybe*
II	Maybe** MAJCOM+	Yes*
III	Maybe** MAJCOM+	Yes*

+For untrained FC II and III personnel, waiver authority is AETC; otherwise it is the MAJCOM of assignment.
*ACS review/evaluation if requested by AETC for initial FC I/IA, FC II and FC III applicants.
**Untrained individuals with passing grades in high school or college and who have not used any medications for at least twelve months do NOT require a waiver for ADHS.

Review of AIMWTS revealed a total of 57 cases. There were 14 FC I cases and all received a waiver for a history of ADHD; all had been off any treatment before beginning college studies. There were a total of 7 FC II cases; the only DQ was an IFCII (flight surgeon) applicant on medications who was also ARMA unsat as he did not want to fly. For FC III, there were 36 cases with 21 disqualifications; 20 were on medications at the time of the waiver and the other one had a new diagnosis for an initial FC III waiver but was not yet on medication.

IV. Information Required for Waiver Submission.

A. Mental health evaluation summary, *specifically including* psychological and neuropsychological evaluation reports (with their raw data), and any pertinent past medical or mental health records. If there are questions regarding appropriate testing, contact personnel in the ACS Neuropsychiatry branch.
B. Any pertinent current neurological or other medical consultation reports.
C. Aeromedical summary detailing any social, occupational, administrative or legal problems, including an analysis of the aeromedical implications of this particular case history.
D. For FC I/IA, detailed history of academic achievement and use of any educational accommodations.

E. For FC II and FC III, a letter from the flier's aviation supervisor or commander supporting a return to flying status.

ICD 9 Codes for Attention Deficit-Hyperactivity Disorder	
314.00	ADHD, primarily inattentive type
314.0	ADHD, child or adult
314.01	ADHD with hyperactivity

This waiver guide was reviewed by Col Timothy Sowin, ACS chief of Neuropsychiatry and Dr. John Patterson, AF/SG Consultant, Aerospace Clinical Psychology

V. References.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Jan 2008
By: Dr Dan Van Syoc
Reviewed by Maj Joel Jenné, staff spine orthopedist at WHMC

CONDITION:
Back Pain (Chronic Low) (Mar 11)

I. Overview.

Chronic recurrent low back pain is commonly defined as pain that has persisted for three months that has not responded to conservative management or, alternatively, three distinct episodes in one year, each lasting at least six weeks, that has recurred despite conservative management.[1] Approximately 75-80% of adults will suffer from low back pain at some point in their life and it is second only to upper respiratory problems as a reason to visit their primary care physician.[2] Low back pain affects men and women equally and is most prevalent in the age range of 30 to 50 years. Occupationally, it is the most common cause of work related disability in people under 45 years of age.[3] Aeromedically, a Royal Air Force study found a 13% incidence of backache directly related to flying in their pilots.[4] The total costs of low back pain in the US exceeds $100 billion annually and that 75% of the total cost is attributable to fewer than 5% of all patients with low back pain.[2, 5] Back pain is the most common and most expensive cause of work-related disability in the population younger than 45 years.[6] For work-related cases, risk factors for the development of disabling chronic or persistent back pain include preexisting psychological distress, disputed compensation issues, others types of chronic pain, and job dissatisfaction.[7]

It is estimated that up to 85% of patients with isolated low back pain cannot be given a precise diagnosis based on symptoms and anatomy.[5, 8] Commonly accepted risk factors include increasing age, heavy physical work, bending, twisting, vibration, excessive weight, poor conditioning, static work postures, sustained or repeated applications of force, sustained awkward postures, rapid repeated motions, cold environment, fatigue, smoking, severe scoliosis, and psychological/psychosocial factors.[9] Vibration is not routinely thought of, but it was the most commonly reported cause of back pain or disorder in occupations that had prolonged whole body vibration exposures.[10] Vibration exposure in the 4 to 6 Hz range, as seen in motor vehicle operation (truck drivers), has been shown to be a risk factor for low back pain. In the aeromedical environment, rotary wing aviators are at the highest risk for vibration associated injury. Repeated exposures to vibration can fatigue the paraspinal musculature which can lead to injury.[10, 11] There is great concern for back pain in our rotary wing aviators. Some feel that the increased incidence of back pain in these individuals is due to vibration, while others feel it is also attributable to their bent-over posture while flying.[11, 12]

Numerous studies report that 90% of patients with low back pain seen within three days of the injury or onset of pain completely recovered within two weeks using conservative therapy.[13] Mechanical low back pain accounts for 97% of the diagnosis; 70% due to lumbar strain/sprain, 10% due to degenerative processes, 4% due to herniated disc, 4% due to osteoporotic compression fracture, 3% due to spinal stenosis, 2% due to spondylolisthesis, less than 1% due to traumatic fracture, and less than 1% due to congenital disease. Referred pain from visceral disease accounts for 2% including disease of the pelvic organs, renal disease, aortic aneurysm, and gastrointestinal

disease. Non-mechanical spinal conditions account for approximately 1%; includes neoplasia (0.7%), inflammatory arthritis (0.3%), and infection (0.01%).[8] This waiver guide primarily deals with mechanical low back pain due to lumbar strain/sprain and degenerative processes. For other causes of low back pain, see the Herniated Nucleus Pulposus (HNP) and Spinal Fusion, Spinal Fracture, and Spondylolysis Spondylolisthesis waiver guides for help with those topics.

Initial evaluation of low back pain should include a history and physical to help place the individual with low back pain into one of three broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy or spinal stenosis or back pain potentially associated with another specific spinal cause. The "red flags" of back pain in the history must be addressed (more likely to be in the latter two categories); history of trauma, age greater than 50 years or less than 20 years, history of malignancy or immune compromised, pain which worsens when supine, recent onset of bowel or bladder dysfunction, saddle anesthesia and severe or progressive neurologic deficit of the lower extremities.[5] Other significant history includes chronic corticosteroid use, unexplained weight loss, IV drug use, recent urinary tract infection, pain over one month duration, or failure to improve with conservative therapy. Psychosocial factors and emotional distress should be assessed because they are stronger predictors of adverse low back pain outcomes than either physical examination findings or severity and duration of pain. Routine imaging and other diagnostic tests in individuals with nonspecific low back pain is not recommended; whereas in individuals with low back pain and severe or progressive neurologic deficits or when serious underlying conditions are suspected then imaging is appropriate.[5] Individuals with persistent (> 4 weeks) low back pain and signs or symptoms of radiculopathy or spinal stenosis should be evaluated with MRI and plain radiographs. Of note, anatomic evidence of a herniated disc may be found in 22 - 40% of asymptomatic persons. Bulging discs may be seen in up to 81% of asymptomatic persons.[8]

Evaluation of nonspecific low back pain rarely necessitates use of imaging modalities. As the vast majority resolve with conservative therapy, imaging adds little to the care and evaluation of the patient.[5] Initial advice for most patient is to maintain activity as tolerated. Bedrest does not improve function or decrease pain levels.[1, 13] Multiple therapeutic modalities are available for low back pain, particularly lumbar strain/sprain and degenerative processes. For most patients with low back pain, recommendations are to resume walking and normal daily activities as quickly as possible, consideration for nonsteroidal anti-inflammatory drugs (NSAIDs) or acetaminophen, muscle relaxants, and manipulation can be helpful. Previously advocated modalities that are not now thought to be helpful include exercise therapy, massage, and acupuncture. Inexpensive patient self-care education tools such as *The Back Book* are good supplements to physician advise.[13] Spinal manipulation may be mildly effective for some individuals with chronic low back pain. Traction, corsets and braces have not been shown to be of much benefit for acute or chronic back pain or prevention of recurrence of back injury. Some patients with cute low back pain may require opioids to control the pain initially, but they should be considered a second- or third-line analgesic option and should be used for only a short period.[13] Tricyclic antidepressants have been shown to effectively treat pain in about one third of those with chronic low back pain (although not waiverable for aircrew).[8] One study showed that medium-firm mattresses improved pain compared to firm or hard bed mattresses.[1] With chronic low back pain, an early multidisciplinary approach to combine cognitive-behavioral therapy, patient education, supervised exercise, selective nerve blocks, or other strategies to restore functioning is recommended.[8]

For additional information and Evidenced Based Clinical Practice Guidelines:

DOD/VA Clinical Practice Guidelines "Assessment and Management of Low Back Pain" – http://www.healthquality.va.gov/low_back_pain_lbp_clinical_practice_guideline.asp

Chou R, Loeser JD, Owens DK,, et al. Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain: an evidence-based clinical practice guideline from the American Pain Society. Spine. 2009 May 1;34(10):1066-77.

II. Aeromedical Concerns.

The final aeromedical disposition for mechanical low back pain due to lumbar strain/sprain and degenerative processes is dependent on the degree of functional residual impairment that remains once treatment and rehabilitation are completed. The flight surgeon must ascertain that the airman can safely perform all flight duties. There should be no significant limitation of motion, loss of strength, or functional impairment that may compromise safe operation of the aircraft, and/or safe egress. If the patient responds well to therapy and there are few or no recurrences, the airman may be eligible for continuation of flight duties. If the low back pain is recurrent and disabling it is disqualifying for all flight classes regardless of the cause. Low back pain due to other causes such as herniated disc, spondylolisthesis, and spinal fractures has unique aeromedical concerns and is discussed in their respective waiver guides.

Aircrew members who wear chest, back or seat style parachutes may use a lumbar pad to provide comfort to the lumbar region of the individual's back and keep the spine in the best position to withstand shock. Technical order 14P3-12-1 provides guidance for the lumbar pads. Life support can obtain, fit and provide specific guidance on the use of lumbar pad.

III. Waiver Consideration.

Back pain is specifically disqualifying for Flying Classes I/IA, II, and III. FC IIU personnel are disqualified based on the following terminology: "Current conditions including, but not limited to, the spine and sacroiliac joints associated with local or referred pain to the extremities, muscular spasms, postural deformities, requires external support, requires frequent treatment, or prevents satisfactory performance of duties." ATC/GBC personnel are disqualified based on this definition: "Any disease, condition, or deformity of the musculoskeletal system, which may impair duty performance or access to control facilities, is likely to progress, or which requires frequent use of analgesic or anti-inflammatory medication for control." And finally, SMOD personnel may possibly be disqualified under the general clause which states: "Any medical condition, the natural history of which is to incapacitate an individual suddenly and without warning."

Table 1: Waiver potential for chronic low back pain

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Chronic Pain	No AETC
II/III	Chronic Pain	Yes* MAJCOM
IIU	Chronic Pain	Yes* AFMSA
ATC/GBC	Chronic Pain	Yes* MAJCOM
SMOD	Chronic Pain	Yes* AFSPC or GSC

* Waiver is unlikely for untrained personnel.

AIMWITS search in Dec 2010 revealed a total of 203 individuals with waiver dispositions containing the diagnosis of low back pain. Of the total of 203, there were 4 FC I/IA cases (1 disqualification), 70 FC II cases (15 disqualifications), 106 FC III cases (64 disqualifications), 14 ATC/GBC cases (8 disqualifications), and 9 SMOD cases (5 disqualifications). The cause for the disqualification in the vast majority of the 93 disqualified cases was strongly related to the issue of low back pain.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for chronic low back pain should include the following:
A. History - Must define the back pain symptomatology; location, radiation, duration, conditions that improve or aggravate the pain, limitations of activities, treatment, and medications. Discuss any "Red Flags" such as bowel and bladder dysfunction and address pertinent negatives.
B. Physical exam – range of motion, muscle strength, gait, sensation, reflexes, etc.
C. Reports of any radiological or neurological studies and lab work to exclude specific causes of back pain.
D. All specialty consults/opinions obtained.

The aeromedical summary for waiver renewal for chronic low back pain should include the following:
A. Brief history of back pain symptomatology; location, radiation, duration, conditions that improve or aggravate the pain, work-up and treatment. Include the interval history since last waiver with special attention to changes in symptoms, exasperation and work impact.
B. All specialty consults/opinions obtained.

ICD-9 codes for low back pain
724.2 Lumbago
724.5 Backache, unspecified

V. References.

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WAIVER GUIDE
Waiver Guide
Updated: March 2012
Supersedes Waiver Guide of Nov 2008
By: Dr. Jason Cromar (RAM 12), Col (Dr.) Roger Hesselbrock (ACS Neurologist), and Dr. Dan Van Syoc

CONDITION:
Bell's Palsy (Mar 2012)

I. Overview.

Bell's palsy is an idiopathic, acute peripheral-nerve palsy involving the facial nerve (CN VII), the cranial nerve that supplies all the muscles of facial expression. Bell's palsy is named after Sir Charles Bell (1774-1842), the first to describe the syndrome along with the anatomy and function of the facial nerve.[1] Bell's palsy was long considered a diagnosis of exclusion and includes 60% to 75% of all cases of facial paralysis. It has an annual incidence of about 20 per 100,000 with the incidence increasing with age.[2] The diagnosis requires three essential criteria: 1) the presence of a peripheral seventh cranial nerve palsy, 2) the absence of any other cranial neuropathies or neurologic deficits, and 3) the lack of an identifiable cause.[3] Patients with Bell's palsy usually progress from onset of symptoms to maximal weakness within three days, and almost always within one week. Left untreated, 85% of patients will show at least partial recovery within three weeks of onset.[1]

At least 70% of treated patients with Bell's palsy have full recovery within days to weeks, but it can take up to several months in rare cases. Those with observable facial movement with an incomplete paralysis experience an almost universal good recovery.[4] Poor prognostic factors include older age, hypertension, impairment of taste, pain other than in the ear, and complete facial weakness. The sexes are equally affected; however, the risk is three times greater during pregnancy. The median age at onset is 40 and the condition rarely recurs.[5] Common findings include eyebrow sagging, inability to close the eye, disappearance of nasolabial fold, and the mouth being drawn to the non-affected side. The clinician can assess facial movement by observing the response to a command to close the eyes, elevate the brow and frowning, showing the teeth, and puckering the lips. If the ipsilateral forehead muscles are spared, this would indicate a central lesion rather than peripheral.[6]

The majority of Bell's palsy patients will recover spontaneously even if left untreated, but it is very difficult to determine which patients will spontaneously improve and which will not. Electrodiagnostic studies can be helpful to determine the prognosis; however, these tests are not necessary in a majority of patients. Patients with a typical lesion that is incomplete and recovers do not need further study. In contrast, electrodiagnostic studies may be warranted in patients with clinically complete lesions for prognostic purposes.

Imaging is warranted if the physical signs are atypical, there is slow progression beyond three weeks, or if there is no improvement at six months. High resolution CT scanning is excellent for bony detail, will demonstrate erosion and can define potential surgical causes of facial palsy. In the rare cases requiring surgical decompression, surgeons have noted the presence of facial nerve swelling.[7] Magnetic resonance imaging (MRI) with and without enhancement with gadolinium may

demonstrate pathological enhancement in Bell's palsy, and is reported in a majority of patients. The absence of enhancement may be a good prognostic sign.

Treatment is usually non-surgical and most clinicians feel it is important to begin treatment quickly (within a few days). Therapy has historically involved aggressive treatment with corticosteroids; normally prednisone is prescribed for a 10-day tapering course starting with 60 mg/day. Recent studies have focused on the possibility of herpes simplex virus (HSV-1) as the etiology of Bell's palsy due to the discovery of elevated HSV-1 titers in affected patients. However, other studies have failed to isolate viral DNA in biopsy specimens, leaving the causative role of HSV-1 in question.[1] Screening blood studies for underlying systemic disease or infection should be strongly considered in cases without spontaneous and rapid improvement and should include screening for Lyme disease, Syphilis and Herpes Zoster.

There have been two recent large studies designed to assess the benefit of antiviral drugs in the treatment of Bell's palsy. The first was in Scotland involving over 500 patients, with all treatment begun within 72 hours of the onset of symptoms. This study used prednisolone as the steroid and acyclovir as the antiviral agent. They concluded the early use of prednisolone was effective, but treatment with acyclovir alone or with the steroid had no effect on the outcome.[8] Another recent study in Japan treating 221 patients either with prednisolone and valacyclovir or prednisolone and placebo, all begun with seven days of symptom onset, showed no significantly higher rate of complete recovery in the valacyclovir/prednisolone group than in the placebo/prednisolone group.[9, 10] In summary, these two high quality randomized controlled trials demonstrated that steroid treatment alone was effective for Bell's palsy, while antiviral treatment showed no benefit either when given alone or when combined with steroids.

II. Aeromedical Concerns.

Aviators with Bell's palsy may have eye irritation due to the inability to close the lid, and food and saliva can pool on the affected side of the mouth potentially spilling out from the corner. Vision can be adversely affected due to the dry eyes, speech may be difficult due to facial weakness, and the wear of life support gear, particularly a tight-fitting aviator mask, can be compromised due to facial weakness. These symptoms, along with normal anxiety accompanying this disorder, make flying inadvisable until resolution of the condition. As most patients will be treated with steroids and possibly antiviral agents, the aviator should be grounded during treatment as these medications, particularly the steroids, are not waiverable.

III. Waiver Consideration.

An episode of Bell's palsy will be disqualifying for FC I/IA, FC II and FC III, and the flyer will be considered for a waiver based on the outcome of treatment and level of post-treatment residual defects. A history of remote Bell's palsy will not necessarily be disqualifying as there is often complete resolution and affected individuals are not at an increased risk of recurrence. It is not disqualifying for ATC/GBC and SMOD personnel.

Table 1: Waiver potential for flyers with Bell's Palsy

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review
I/IA	History of Bell's palsy, resolved	Yes+ AETC	No
	History of Bell's palsy with residual	Maybe*+ AETC	If being considered for waiver
II/III/IIU	History of Bell's palsy, resolved	Yes+ MAJCOM**	No
	History of Bell's palsy with residual	Maybe*+ MAJCOM	If being considered for waiver

*Level of residual will be critical for consideration of waiver.
**Waiver authority for FC IIU personnel is AFMSA.
+Waivers can be granted on an indefinite basis.

AIMWTS review in March 2012 revealed a total of nineteen cases; one was FCI, nine were FCII, and nine were FC III. Each case was granted a waiver. Two pilots demonstrated very mild facial weakness, one FC I applicant showed a mild hemifacial spasm, a flight surgeon had residual lagophthalmos, and one pilot showed mild facial asymmetry.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for Bell's palsy should include the following:

A. Complete history of event detailing all symptoms, treatment (all medications, dosages, and number of days treated) and level of symptom resolution.
B. Report from all treating physicians, including the results of any diagnostic testing.
C. Surgical report if applicable.

The AMS for waiver renewal for Bell's palsy should include the following:
A. Interval history and level of symptom resolution.
B. Report from all treating physicians, including the results of any interval diagnostic testing.

ICD 9 codes for Bell's palsy	
351	Facial nerve disorders
351.0	Bell's palsy
351.9	Facial nerve disorder, unspecified

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WAIVER GUIDE
Updated: Jan 10
Supersedes Waiver Guide of Dec 05
By: Dr Dan Van Syoc

CONDITION:
Benign Prostatic Hyperplasia (Jan 10)

I. Overview.

Benign prostatic hyperplasia (BPH), one of the most common diseases of aging men, can be associated with bothersome lower urinary tract symptoms (LUTS) that include increased urinary frequency, nocturia, hesitancy, urgency and a weak urinary stream[1]. Chronic inability to completely empty the bladder may cause bladder distension with hypertrophy and instability of the detrusor muscle[2]. BPH can affect quality of life by interfering with normal daily activities and sleep patterns. The prevalence of histopathologic BPH is age-dependent, with initial development usually after 40 years of age. By age 60, its prevalence is greater than 50% and by age 85 it is as high as 90%[2, 3]. Similar to that of histologic evidence, the prevalence of bothersome symptoms also increases with age. Approximately one half of all men who have a histologic diagnosis have moderate to severe LUTS[3].

Diagnostically, BPH is defined as a patient with a score > 7 on the American Urological Association Symptom Index (AUASI) (see Table 1) and a peak urinary flow rate < 15 mL/s[4]. It has also been defined as prostate enlargement from progressive hyperplasia of stromal and glandular prostatic cells. Clinical BPH refers to the LUTS associated with benign prostatic enlargement (BPE) causing bladder outlet obstruction (BOO)[5]. There is growing interest in the relationship of inflammation and BPH. In fact, inflammation of the prostate appears to be more closely related to BPH than the clinical syndrome chronic prostatitis[5]. In the future, this may lead to treatment of BPH with therapies that target inflammation, but there is no good evidence at this time to support the treatment of BPH with antibiotics or anti-inflammatory medications such as NSAIDs. Large-scale studies of different populations have demonstrated consistent evidence of a relationship between LUTS symptoms and ejaculatory dysfunction that is independent of age and other comorbidities[6].

Because long-term data from population-based studies have only recently become available, the risks of developing complications and morbidities from untreated BPH are unclear. For example, despite recent evidence, there is still uncertainty regarding the likelihood that a patient with a specific symptom complex will develop acute urinary retention within a particular time frame. Nonetheless, BPH-associated mortality is rare in the United States, and serious complications are uncommon[7]. In contrast, LUTS are bothersome to many patients, and the amount of bother may differ greatly among individuals with the same degree of symptom frequency and severity. Since the impact of LUTS on the patient's quality of life is highly variable and not directly related to any measurable physiological factors, the patient's perception of the severity of the condition, as well as the degree to which it interferes with his lifestyle or causes embarrassment, should be the primary consideration in choosing therapy[3].

The AUA recommends urinalysis for all men presenting with lower urinary symptoms to help rule out non-BPH causes of symptoms such as bladder cancer, bladder stones, infections, or urethral

strictures. In addition, LUTS can be a presenting symptom of prostate cancer, and men with LUTS should undergo screening for prostate cancer with a digital rectal examination and serum Prostate Specific Antigen (PSA). Prostate cancer should be considered a diagnosis of exclusion in men with LUTS. PSA levels correlate with prostate volume and increased levels may direct particular forms of therapy. In addition, urine cytology should be obtained in men at risk of bladder cancer, particularly if they have associated irritative symptoms of urinary frequency and urgency or hematuria[2, 3].

Treatment options for BPH include watchful waiting, medications and surgery. The decision to treat involves balancing the severity of the patient's symptoms with potential side effects of therapy. Watchful waiting is recommended in men who have mild symptoms (AUASI of 6 or less) or who do not perceive their symptoms to be particularly bothersome. These men need to be monitored at least annually for symptom progression[2].

Treatment with medications is an increasingly popular choice. When selecting an agent one has to take into consideration the nature of the man's disease, side effects of the selected agent and other medications utilized by the patient. The two major classes of medications act upon different components of the bladder outlet obstruction of BPH. The dynamic (physiologic, reversible) component is related to the tension of prostatic smooth muscle in the prostate, prostate capsule, and bladder neck. The fixed (structural) component is related to the bulk of the enlarged prostate impinging on the urethra. Two classes of drugs, alpha-adrenergic antagonists and 5-alpha-reductase inhibitors, act upon the dynamic and fixed components, respectively. Alpha-adrenergic antagonists (terazosin, doxazosin, tamsulosin, alfuzosin, and prazosin) appear to be more effective for short-term treatment of symptoms but do not appear to have an impact on reducing long-term complications such as urinary retention or the need for surgical intervention. Only 5-alpha-reductase inhibitors (finasteride and dutasteride) have demonstrated the potential for long-term reduction in prostate volume, which in turn reduces the long term risks of urinary retention and surgical intervention[8]. The only current aeromedically approved medication therapy for BPH is the 5-alpha-reductase inhibitor finasteride[9]. Regarding ED, the alpha-adrenergic antagonists appear to have a lower incidence of this potential side effect than do the 5-alpha-reductase inhibitors[6].

There is increased interest in "natural" remedies for BPH. The most popular such agent over the past few years has been saw palmetto, which is an extract of the saw palmetto berry. In 2001 it was estimated that 2.5 million adult Americans had reported using this product. A recent trial compared saw palmetto with placebo and found that there was no difference after one year in the two groups in AUASI scores, maximal urinary flow rates, prostate size, residual volume after voiding, quality of life, or PSA scores during the study[10]. This study and others examining the efficacy of dietary supplement-like substances (including beta-sitosterol) raises questions about the variability of botanical products as well as their overall efficacy compared to their claims[11].

The most commonly performed surgical treatment for BPH is transurethral resection of the prostate (TURP). After this procedure, the patient is left with a wide open prostatic fossa bound by a denuded surgical capsule that will be lined by a newly regenerated epithelial surface in 6 to 12 weeks. Until this occurs, the patient is vulnerable to bleeding and most surgeons encourage him to avoid straining for at least six weeks. Most men note a marked decrease in symptom scores and a substantial increase in maximal urinary flow rates post-operatively. Side effects to this procedure include bleeding, incontinence and urethral strictures, each which is relatively uncommon. Most men will experience retrograde ejaculation after this procedure[12]. Newer surgical options include

several procedures with lasers, transurethral incision of the prostate, electrovaporization of prostate tissue, as well as several minimally invasive procedures such as transurethral needle ablation of the prostate and microwave thermotherapy have demonstrated efficacy as well, but are not appropriate for all TURP candidates. Urethral stents have been studied for BPH indications and are available, but have been abandoned by most urologists due to the tendency for tissue growth through stent fenestrations and encrustation of stent material.

Table 1 - AUA Urinary Symptom Index (AUASI)[3]

Questions to be Answered	**Not at all**	**Less than 1 time in 5**	**Less than half the time**	**About half the time**	**More than half the time**	**Almost always**
			Circle one number for each question			
1. Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5
2. Over the past month, how often have you had to urinate again less than 2 hours after you finished urinating?	0	1	2	3	4	5
3. Over the past month, how often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5
4. Over the past month, how often have you found it difficult to postpone urination?	0	1	2	3	4	5
5. Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5
6. Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5
7. Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	0 (none)	1 (1 time)	2 (2 times)	3 (3 times)	4 (4 times)	5 (5 or more times)
Sum of circled numbers (AUA symptom score): _____						
0 to 7: Mild symptoms						
8 to 19: Moderate symptoms						
20 to 35: Severe symptoms						

II. Aeromedical Concerns.

The presence of BPH symptoms alone is not automatically disqualifying for flying duties. The primary aeromedical and operational concern with BPH relates to the potential for urinary obstruction/retention. The symptoms of acute urinary retention include severe lower abdominal pain, a distended abdomen, and the sudden inability to pass urine.

Operationally, urinary frequency can be disruptive, and nocturia can result in sleep disruption and fatigue. The tendency to delay bladder emptying while in-flight can lead to excessive bladder distention and acute urinary retention. As such, judgment should be used in determining the aeromedical significance of reported symptoms.

Regarding medication therapy, the most important side effects of the alpha-1-adrenergic antagonist class are orthostatic hypotension, dizziness, and somnolence[2, 8]. As such, alpha-blockers are not acceptable for use in the aerospace environment at this time. Afulzosin may be reviewed in the next year for consideration. Regarding the 5-alpha-reductase inhibitors, specifically finasteride, a detailed aeromedical medication review in Sep 04 concluded it to be both effective and safe in the aerospace environment.[9] Surgical treatment for BPH should only result in grounding for several weeks and a later return to flying as long as the symptoms are relieved with the procedure. Furthermore, "natural" products such as saw palmetto and beta-sitosterol should be considered cautiously, with the knowledge and approval of the flight surgeon, due to big questions regarding efficacy, side effect profile, and the lack of regulation regarding contents and purity of these over-the-counter supplements.

III. Waiver Consideration.

Symptomatic BPH (AUASI score of seven or greater) is disqualifying for all classes of flying in the Air Force per AFI 48-123. Asymptomatic BPH, and history of invasive surgical therapy such as TURP are not disqualifying, and do not require waiver submission if the obstructive symptoms are relieved, urinary continence is maintained, and healing is complete. Of note, it is recommended that after invasive surgery the aviator remain DNIF for a minimum of 3 weeks to heal due to the risk for acute bleeding and post-operative urgency. Furthermore, DNIF is required if the patient's symptoms remain operationally significant, regardless of the treatment course.

Table 2: Waiver potential for Benign Prostatic Hyperplasia

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**Review/Evaluation at the ACS**
I/IA	Maybe*# AETC	No
II	Yes*+& MAJCOM	No
IIU	Yes*+& AFMSA	No
III	Yes*+& MAJCOM	No

*No indefinite waivers
This problem is very unlikely in the predominately young population contemplating flying training. Such a case will need to be worked up very carefully to rule out other sources of GU pathology.
+ No waiver required if symptoms are mild (less than seven on the AUASI Scale) without evidence of urinary retention and watchful waiting is the "treatment".
& No waiver required if surgery is the treatment of choice and there is no post-operative evidence of urinary retention.

AIMWTS review in Jan 2010 revealed 19 cases submitted with a diagnosis of BPH. Of the total, there were 0 FC I/IA cases, 12 FC II cases, and 7 FC III cases. There were two disqualifications; one was a FC II flight surgeon disqualified for another medical problem and the other was an initial FC III case who was disqualified as he was on a medication (tamsulosin) that is not approved for flying in the Air Force. Interestingly, there were three aviators waived on different alpha-1 receptor antagonists (these medications are not approved for aviation duties in the US Air Force.); one each for doxazosin, terazosin and alfuzosin. Two of these cases were FC III aviators and the other was a pilot (FC II). It is important that all waived medications are on the current approved medication list.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Information required for an initial waiver for benign prostatic hyperplasia should include:
A. Complete symptom history to include feelings of incomplete emptying of the bladder, urinary frequency, stopping and starting of urinary stream, urinary urgency, weak stream, difficulty initiating stream and nocturia. Discuss all attempted treatments/medications to include results and side effects.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. Exam: GU exam to include a digital rectal exam.
D. Laboratory: urinalysis, PSA, urine flow rate, and post-void residual. Some cases may require a more detailed evaluation to include cystoscopy, 24-hour urine for creatinine clearance and protein, IVP, renal/prostate ultrasound, and serum creatinine.
E. Consult: Urology evaluation if surgery performed or symptoms severe, otherwise, a report from the treating physician will suffice if treated medically.

The following information will be required for waiver renewal every three years (if any abnormalities surface in the interim, they will need to be addressed appropriately):
A. Interim history to include change in symptoms, medication usage, and side effects.
B. Exam: digital rectal exam and any other pertinent exam findings.
C. Current treatment doses and documentation of therapeutic benefit.
D. Report from treating physician.

ICD 9 code Benign Prostatic Hyperplasia	
600	Hyperplasia of prostate

Waiver Guide reviewed by the AF/SG Consultant for Urology, Lt Col Edith Canby-Hagino.

V. References.

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WAIVER GUIDE
Updated: Oct 2010
Supersedes Waiver Guide of Sep 2007
By: Dr Dan Van Syoc
Reviewed by Dr. William Kruyer, chief cardiologist at the ACS

CONDITION:
Bicuspid Aortic Valve (Oct 10)

I. Overview.

Bicuspid aortic valve (BAV) occurs in 1-2% of the general U.S. population and is the most common congenital cardiac malformation, excluding mitral valve prolapse.[1, 2] The prevalence of BAV has been about 0.6% in the United States Air Force (USAF) database of Medical Flight Screening echocardiograms (echo) performed on pilot training candidates.[3, 4] Over 70% of BAV subjects will develop some degree of aortic stenosis (AS) and/or aortic insufficiency (AI) during their lifetime. Additionally, 30-40% will require surgical placement of a prosthetic aortic valve during their lifetime, predominantly after the age of 45 years.[3, 4]

In early 2007, the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[5] Endocarditis prophylaxis was recommended only for specified high risk groups, and only for dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Such common conditions no longer recommended for endocarditis prophylaxis include, but are not limited to, mitral valve prolapse, bicuspid aortic valve, mitral or aortic regurgitation with normal valve (e.g. primary MR) and uncorrected small defects of the atrial and ventricular septum.

II. Aeromedical Concerns.

Aeromedical concerns include the development and progression of AS and/or AI. Risk of a sudden incapacitating event is very low and aeromedically acceptable in the absence of significant AS or severe AI.[1, 2, 3, 4] Waiver policies are thus primarily dependent on the presence and severity of associated AS and AI. AI severity is graded by echo as: trace, mild, moderate and severe. AS is graded by echo as: mild, mild-to-moderate, moderate and severe.[3] Please refer to the AS and AI waiver guides for further details.

Medications to reduce afterload, such as ACE inhibitors and nifedipine, have documented clinical benefit in chronic significant AI, including delaying the need for surgery and improvement of surgical outcome. The use of approved ACE inhibitors and nifedipine is therefore acceptable in aviators with asymptomatic moderate and severe AI.[3]

III. Waiver Consideration.

Per AFI 48-123, BAV is disqualifying for all classes of flying duties, however it is not listed as disqualifying for FC IIU, ATC/GBC, or SMOD duties. If BAV is associated with symptomatic aortic stenosis, it is disqualifying for FC IIU and ATC/GBC duties. Aortic disease (or any valvular disease) is disqualifying for all flying classes (including SMOD, ATC/GBC, and FC IIU) per retention standards.

ACS review is required for waiver consideration. ACS evaluation may be required, depending on the flying class or for specific concerns in an individual case. As stated above, waiver recommendations are primarily dependent on the presence and severity of associated AS and AI. FC I and IA will only be waiver eligible for BAV with ≤ mild AI and no AS; any greater AI or any AS is not waiver eligible. FC II/III requires ACS evaluation for waiver consideration. ACS re-evaluations will be performed at 1-3 year intervals, depending on the degree of AI and/or AS and other related conditions such as chamber dilation, left ventricular function and left ventricular hypertrophy. As discussed above, the use of approved ACE inhibitors and nifedipine for afterload reduction is acceptable in aviators with BAV and asymptomatic moderate or severe AI.[3] Waiver may be considered after surgery; please refer to the "Valve Surgery – Replacement or Repair" waiver guide. Table 1 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties.

If the disease process appears mild and stable, waiver for all classes of flying duties will generally be valid for three years with ACS reevaluation/review at the time of waiver renewal. Each waiver recommendation will specify requirements and timing for waiver renewal.

Table 1. Summary of BAV and Associated Clinical Conditions and ACS Requirements.

BAV and Associated Levels of Aortic Stenosis (AS) and/or Aortic Insufficiency (AI)	**Flying Class**	**Waiver Potential** **Waiver Authority**	**Required ACS Review and/or ACS Evaluation**
BAV with no, trace or mild AI (≤mild) and no AS	FC I/IA	Yes AETC	ACS review
BAV with >mild AI or any AS	FC I/IA	No AETC	ACS review
	FC IIU	Yes AFMSA**	ACS review
	ATC/GBC	Yes MAJCOM	ACS review
BAV with ≤ mild AI and/or ≤ mild AS	FC II/III	Yes MAJCOM	ACS evaluation
	FC IIU	Yes AFMSA**	ACS review
	ATC/GBC	Yes MAJCOM	ACS review
BAV with moderate AI and/or mild-to-moderate AS	FC IIA	Yes AFMSA	ACS evaluation
	FC III (low performance only)	Yes MAJCOM	ACS evaluation
BAV with severe AI only – asymptomatic and nonsurgical AI per guidelines	FC IIA only	Maybe* MAJCOM	ACS evaluation
	FC III (low performance only)	Maybe* MAJCOM	ACS evaluation
	FC IIU	Maybe AFMSA**	ACS Review
	ATC/GBC	Maybe MAJCOM	ACS Review
BAV with ≥ moderate AS† or with severe AI‡ surgical by guidelines	FC II/III	No MAJCOM	ACS review
	FC IIU	Maybe AFMSA**	ACS review to confirm
	ATC/GBC	Maybe MAJCOM	ACS review to confirm

* Waiver in untrained FC II and III individuals unlikely.
** Certification authority for FC IIU (untrained) is AETC
† Moderate to severe AS requires medical evaluation board (MEB).

‡ Severe AI if symptomatic and associated with left ventricular dilation or dysfunction requires MEB.

AIMWITS search in late August 2010 revealed a total of 199 individuals with an aeromedical summary that included a diagnosis of BAV. Included in this total were 32 FC I/IA cases (6 disqualifications), 120 FC II cases (12 disqualifications), 39 FC III cases (6 disqualifications), 1 FC IIU cases (1 disqualification), 2 ATC/GBC cases (1 disqualification), and 3 SMOD cases (0 disqualifications). Out of the 199 total cases, 29 had no gradable AI (1 disqualification due to exercise-induced syncope).

IV. Information Required for Waiver Submission.

Aeromedical Consultation Service (ACS) review/evaluation is required for all classes of flying duties for BAV with or without AI/AS. No additional studies are routinely required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required non-flying observation period for waiver consideration for BAV, regardless of the presence or severity of AI or AS.

The aeromedical summary for <u>initial waiver</u> for BAV (initial ACS evaluation) should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
C. Copy of the local echo report and videotape or CD copy of the echo documenting BAV. (Notes 1 and 2)
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

The aeromedical summary of <u>waiver renewal</u> for BAV [ACS follow-up evaluations] should include the following:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

<u>Note 1</u>: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
<u>Note 2</u>: State in AMS when studies were sent to ACS.

ICD 9 code(s) for Bicuspid Aortic Valve	
746.4	Congenital insufficiency of aortic valve

V. References.

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WAIVER GUIDE
Initial Version: Nov 2010
By: Dr Dan Van Syoc

CONDITION:
Birth Control (Nov 10)

I. Overview.

Air Force aviators lead busy lives and those desiring children generally wish to plan for this event. Current estimates are that half of all pregnancies are unplanned and in approximately half of these unintended pregnancies, contraception of some type was being used.[1, 2] The options available to men and women are much greater than in previous generations and the flight surgeon can play a pivotal role in aiding in the best choice for the couple involved. Factors to consider in the choice of a contraceptive method include efficacy, convenience, duration of action, reversibility once the decision to conceive has been made, effect on uterine bleeding, frequency of side effects and adverse events, affordability, protection against sexually transmitted diseases, and a wish for a more permanent solution.[1]

Options for women include natural methods, barrier methods, oral contraceptives (hormonal agents), transdermal patches, vaginal rings, intrauterine devices, and sterilization. Natural methods refer to the timing of intercourse that does not involve the days surrounding an expected ovulation. This method, to be successful, requires predictable cycles, assessment of basal body temperature and cervical mucus, and a highly motivated and disciplined couple. Barrier methods for women include the diaphragm and female condom. Each of these methods must be done in conjunction with a spermicidal lubricant and also requires diligence on the part of the couple. If used properly, the failure rate can be as low as 2.4 per 100 woman-years.[3]

In the US, the combined estrogen-progestin oral contraceptive (OC) preparations have proved to be the most effective method of contraception, with pregnancy rates reported as less than 0.5 per 100 woman-years. Most compounds include 35 μg or less of estrogen and varying amounts of progestins. OCs can be started anytime during the female's cycle. Traditionally, OC usage has begun on the first Sunday after the woman's period begins, but recently most providers are switching to the Quick Start method in which the woman begins her pill on the day the prescription is given as long as pregnancy has been excluded. It is important that the woman take the pill each day as missed pills are the most common cause of contraceptive failure.[1, 3] Two related methods of contraception are the progestin only pills and depot medroxyprogesterone acetate (DMPA). Progestin only pills are an option for women who desire an OC, but need to avoid estrogen. This method is associated with more unscheduled (breakthrough) bleeding and slightly higher failure rates than traditional OCs. DMPA is the only injectable contraceptive option in the US. In most cases, it is given by deep intramuscular injection (150 mg) and is effective for three months. A new lower-dose DPMA formulation is administered subcutaneously every three months. In addition, there are a few contraceptive implants available that provide a constant slow release of a progestin. These implants can be left in place for up to five years and the primary complaint in women is irregular bleeding.[3]

A new option available to women is the transdermal patch which was approved for use in the US in 2002. It is similar to the OCs but is applied topically and only requires three weekly applications

per month. A recent review has found that the efficacy of the patch was similar to the OC and user satisfaction has been high. A similar new product is NuvaRing® which is a flexible, single-size contraceptive vaginal ring that was introduced to the US market in 2001. The ring releases an estrogen and progestin combination at a constant rate for the three-week period of use. Review of recent usage data reveals that the ring has an effectiveness rate similar to OCs, a low incidence of adverse events and a high satisfaction rate among users. Both of these newer methods have the additional benefit of easy reversibility after cessation of use.[2]

Worldwide the intrauterine device (IUD) is the most widely used form of reversible birth control. In the US only 2% of women using contraception utilize this method. The two FDA-approved devices are the copper T380A® and the LNG IUS® (Mirena). The copper T380A® consists of a T-shaped frame made of a polyethylene blend. The active component is 380 mm2 of exposed copper surface area in the form of copper wire wound on the stem and copper collars on the horizontal arms. The copper ions released into the endometrium are toxic to sperm and provide the prefertilization contraceptive effect. The LNG IUS® is also a T-shaped device, but the active ingredient, LNG, is contained in a steroid reservoir around the stem. The reservoir releases 20 mg per day of LNG directly into the uterine cavity. Contrary to widely-held misconceptions, the IUD is one of the most effective and safe methods of contraception. There is also very little risk of post-use infertility as there was with some of the earlier used IUDs.[4]

The last method to discuss for women is that of sterilization. For women, this is the tubal ligation or tubal obstruction. Both are potentially reversible, but the patient needs to be counseled that it is a permanent procedure. The most convenient time to perform at tubal ligation/obstruction procedure is in the postpartum period. Unfortunately, these are the women most likely to regret sterilization. Pregnancy after tubal sterilization is uncommon, and the risk with such a pregnancy is an ectopic pregnancy.[1]

For men, the only two methods used effectively are the use of condoms and vasectomy. Condoms are convenient in that they do not require a prescription. If used correctly (not removed until after intercourse completed and used each time) and with a spermicidal agent, the effectiveness can approach that of hormonal contraceptives. They have the added benefit of protection against most sexually transmitted diseases.[1] The last method for men is vasectomy which is a sterilization technique. Vasectomy is the most commonly performed urologic surgical procedure performed in the US, with an estimated 500,000 each year. It is employed by nearly 11% of all married couples, but is less prevalent than is tubal procedures in women. The irony of this is that vasectomy is less expensive, and associated with less morbidity and mortality than tubal procedures. As with tubal procedures, adequate counseling is necessary to include discussion that the procedure is not 100% effective. With an experienced surgeon who insists on a postvasectomy semen analysis, it is unusual to have a pregnancy result months to years after the procedure.[5, 6]

II. Aeromedical Concerns.

Recognized risks with the use of oral contraceptives containing estrogen compounds include nausea, breast tenderness, and breast enlargement. Pills with lower estrogen doses have an increased incidence of monthly breakthrough bleeding. Pills with the newer progesterone compound drospirenone can theoretically lead to hyperkalemia. The more commonly used formulations have a lower dose of estrogen and this can lead to a 3-to-4 fold increase in the risk of thromboembolism. If the woman is a smoker and older than age 35, estrogen-containing pills are not recommended due to the increased risk of thromboembolic disease. The same is true for women with uncontrolled hypertension, diabetes with end-organ damage, or migraine headaches with focal neurological symptoms. If the woman is well screened and has no adverse effects, there is no aeromedical contraindication for the use of oral contraceptives.[7] Neither tubal ligation/obstruction procedures or vasectomy have any adverse health consequences once healing has completed, so there are also no contraindications to flying after these procedures.

III. Waiver Consideration.

Waiver is not required for birth control with approved medications or successful sterilization surgery without chronic adverse effects.

IV. Information Required for Waiver Submission.

N/A

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WAIVER GUIDE
Updated: Jun 09
Supersedes Waiver Guide of Oct 98
By: Maj Ken Egerstrom (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Bladder Cancer (Jun 09)

I. Overview.

Bladder cancer is the fourth most common cause of cancer in males and affects men three times more frequently than women. Its incidence also increases with age, with 90% of cases occurring in individuals over 55-years-old. There are more than 60,000 new cases diagnosed annually in the US accounting for approximately 14,000 deaths[1]. In addition, there are an estimated 500,000 patients in the US with a history of bladder cancer which makes its prevalence greater than that of lung cancer[2]. Cigarette smoking is one of the most well known risk factors, increasing the risk 2-to-4 fold and is attributed to causing 50-66% of all bladder cancers in men[3, 4]. Unlike lung cancer, the risk for bladder cancer remains elevated for a long time after the member quits tobacco, which probably accounts for the rising incidence of disease noted in the past few decades[1]. Bladder cancer is much less common in the African American population than in Caucasians, who have the highest rate in the US population[5].

Exposures to toxins such as in the textile dye and rubber tire industries are risk factors. Historically, these industries used β-naphthylamine, 4-aminobiphenyl, and benzidine all of which were unequivocally associated with bladder cancer. These chemicals have been banned, but the long delay between exposure and the development of malignancy makes it difficult to ascertain a definitive relationship for a whole host of other compounds which are still used in the chemical, dye and rubber industries[3]. Chronic infection can also be a risk factor for bladder cancer. This is seen more commonly in under-developed countries and thought to be largely related to infection with schistosomiasis[6].

As with most cancers, prognosis is largely, but not entirely determined by stage and grade; other factors include location of the lesion in the bladder, number of lesions and maximum diameter of the largest tumor[7]. The American Joint Committee on Cancer staging system (also known as TNM) is the most widely used system for staging[8] (see Table 2), while the World Health Organization and International Society of Urologic Pathologists published a recommended revised consensus classification system in 2004[9] (see Table 3). The upper urinary tract should be imaged during initial work up as 5% of bladder cancers can have an upper tract lesion[10].

Urothelial carcinoma, also known as transitional cell carcinoma, is the most common pathologic subtype of bladder cancer and is seen in over 90% of all tumors. Squamous cell tumors account for about 5% of all cases and adenocarcinomas are about 1% of the total. The presenting symptom in the majority of cases is hematuria which can be either continuous or intermittent. Therefore, the American Urologic Association (AUA) recommended in 2001 that all patients with hematuria, particularly those without evidence of infections, stones or other common causes, undergo cystoscopy and upper tract imaging. The physical exam is unremarkable in bladder cancer patients, particularly those with nonmuscle invasive disease, (which accounts for 70% to 75% of patients)[1].

As our population is relatively young, most of the cases will be early in the lifecycle and more likely to be non-muscle-invasive in nature.

Table 1: American Joint Committee on Cancer Bladder Staging System[8]

Stage	Clinical Tumor Stage
TX	Tumor cannot be assessed
Ta	Non-invasive papillary carcinoma
Tis	Carcinoma in situ
T1	Tumor invades lamina propria
T2	Tumor invades muscularis propria
T2a	Invades superficial muscularis propria (inner half)
T2b	Invades deep muscularis propria (outer half)
T3	Tumor invades perivesical tissue/fat
T3a	Invades perivesical tissue/fat microscopically
T3b	Invades perivesical tissue/fat macroscopically (extravesical mass)
T4	Tumor invades prostate, uterus, vagina, pelvic wall, or abdominal wall
T4a	Invades adjacent organs (uterus, ovaries, prostate stroma)
T4b	Invades pelvic wall and/or abdominal wall
	Regional Lymph Nodes (N)
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in a single lymph node, 2 cm or less in greatest dimension
N2	Metastasis in single lymph node, more than 2 cm but not more than 5 cm in greatest dimension; or multiple lymph nodes, none more than 5 cm in greatest dimension
N3	Metastasis in a lymph node more than 5 cm in greatest dimension
	Distant Metastasis (M)
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Table 2 – AJCC Stage Grouping for Bladder Cancer.[8]

Stage	Primary Tumor (pT)	Regional Lymph Nodes (N)	Distant Metastasis (M)
0a	Ta	N0	M0
0is	Tis	N0	M0
I	T1	N0	M0
II	T2a	N0	M0
	T2b	N0	M0
III	T3a	N0	M0
	T3b	N0	M0
	T4a	N0	M0
IV	4b	N0	M0
	Any T	N1	M0
	Any T	N2	M0
	Any T	N3	M0
	Any T	Any N	M1

Table 3: WHO Grading Classification of Nonmuscle Invasive Urothelial Neoplasia[9]

Hyperplasia (flat and papillary)
Reactive atypia
Atypia of unknown significance
Urothelial dysplasia
Urothelial carcinoma in situ
Urothelial papilloma
Papillary urothelial neoplasm of low malignant potential
Nonmuscle invasive low-grade papillary urothelial carcinoma
Nonmuscle invasive high-grade papillary urothelial carcinoma

Treatment is largely dependent upon the grade and stage, with more invasive treatment as the grade and stage increase. Therapy can range from transurethral resection of a bladder tumor (TURBT) to radical cystectomy and resection of affected structures. Often, intravesical therapy is used as an adjunct to tumor resection and or as a prophylactic measure to prevent recurrence.

For non-muscle invasive tumors (defined as stages Ta, Tis, and T1), the initial treatment is a complete TURBT and an examination under anesthesia (EUA) to rule out a palpable mass which would suggest muscle invasive disease. For T1 tumors, up to 30% of cases will be understaged by TURBT, so repeat TURBT is recommended to decrease likelihood of actual understaging. The majority of these non-muscle invasive tumor cases will recur and up to 25% of these will progress, so rigorous surveillance and follow-up is mandatory[11]. Intravesical therapy (instilled into the bladder via catheter) is generally used in the adjuvant setting, to prevent further recurrence. Chemotherapy or immunotherapy agents can be used in this manner. Bacillus Calmette-Guérin (BCG) and mitomycin C are widely used as an intravesical immunotherapy agent but other agents can be used as well. A key point with these agents is that patients often have no side effects for several cycles, and then 90% will develop cystitis[1, 4] and up to than 25% will develop fever, malaise, and hematuria[4]. These symptoms generally resolve quickly after completion of therapy, which is usually administered once/week for 6 weeks.

For tumors that are invasive (T2 and above) and for some high grade T1 tumors, radical cystectomy is the recommended therapy, with consideration of neoadjuvant chemotherapy and radiotherapy, depending on stage of disease at presentation and the patient's overall health status. Bladder preservation or sparing treatment using primary chemotherapy and external beam radiotherapy is an option in selected patients with T2 and T3a urothelial carcinomas, but is associated with higher rates of recurrence and disease specific mortality. Often this approach is reserved for patients who are medically unfit for major surgery or for those seeking an alternative treatment course[5].

Because of a fairly high risk of recurrence for all grades and stages, there will be a lifetime need for scheduled follow up evaluation. In general, all patients with non-invasive disease can expect a recurrence rate of 50%, but this rate is higher in those with high grade disease[2]. Follow up is recommended in accordance with American Urological Association (AUA) practice guidelines. Early after treatment, the patient may be required to undergo urologic evaluation (urinalysis, cytology, cystoscopy, +/- imaging and additional labs) every 3 months. After 2 years without recurrence, the recommendation is for annual exams indefinitely[5]. Several urothelial malignancy markers have recently been approved by the FDA, but there is not sufficient evidence at this time for their routine use in detection of new disease or surveillance for recurrence[10, 12]. However, studies are ongoing.

II. Aeromedical Concerns.

The aeromedical concerns are based more on the treatment and possible therapy complications than on the disease itself. If the aviator is off all treatment medications and is disease-free (considered to be in remission) and asymptomatic, he or she can be considered for a waiver. Due to a relatively high risk for recurrence, the flyer needs frequent follow up with their urologist. There is low likelihood that recurrence of non-invasive disease would cause sudden incapacitation.

III. Waiver Considerations.

History of bladder cancer is disqualifying for all flying classes in the US Air Force.

Table 4. Waiver potential of bladder cancer in FC I/IA, II and III.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages 0 and I	Yes#† AETC	Yes%
II	Stages 0, I, II and possibly early III	Yes+*† AFMOA	Yes%
III	Stages 0, I, II and possibly early III	Yes+*† MAJCOM	Yes%

For FC I/IA individuals waiver may be considered after 5 years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered six months after treatment completed, in remission and asymptomatic.
* For untrained FC II and III, waiver may be considered after 5 years of remission.
† No indefinite waivers.
% ACS review needed only if waiver authority considering a waiver

Review of AIMWTS database in Jun 09 revealed 12 waiver requests. There was one FC I case which was actually an active duty navigator applying to UPT; he had a superficial tumor, but was disqualified due to the fact it was a FC I case. There were eight FC II cases and all were granted a waiver and three FC III cases, all granted a waiver. One of the FC III cases was for a young man who had a bladder rhabdomyosarcoma at age 2 and recovered well. The remaining 11 cases all appeared to be superficial tumors (not all discussed pathology).

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.
Waiver can be considered once the aviator is asymptomatic from both the disease and therapy. The aeromedical summary for <u>initial waiver</u> for bladder cancer should include:

A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Reports from all imaging studies.
D. All cystoscopy/surgical reports along with pathology-confirmed histological diagnosis.
E. Current urinalysis.
F. Urology/oncology consults to include the quarterly tumor surveillance follow-up in accordance with National Comprehensive Cancer Network (NCCN) guidelines.
G. Tumor board report, military or civilian, if applicable.
H. Medical evaluation board results.
I. Confirmation the aviator does not require continued therapy (other than routine follow-up) and that he or she is free of physical limitations.

The aeromedical summary for waiver renewal for bladder cancer should include the following:

A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level; all must be consistent with NCCN guidelines.
B. Physical – pertinent to present case.
C. Urology/oncology consult.
D. Labs – all urinalysis and cystoscopy results since last waiver.

ICD9 Codes for Bladder Cancer	
188	Malignant neoplasm of bladder
233.7	Carcinoma in situ of bladder

Waiver Guide reviewed by the AF/SG Consultant for Urology, Lt Col Edith Canby-Hagino.

V. References.

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WAIVER GUIDE
Updated: Jun 09
Supersedes Waiver Guide of Mar 99
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CONDITION:
Breast Cancer (Jun 09)

I. Overview.

Breast cancer is a malignant tumor stemming from cells of the breast. Aside from non-melanoma skin cancer, breast cancer is the most common form of cancer in women. Breast cancer is the number one cause of cancer death in Hispanic women and it is the second most common cause of cancer death in Caucasian, African-American, Asian/Pacific Islander, and American Indian/Alaska Native women. In 2005 (the most recent year numbers are available), 186,467 women and 1,764 men were diagnosed with breast cancer and 41,116 women and 375 men died from breast cancer. The chance of a woman having invasive breast cancer some time during her life is about 1 in 8 and the chance of a woman dying from breast cancer is about 1 in 35. Breast cancer is about 100 times less common among men than among women. Men and women with similar stages of breast cancer have a similar outlook for survival[1].

Immutable Risk Factors[1-5]

Gender is the main risk for breast cancer; 100 times more common in women than in men.
Age: The chance of getting breast cancer goes up as a person ages. About 2 out of 3 women with invasive breast cancer are age 55 or older when the cancer is discovered.
Genetic risk factors: About 5% to 10% of breast cancers are thought to be linked to inherited changes (mutations) in certain genes. The most common gene changes are the BRCA1 and BRCA2 genes. Women with these gene changes have up to an 80% lifetime chance of getting breast cancer.
Family history: Breast cancer risk is higher among women with close blood relatives with the disease. The relatives can be from either the mother's or father's side of the family. Having a mother, sister, or daughter with breast cancer almost doubles a woman's risk.
Personal history of breast cancer: A woman with a history of cancer in one breast has a greater chance of getting a new cancer in the other breast or in another part of the same breast.
Race: White women are slightly more at risk than are African-American women. Asian, Hispanic, and American Indian women have a lower risk of getting breast cancer.
Dense breast tissue: Dense breast tissue means there is more glandular tissue and less fatty tissue leading to a higher risk of breast cancer.
Menstrual periods: Women who begin menstruating before age 12 or who went through menopause after age 55 have a slightly increased risk of breast cancer.
Earlier breast radiation: Women who have had radiation treatment to the chest area (as treatment for another cancer) earlier in life have a greatly increased risk of breast cancer.
Treatment with DES: Women (and their daughters who were exposed to DES in utero), have a slightly increased risk of getting breast cancer.

Modifiable Risk Factors[3]

Not having children or having them later in life: Women who have not had children, or who had their first child after age 30, have a slightly higher risk of breast cancer.

Recent use of birth control pills: Studies have found that women using birth control pills have a slightly greater risk of breast cancer than women who have never used them.
Postmenopausal hormone therapy (PHT): Therapy with both estrogen and progesterone is known as combined PHT. Estrogen alone is known as estrogen replacement therapy (ERT). Long-term use of combined PHT increases the risk of breast cancer, but ERT alone does not seem to increase the risk of developing breast cancer.
Not breast-feeding: Some studies have shown that breast-feeding slightly lowers breast cancer risk, especially if the breast-feeding lasts 1½ to 2 years.
Alcohol: Use of alcohol is clearly linked to an increased risk of getting breast cancer.
Being overweight or obese: Being overweight or obese is linked to a higher risk of breast cancer, especially for women after menopause and if the weight gain took place during adulthood.
Lack of exercise: Studies show that regular exercise reduces breast cancer risk.

Types of Breast Cancers

Ductal carcinoma in situ (DCIS): This is the most common type of non-invasive breast cancer. DCIS indicates the cancer is only in the ducts and has not spread through the walls of the ducts into breast tissue.
Lobular carcinoma in situ (LCIS): This condition begins in the milk-making glands but does not extend through the wall of the lobules. Although not a true cancer, having LCIS increases a woman's risk of getting cancer later.
Invasive (infiltrating) ductal carcinoma (IDC): This is the most common breast cancer. It starts in a milk passage or duct, breaks through the wall of the duct, and invades the tissue of the breast. From there it may be able to spread to other parts of the body. It accounts for about 80% of invasive breast cancers.
Invasive (infiltrating) lobular carcinoma (ILC): This cancer starts in the milk glands or lobules. It can spread to other parts of the body. It accounts for about 10% of invasive breast cancers.
Inflammatory breast cancer (IBC): This uncommon type of invasive breast cancer accounts for 1% to 3% of all breast cancers. Usually there is no single lump or tumor. Instead, IBC makes the skin of the breast look red and feel warm[6].

Detection

Mammogram: Women age 40 and older should have a screening mammogram annually and should continue to do so for as long as they are in good health[7, 8].
Clinical breast exam: Women in their 20s and 30s should have a clinical breast exam (CBE) as part of a regular exam by a health expert, at least every 3 years. After age 40, women should have a breast exam by a health expert every year[8].
Breast self-exam (BSE): BSE is an option for women starting in their 20s. Women should be counseled regarding the benefits and limitations of BSE[9].
Diagnosis: The diagnosis of breast cancer is a tissue diagnosis. Tissue is obtained via a breast biopsy.

Biopsy: There are three types of biopsy:

Fine needle aspiration biopsy (FNAB): For this test, a very thin, hollow needle is used to pull out fluid or tissue from the lump. For clinically palpable breast masses, this technique is inexpensive and relatively complication free[10].
Stereotactic core needle biopsy: The needle used for this test is larger than the one for fine needle biopsy. Two newer methods that may be used are Mammotome® and ABBI (Advanced Breast Biopsy Instrument). These techniques remove more tissue than a core biopsy.
Open Surgical Biopsy: by a surgeon with or without the placement of a marker to guide the biopsy site.

If the biopsy indicates cancer, the biopsy sample is also given a grade from 1 to 3. Cancers resembling normal breast tissue tend to grow and spread more slowly. In general, a lower grade number means a slower-growing cancer, while a higher number means a faster-growing cancer.

Regarding hormone receptor status, the biopsy sample can be tested for receptors for estrogen and/or progesterone (estrogen and progesterone often attach to these receptors and fuel the growth of breast cancer cells). If it does, it is often referred to as estrogen receptor (ER)-positive or progesterone receptor (PR)-positive. Such cancers tend to have a better outlook than cancers without these receptors because they are much more likely to respond to hormone treatment[6].

About 1 out of 5 breast cancers have too much of a protein called HER2/neu. Tumors with increased levels of HER2/neu are referred to as "HER2-positive." These cancers tend to grow and spread faster than other breast cancers[11].

Staging

Staging is the process of finding out how widespread the cancer is at the time it is found. The stage of a cancer is the most important factor in choosing among treatment options. The following tests may be used for staging: Chest X-Ray, Mammogram, CT Scan, MRI, Ultrasound, PET Scan.

Table 1. American Joint Committee on Cancer (AJCC) Breast Cancer Staging System[12]

Stage (T)	**Primary Tumor (T)**
TX	Primary Tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma in situ (DCIS, LCIS, or Paget disease of the nipple with no associated tumor mass)
T1	Tumor is 2 cm (3/4 of an inch) or less across.
T2	Tumor is more than 2 cm but not more than 5 cm (2 inches) across
T3	Tumor is more than 5 cm across
T4	Tumor of any size growing into the chest wall or skin. This includes inflammatory breast cancer
	Regional Lymph Nodes
NX	Regional lymph nodes not assessed
N0	Cancer has not spread to nearby lymph nodes
N1	Cancer has spread to 1 to 3 axillary (underarm) lymph node(s), and/or tiny amounts of cancer are found in internal mammary lymph nodes (those near the

	breast bone) on sentinel lymph node biopsy
N2	Cancer has spread to 4 to 9 axillary lymph nodes under the arm, or cancer has enlarged the internal mammary lymph nodes
N3	One of the following applies:
	Cancer has spread to 10 or more axillary lymph nodes
	Cancer has spread to the lymph nodes under the clavicle (collar bone)
	Cancer has spread to the lymph nodes above the clavicle
	Cancer involves axillary lymph nodes and has enlarged the internal mammary lymph nodes
	Cancer involves 4 or more axillary lymph nodes, and tiny amounts of cancer are found in internal mammary lymph nodes on sentinel lymph node biopsy
	Distant Metastasis
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Spread to distant organs is present

Breast cancer stage grouping

Some additional comments on staging:

Stage 0: This is *ductal carcinoma in situ (DCIS),* the earliest form of breast cancer. In DCIS, cancer cells are still within a duct and have not invaded deeper into the surrounding fatty breast tissue. *Lobular carcinoma in situ (LCIS)* is sometimes classified as stage 0 breast cancer, but most oncologists do not consider it a true breast cancer. In LCIS, abnormal cells grow within the lobules or milk-producing glands, but they do not penetrate through the wall of these lobules. Paget disease of the nipple (without an underlying tumor mass) is also stage 0. In all cases the cancer has not spread to lymph nodes or distant sites.

Inflammatory breast cancer is classified as stage IIIB unless it has spread to distant lymph nodes or organs, in which case it would be stage IV.

Stage IV: The cancer can be any size and may or may not have spread to nearby lymph nodes. It has spread to distant organs (the most common sites are the bone, liver, brain, or lung), or to lymph nodes far from the breast.

Table 2 Stage Grouping for Breast Cancer[12]

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)
0	Tis	N0	M0
I	T1	N0	M0
IIA	T0	N1	M0
	T1	N1	M0
	T2	N0	M0
IIB	T2	N1	M0
	T3	N0	M0
IIIA	T0-T2	N2	M0
	T3	N1-2	M0
IIIB	T4	Any N	M0
IIIC	Any T	N3	M0
IV	Any T	Any N	M1

Breast cancer survival rates by stage

The numbers below come from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database, and are based on women who were diagnosed with breast cancer between 1988 and 2001. There are some important points to note about these numbers:

The *5-year survival rate* refers to the percentage of patients who live at *least 5 years* after being diagnosed with cancer. Many of these patients live much longer than 5 years after diagnosis. Five-year *relative* survival rates (such as the numbers below) take into account the fact that some patients with cancer will die from other causes. They are considered to be a more accurate way to describe the outlook for patients with a particular type and stage of cancer.

The SEER database does not divide survival rates by substages, such as IIA and IIB. The rates for these substages are likely to be close to the rate for the overall stage. For example, the survival rate for stage IIA is likely to be slightly higher than that listed for stage II, while the survival rate for stage IIB would be expected to be slightly lower. These numbers were taken from patients treated several years ago. Although they are among the most current numbers we have available, improvements in treatment since then mean that the survival rates for people now being diagnosed with these cancers may be higher.

While survival statistics can sometimes be useful as a general guide, they may not accurately represent any one person's prognosis. A number of other factors, including other tumor characteristics and a person's age and general health, can also affect outlook.

Table 3 – Breast Cancer Survival Rates

Stage	5-year Relative Survival Rate
0	100%
I	100%
II	86%
III	57%
IV	20%

Surgery for breast cancer

Most patients with breast cancer will have some type of surgery to treat the main breast tumor. The purpose of surgery is to remove as much of the cancer as possible. Surgery can also be done to find out whether the cancer has spread to the lymph nodes under the arm (axillary dissection), to restore the breast's appearance after a mastectomy, or to relieve symptoms of advanced cancer**.**

Lumpectomy: This surgery removes only the breast lump and some normal tissue around it. Radiation treatment is usually given after this type of surgery. If chemotherapy is also going to be used, the radiation may be put off until the chemo is finished.
Partial (segmental) mastectomy or quadrantectomy: This surgery removes more of the breast tissue than in a lumpectomy. It is usually followed by radiation therapy. Again, this may be delayed if chemotherapy is also going to be given.
Simple or total mastectomy: In this surgery the entire breast is removed, but not the lymph nodes under the arm or the muscle tissue beneath the breast.
Modified radical mastectomy: This operation involves removing the entire breast and some of the lymph nodes under the arm.
Radical mastectomy: This is a major operation where the surgeon removes the entire breast, underarm (axillary) lymph nodes, and the chest wall muscles under the breast.
Axillary lymph node dissection: This operation is done to find out if the breast cancer has spread to lymph nodes under the arm. Breast cancer cells that have spread beyond the breast and axillary lymph nodes are best treated by systemic therapy. Axillary dissection is used as a test to help guide other breast cancer treatment decisions.
Sentinel lymph node biopsy: A sentinel lymph node biopsy is a way to look at the lymph nodes without having to remove all of them. If the sentinel nodes contain cancer, more lymph nodes are removed. If they are free of cancer, further lymph node surgery might not be needed.
Reconstructive or breast implant surgery: These operations are not meant to treat the cancer. They are done to restore the way the breast looks after mastectomy[6].

Treatment for Stages of Breast Cancer

Treatment Options for Patients with Ductal Carcinoma in-situ
1. Breast-conserving surgery and radiation therapy with or without tamoxifen.
2. Total mastectomy with or without tamoxifen.

Treatment Options for Patients with LCIS
1. Observation after diagnostic biopsy.
2. Tamoxifen to decrease the incidence of subsequent breast cancers.

3. Ongoing breast cancer prevention trials (including the National Cancer Institute of Canada's trial [CAN-NCIC-MAP3], for example).
4. Bilateral prophylactic total mastectomy, without axillary node dissection.

Treatment Options for Stage I, II, IIIA, and Operable IIIC Breast Cancer
Local-regional treatment:
1. Breast-conserving therapy (lumpectomy, breast radiation, and surgical staging of the axilla).
2. Modified radical mastectomy (removal of the entire breast with level I–II axillary dissection) with or without breast reconstruction.
3. SLN biopsy is under clinical evaluation by the American College of Surgeons Oncology Group's trial (ACOSOG-Z0010).

Adjuvant radiation therapy post-mastectomy in axillary node-positive tumors:

1. For one to three nodes: unclear role for regional radiation (infra/supraclavicular nodes, internal mammary nodes, axillary nodes, and chest wall).
2. For more than four nodes or extranodal involvement: regional radiation is advised.

Adjuvant systemic therapy: An International Consensus Panel proposed a three-tiered risk classification for patients with negative axillary lymph nodes. This classification, with some modification, is described below[13]:

Table A: Risk Categories for Women With Node-Negative Breast Cancer	**Low risk (has all listed factors)**	**Intermediate risk (risk classified between the other two categories)**	**High risk (has at least one listed factor)**
Tumor size	≤1 cm	1–2 cm	>2 cm
ER or PR Status	positive	positive	negative
Tumor grade	grade 1	grade 1–2	grade 2–3
Table B: Adjuvant Systemic Treatment Options for Women With Axillary Node-Negative Breast Cancer Patient group	**Low risk**	**Intermediate risk**	**High risk**
** Note: This treatment option is under clinical evaluation.*			
Premenopausal, ER-positive or PR-positive	None or tamoxifen	Tamoxifen plus chemotherapy, tamoxifen alone, ovarian ablation, GnRH analog*	Chemotherapy plus tamoxifen, chemotherapy plus ablation or GnRH analog*, chemotherapy plus tamoxifen plus ovarian ablation or GnRH*, or ovarian ablation alone or with tamoxifen or GnRH alone or with tamoxifen
Premenopausal, ER-negative or PR-negative	—	—	Chemotherapy
Postmenopausal, ER-positive or PR-positive	None or tamoxifen	Tamoxifen plus chemotherapy, tamoxifen alone	Tamoxifen plus chemotherapy, tamoxifen alone
Postmenopausal, ER-negative or PR-negative	—	—	Chemotherapy
Older than 70 years	None or tamoxifen	Tamoxifen alone, tamoxifen plus chemotherapy	Tamoxifen; consider chemotherapy if ER-negative or PR-negative

Table C: Treatment Options for Women With Axillary Node-Positive Breast Cancer **Patient group**	**Treatments**
** Note: This treatment option is under clinical evaluation.*	
Premenopausal, ER-positive or PR-positive	Chemotherapy plus tamoxifen, chemotherapy plus ovarian ablation/GnRH analog, chemotherapy plus tamoxifen plus ovarian ablation/GnRH analog*, ovarian ablation alone or with tamoxifen or GnRH alone or with tamoxifen
Premenopausal, ER-negative or PR-negative	Chemotherapy
Postmenopausal, ER-positive or PR-positive	Tamoxifen plus chemotherapy, tamoxifen alone
Postmenopausal, ER-negative or PR-negative	Chemotherapy
Older than 70 years	Tamoxifen alone; consider chemotherapy if receptor-negative

Local vs. systemic treatment
Surgery and radiation are examples of local treatment. Chemotherapy, hormone therapy, and immunotherapy are systemic treatments.

Adjuvant and neoadjuvant therapy
The goal of adjuvant therapy is to kill hidden cancer cells. Neoadjuvant therapy is systemic treatment before surgery to shrink a tumor.

Metastatic Disease
There are multiple chemotherapeutic regimens for advanced or metastatic disease available to the oncologist. These choices include anthracyclines, taxanes, anti-metabolites, and other agents such as cyclophosphamide and fluorouracil. There are also multiple chemotherapy combinations used, but there is no compelling evidence that the combination regimens are superior to sequential single agents[14].

II. Aeromedical Concerns

Breast cancer in the early stages has almost no risk of sudden incapacitation, and it is only in the later stages with involvement of the distant organ metastasis where there is such a risk. However, the treatment for breast cancer can have local and systemic effects which can have a severe detrimental impact in the aerospace environment. For instance, mastectomy can be associated with significant muscle and tissue loss as well as lymphedema from axillary node dissection. There can also be loss of upper limb mobility from nerve damage during the surgery particularly if there is damage to the long thoracic and thoracodorsal nerve distributions. Scar tissue and chronic pain can be the result of surgery and/or radiation therapy. All of these can adversely affect strength,

endurance, comfort, and mobility in the cockpit environment, and may preclude safe operation of an aerospace vehicle. In addition, the systemic effects of chemotherapy can lead to neutropenia as well as anemia, which in its moderate to severe forms will decrease performance at altitude. The systemic effects of chemotherapy can also adversely affect strength, endurance, and stamina in the cockpit and the aviation environment.

III. Waiver Considerations

Breast cancer or a history of breast cancer is disqualifying for all classes of flying in the United States Air Force.

Table 4 - Waiver potential of breast cancer in FC I/IA, FC II, and FC III

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages 0 or I	Yes#† AETC	Yes
	Stage IIA, or IIB	No AETC	No
	Stage III or IV	No AETC	No
II	Stages 0, I, IIA or IIB	Yes+*† MAJCOM%	Yes
	Stage III or IV	No MAJCOM%	No
III	Stages 0, I, IIA, or IIB	Yes+*† MAJCOM%	Yes
	Stage III or IV	No MAJCOM%	No

For Flying Class I/IA Individuals may be considered after five years cancer free
† No indefinite waivers.
* For untrained FC II and III, waiver may be considered after 5 years of remission.
+ For trained FC II and III individuals waiver may be considered as early as six months after treatment completed, in remission, surveillance is ongoing, and asymptomatic.
% All waivers need to go to MAJCOM who will then route them to AFMOA after appropriate review at their level.

AIMWTS review in April 2009 revealed that nine individuals have been waivered with the diagnosis of breast cancer for Flying Class II (3) and Flying Class III (6). There were no Flying Class I cases. Of the nine waivered individuals, one was a male. The highest stage of breast cancer that was successfully waived was stage IIb. At least two individuals have been waived for Flying

Class III duties while taking Arimidex® (anastrozole). There were no disqualifications in the database.

IV. Information Required for Waiver Submission

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Aeromedical summary for initial waiver for breast cancer must include the following:
A. History- initial symptom or screening used to detect the malignancy. Also include overall health, fitness, prior surgery, and prior illnesses.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Current Physical- especially describing any deformity, lymphedema, or restricted range of motion for the upper extremities and chest wall.
D. Radiologic reports and ultrasound reports. For stage II or greater, include mammogram, ultrasound, chest X-ray, CT scan of brain and liver, bone scan.
E. Pathology findings to include tumor, tumor markers, size, location, margins, node status, and means used to obtain lymph nodes.
F. Surgical operative reports to include placement of any prosthesis, vascular access port, or implant.
G. Oncology report to include treatment plan and treatment protocol, prognosis, and stage of cancer.
H. Evidence that the level of follow-up care is consistent with current NCCN standards[14].
I. Tumor Board report, military or civilian, as applicable.
J. Medical Evaluation Board report.

Aeromedical summary for waiver renewal for breast cancer must include the following:
A. Interim history.
B. Physical exam of chest wall and axillae regions.
C. Oncology and Surgery consultation reports.
D. Laboratory results since last waiver.
E. Radiological results since last waiver.
F. Evidence of follow-up care consistent with NCCN standards[14].

ICD 9 codes for breast cancer	
174	Malignant neoplasm of the female breast
175	Malignant neoplasm of the male breast

Reviewed by Col David Smith, AF/SG Consultant in General Surgery.

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WAIVER GUIDE
Updated: Aug 09
Supersedes Waiver Guide of May 06
By: Dr. Dan Van Syoc

CONDITION:
Breast Implants (Aug 09)

I. Overview.

Breast implants were developed and first marketed in the 1960s and are performed both for breast enlargement and for breast reconstruction in women who have undergone a mastectomy for breast cancer[1]. Breast augmentation (also called augmentation mammoplasty) is the most popular aesthetic surgery procedure performed in the United States, with almost 350,000 procedures performed in 2007, up 6% from 2006 and up 64% from 2000[2, 3].

There are two primary types of implants: saline-filled and silicone gel-filled. Both silicone and saline were available in the United States until 1992, when the FDA called for a moratorium on silicone implants until their safety could be established. The safety concerns have been essentially answered and the ban on silicone implants was lifted in November 2006[1]. The concerns with silicone implants surrounded issues related to implant rupture and possible subsequent connective tissue problems. Implant ruptures do occur and can be prevented with the choice of implant and surgical technique, but are more common with increasing age of the implant[4]. In addition, analysis of several large studies of women with silicone breast implants, or with silicone injections, has failed to demonstrate a significantly increased risk of any connective tissue disease or other autoimmune or rheumatic conditions[5]. In some cases, there can be a foreign body reaction to extruded silicone leading to supraclavicular lymphadenopathy that can cause concern about the possibility of breast cancer[6].

Breast augmentation is usually accomplished through a discrete incision placed either around the areola, at the inframammary fold, or in the axilla. Regardless of the approach or the type of implant, the goal is to restore a normal position of the breast structures in relation to the inframammary fold[7]. For most surgeons performing these procedures, the inframammary approach offers the greatest visualization of the critical operative tissues and results in the least damage to normal tissue[8].

Depending on the type of implant, the shell is either pre-filled with a fixed volume of saline or silicone, or saline-filled through a valve intraoperatively. Some allow for volume adjustments after surgery. The two basic placements for implants are subglandular and submuscular. Subglandular implants are placed directly under the natural breast tissue, typically through an inframammary or axillary incision. An inframammary incision is normally used for submuscular implants because it gives the best access to the pectoralis major. Part of the pectoralis is cut at the sternal origin, and the implant is placed underneath the muscle. Submuscular implants are less palpable; however, recovery time is longer, postoperative pain may be more severe, and reoperation is more difficult. Most women do not notice a decrease in pectoralis strength, although some note a slight decrease, which is typically not functionally significant.

Post-operative and cosmetic complications include breast asymmetry, inflammation, pain, necrosis, changes in nipple sensation, infection, scarring, hematoma, skin dimpling and capsular contracture. Approximately 20% of women with breast implants have some type of problem post-operatively that may or may not result in a reoperation. Many of the common problems that the surgeons encounter are ultimately related to asymmetries in breast volume, contour, and position of the breast or nipple-areolar complex[9]. Causes of implant rupture include trauma, overcompression of the breast, manufacturing defects, and deterioration of the implant shell. A recent large European study concludes that up to 25% of patients suffer chronic pain (described as "persisting continuous or intermittent pain for more than 3 months after surgery") after breast augentation[10] (Air Force plastic surgeons are not seeing chronic pain rates this high). Recent studies have identified several independent risk factors for surgical site infections and newer reviews recommend antibiotic prophylaxis for procedures involving placement of prosthetic material such as saline implants and any tissue expanders[11, 12].

II. Aeromedical Concerns.

The main risk of breast implants in the aviation environment is rupture or shifting due to compression from high G flight, egress, ejection or life support equipment. This could cause pain and/or distraction during flight (these complications have not been documented among female military aviators). Ambient pressure effects should be negligible because this is a closed fluid or gel device without trapped gas. One in-vitro study showed insignificant bubble formation in both silicone and saline implants at an altitude of 30,000 feet immediately following prolonged hyperbaric exposure. Implant volumes were slightly increased, but none ruptured and bubbles resolved spontaneously[13]. Post-operative complications may result in prolonged DNIF, which could negatively impact the mission. Long-term health effects are not fully known.

III. Waiver Consideration.

According to AFI 48-123, "silicone implants, injections, or saline inflated implants in breasts" is disqualifying for all classes of flying in the US Air Force.

Table 1 – Waiver Potential for Breast Implants for FC I/IA, FC II and FC III

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	History of breast implants or augmentation	Yes AETC*	Only if requested
II	History of breast implants or augmentation	Yes MAJCOM*	Only if requested
III	History of breast implants or augmentation	Yes MAJCOM*	Only if requested

* Indefinite waivers appropriate in most cases if there are no extenuating circumstances.

AIMWTS review in Jun 09 revealed a total of 115 submitted cases for breast implants or breast augmentation. All but 6 cases were given a waiver. Four of the disqualified cases were for other

medical problems, one for an unsatisfactory ARMA, and the sixth was an initial FC III case that had also had LASIK with the pre-operative refractive error exceeding acceptable standards. Twenty-three of the cases do not state the type of implant; of the remaining, 77 were saline implants and the other 15 were silicone implants. Two of the cases were secondary to surgery for breast cancer and one other was for bilateral mastectomies due to a very strong family history of breast cancer and a positive genetic predisposition. There were 7 FC I cases, 20 FC II cases and 88 FC III cases.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Information required for an initial waiver for breast implants should include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history to include the clinical indication for the procedure, operative complications (if any), post-operative satisfaction, and statement addressing ability to wear life support equipment. If the procedure was indicated for reconstruction following mastectomy for breast cancer, waiver submission should also follow breast cancer waiver guide requirements.
C. Exam: assurance that surgical sites are well healed.
D. Surgeon's consultation report and the operative report from the procedure.

ICD-9 Code for Breast Implants	
85.5	Augmentation Mammoplasty
85.54	Bilateral Breast Implant
85.6	Mastopexy
611.79	Other signs and symptoms in the breast
V50	Elective Surgery for purpose other than remedying health status
V50.1	Other Plastic Surgery for unacceptable cosmetic appearance
V52.4	Fitting and adjustment of breast prosthesis

Waiver Guide reviewed by the AF/SG Consultant for Plastic Surgery, Lt Col Earl E. Ferguson.

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WAIVER GUIDE
Updated: Apr 2012
Supersedes Waiver Guide of Nov 2008
By: Dr. Dan Van Syoc

CONDITION:
Cancers, Miscellaneous (Apr 12)

I. Overview.

Previously, there were several cancer diagnoses in the waiver guide which have since been removed. The reason for so doing is the paucity of AIMWTS submissions in these categories. Causes for this would include: rarity of the tumor in our aviation population, poor prognosis of the tumor once diagnosed, long duration of chemotherapy and hazards associated with a particular drug regimen, and treatment side effects that are not compatible with aviation duties.

Having said this, there are those folks with many types of cancer who defy the odds and do well after an aggressive approach to their disease. After a thorough evaluation it may be determined that they are fit for waiver consideration.

The following malignancies have a current posted waiver guide:

- Bladder
- Breast
- Cervical
- Colorectal
- Hodgkin Lymphoma
- Leukemia
- Malignant Melanoma
- Neurological Tumors
- Non-Hodgkin Lymphoma
- Pituitary Tumors
- Prostate
- Salivary Gland
- Testicular
- Thyroid

The following malignancies have been removed from the waiver guide:

- Carcinoid
- Kidney
- Laryngeal
- Lung
- Oral cancers
- Other GI tumors
- Ovarian

Plasma cell dyscrasias

- Uterine

II. Aeromedical Concerns.

As with all malignancies, there is concern with recurrence and sudden incapacitation. There is also concern with side effects of treatment such as surgery, radiation, and chemotherapy. An aviator returned to flying duties after treatment for a malignancy must be able to endure all the rigors of his or her aviation environment as well as to safely egress the aircraft in case of an emergency. Depending on the tumor and stage, as well as flyer's aircraft, it may be prudent to have the aviator spin in a centrifuge and/or go through altitude chamber training prior to waiver consideration.

III. Waiver Considerations.

According to AFI 48-123, the history, or presence of, a malignant tumor, cyst or cancer of any sort is disqualifying. Childhood malignancy considered cured may be considered for waiver on a case-by-case basis. To be considered for a waiver, the malignancy needs to be considered cured, or in remission, by applicable clinical standards. The individual must be off all chemotherapeutic agents for long enough to allow for all the intended clinical effects and for all unintended effects to have resolved. The individual must also have no identifiable aeromedically significant side effects from any treatment modality. Each such case must be submitted to the ACS for review prior to waiver action. All contributing lifestyle issues must be resolved. Generally, waiver will not be considered within six months of cessation of definitive therapies.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> should include the following, at a minimum:
A. History of tumor diagnosis, all treatment performed and any side effects from the tumor and/or treatment. Need good time lines.
B. All imaging reports (actual may be required in some cases).
C. Surgical reports, consults and pathology reports.
D. Clinically relevant labs.
E. Oncology consultation stating malignancy is considered cured, or in remission, and the recommended follow-up schedule for the patient.
F. Tumor board results if accomplished.
G. MEB results.

The aeromedical summary for <u>waiver renewal</u> should include the following:
A. Detailed interim history since last waiver submittal.
B. All applicable labs and imaging studies.
C. Consult from oncologist.

WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Dec 2007
By: Dr Dan Murray (RAM XI), Dr Bill Kruyer (ACS chief cardiologist), and Dr Dan Van Syoc
Reviewed by Dr. Bill Kruyer, chief ACS cardiologist

CONDITION:
Cardiomyopathy (Mar 11)

I. Overview.

The term cardiomyopathy broadly encompasses any disease of the myocardium associated with cardiac dysfunction. Primary cardiomyopathies encompass four disease entities in which the abnormality is intrinsic to the myocardium itself: idiopathic or dilated cardiomyopathy (DCM), hypertrophic cardiomyopathy (HCM), restrictive cardiomyopathy (RCM), and arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D). Secondary cardiomyopathies refer to disease states in which the primary abnormality is extrinsic to the myocardium but results in cardiac dysfunction. The most common secondary cardiomyopathies are ischemic cardiomyopathy (ICM) secondary to coronary artery disease, hypertensive cardiomyopathy (commonly isolated diastolic dysfunction), Chagas' disease-related cardiomyopathy, and cardiomyopathy secondary to valvular heart disease. Although different categorization schemes have been proposed, this functional approach to classification has proven to be the most clinically and aeromedically useful and will be used here.[1, 2, 3, 5]

DCM is typically characterized by left ventricular dilation, systolic dysfunction, and a general reduction in overall contractility. The natural history of DCM is not well-established, although the 5-year mortality rate ranges from 20-50%. Individual predictions of morbidity and mortality vary substantially, however disease severity correlates well with outcomes. DCM is most common in middle-aged men, and has an overall incidence of 5-8/100,000/year. Symptoms are generally progressive and include those of left-heart failure (fatigue, exercise intolerance, dyspnea, etc). Associated right-heart failure and/or global chamber enlargement are late signs. Although the final cause of death in individuals with DCM is typically systolic failure, arrhythmias, thromboembolic events, and sudden death may occur at any time.[1, 2, 3, 5] Post-partum cardiomyopathy is a type of DCM.[4, 5]

Viral myocarditis is considered the likely etiology for many cases of idiopathic DCM. There may thus be some confusion whether a case is more appropriately considered myocarditis or DCM. ACS review of the case and reference to the *Pericardial Disorders Including Myopericarditis* Waiver Guide will help discern the appropriate aeromedical disposition. Typically, myopericarditis will present acutely with chest discomfort, characteristic ECG changes, elevated cardiac enzymes and regional or diffuse left ventricular wall motion abnormality. DCM with diffuse hypokinesis may be the end result of viral myocarditis, presenting either with symptoms of left ventricular dysfunction or diagnosed incidentally on echocardiography.

HCM is characterized by hypertrophy of the left ventricle, usually in an asymmetric fashion involving the base of the LV septum. Multiple anatomic variations are known to occur, however, including concentric and apical-only patterns. HCM is characterized by the development of scar tissue and disorganized myofibrils. Thus, ventricular arrhythmias and sudden death are common.

While HCM is known to be an autosomal dominant heritable disorder, roughly half of all cases are spontaneous in nature. Nevertheless, familial screening of identified probands is usually undertaken, particularly in the young. The prevalence of HCM is broadly estimated at 20-200/100,000. It is most commonly diagnosed in the 4th and 5th decades but has been identified in all age groups including stillborns. Although a pressure gradient of the left ventricular outflow tract is a distinctive clinical feature, it is present in only about 25% of patients. Symptoms, when present, commonly include dyspnea, angina, fatigue, presyncope, and syncope. In younger populations, HCM is commonly confused with athlete's heart; HCM will not regress with cessation of athletic activity, however.[1, 2, 3]

Both DCM and HCM may be misdiagnosed locally, because of the unfamiliarity of some clinicians with cardiac variants seen in relatively young and athletic subjects such as our aviator population. Ejection fraction at rest may be low normal or mildly reduced (45-50%) in athletic individuals compared to clinical norms (50-70%), resulting in a misdiagnosis of mild DCM. And left ventricular wall thickness may be upper normal to mildly increased (12-13 mm) compared to clinical norms (7-11 mm), resulting in a misdiagnosis of pathologic left ventricular hypertrophy or mild HCM.[2, 3] Thus, ACS review is recommended for all locally diagnosed cardiomyopathies, to confirm (or refute) the diagnosis, then advise regarding prognosis and waiver eligibility in accordance with approved policy.

The hallmark of restrictive cardiomyopathy (RCM) is severely abnormal diastolic function. The ventricular walls are excessively rigid and impede filling, resulting in pulmonary and systemic venous congestion. RCM must be differentiated from constrictive pericarditis, which can be successfully surgically treated. RCM can be a primary disorder or secondary to infiltrative or scarring processes that involve the myocardium such as amyloidosis, sarcoidosis, or scleroderma. Other rare causes such as hypereosinophilic syndrome and endomyocardial fibrosis are usually seen only in certain geographic areas such as equatorial Africa and South America. Common symptoms include exercise intolerance, dyspnea, fatigability, and weakness. RCM is typically relentlessly progressive, poorly responsive to most therapies, and associated with a high mortality rate.[1, 2, 3]

Arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D) has received heightened attention in recent years because of its association with ventricular tachycardia and sudden death, particularly in younger populations. It is characterized by fibro-fatty replacement of the right ventricular myocardium. This results in a predisposition towards potentially lethal ventricular arrhythmias, and the usual clinical presentation is sustained or non-sustained ventricular tachyarrhythmias and/or sudden cardiac death.[2, 3]

Finally, secondary cardiomyopathies such as ischemic cardiomyopathy, hypertensive cardiomyopathy, and valvular cardiomyopathy all have variable prognoses depending on the severity and treatment of the underlying disease. If left untreated, all may progress to a terminal stage of irreversible myocardial dysfunction marked by systolic and/or diastolic failure, dilation, and an increased likelihood of associated arrhythmias, thromboembolic events, and sudden death. The development of a secondary cardiomyopathy is considered an aeromedical endpoint for the above disorders, and is usually not compatible with a return to flight status recommendation. Aeromedical disposition will be based on policies for the underlying disorder (see applicable waiver guides) and the impact of the secondary cardiomyopathy on prognosis.

II. Aeromedical Concerns.

There are two primary military aeromedical concerns for individuals with cardiomyopathy. The first is the risk of sudden incapacitation. The risk of sudden death, arrhythmias, and/or thromboembolic events is generally correlated with the overall degree of cardiac dysfunction, although as noted above some types of cardiomyopathy (notably HCM and ARVC/D) are more likely to be associated with potentially suddenly incapacitating symptoms. Secondly, even mild degrees of myocardial dysfunction may be incompatible with military aviation duties due to an associated reduction in exercise tolerance, the need for complex medical therapy, and the need for frequent access to specialized medical care. Specifically, standard-of-care medical therapy for cardiomyopathy usually involves multiple hemodynamic, vasoactive, chronotropic, and diuretic medications which may alter physiologic responses to the military aeromedical environment such that the aviator cannot perform his or her usual duties without an undue increase in risk to themselves, the crew, or the mission. Device therapies for cardiomyopathies are not waiverable due in part to the unacceptably high complication rates associated with the devices themselves.

III. Waiver Consideration.

Cardiomyopathy is disqualifying for all classes of flying duties. It is disqualifying for retention purposes, which would then require a waiver for afflicted ATC/GBC and SMOD personnel. Diagnoses of cardiomyopathies may be made following acute symptomatic episodes or in an asymptomatic subject receiving an echocardiogram for a variety of clinical and/or aeromedical indications. Waiver submissions should be made only after resolution of any acute episode, stabilization of the medical regimen, and release of the individual back to full unrestricted activities by the treating cardiologist. Most members diagnosed with any type of cardiomyopathy will also need to meet an MEB prior to waiver submission. Waivers for members with all but the most mild degrees of cardiomyopathy will only be considered after the individual has been released to full unrestricted activity and found fit for continued military duty by an MEB.

As noted below, ACS review is required for all locally diagnosed cardiomyopathies however, to confirm (or refute) the diagnosis and advise regarding prognosis and waiver eligibility. Mild cases of DCM which resolve over time might be considered for waiver after ACS evaluation. And some secondary cardiomyopathies may be waiver eligible, based on policies for the underlying disorder and the impact of the secondary cardiomyopathy on overall prognosis. Typically, this will involve definitive therapy that results in an aeromedically acceptable result, including resolution of the cardiomyopathy. Resolution of tachycardia-induced cardiomyopathy is one example. Return of left ventricular and left atrial size and function to normal after successful surgical repair of severe mitral regurgitation is another.

Table 1: Waiver potential for Cardiomyopathy

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation@
I/IA	DCM, HCM, RCM, ARVC/D, secondary cardiomyopathy	No AETC	Yes
II/III/IIU*#	DCM	Maybe MAJCOM	Yes
	HCM, ARVC/D, and RCM	No MAJCOM	Yes
	Secondary cardiomyopathy	Maybe MAJCOM	Yes
ATC/GBC*	DCM	Maybe MAJCOM	Maybe
	HCM, ARVC/D, and RCM	No MAJCOM	Maybe
	Secondary cardiomyopathy	Maybe MAJCOM	Maybe
SMOD*	DCM	Maybe AFSPC or GSC	Maybe
	HCM, ARVC/D, and RCM	No AFSPC or GSC	Maybe
	Secondary cardiomyopathy	Maybe AFSPC or GSC	Maybe

*Initial training cases should all be treated similar to FC I/IA
#Waiver authority for FC IIU is AFMSA
@ACS review or evaluation for initial cases is at the discretion of the waiver authority

AIMWITS search in Feb 2011 revealed 35 cases listed as cardiomyopathy; 2 FC I, 10 FC II, 20 FC III, 1 SMOD and 2 ATC/GBC. Eighteen (51%) were disqualified due to cardiomypathy (though many had multiple disqualifying conditions); 1 FC I, 7 FC II, and10 FC III. The 17 granted waivers had cardiomyopathy that resolved (7 DCM [peripartum, viral, idiopathic]; 3 had hypertrophic cardiomyopathy (not evaluated by ACS; seven were incorrectly diagnosed with hypertrophic cardiomyopathy when evaluated by the ACS and 1 had noncompaction (congenital) cardiomyopathy. All had resolution of any symptoms or radiographic evidence of cardiomyopathy.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for cardiomyopathy should include the following:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Cardiology consult
C. Electrocardiogram (ECG).
D. Chest x-ray report.
E. Official report of all local echocardiograms. Also send videotape/CD copy of the images of the most recent echocardiogram to the ACS. (Notes 1 and 2)
F. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
G. Results of medical evaluation board (MEB) (worldwide duty evaluation for ARC members).

The aeromedical summary for waiver renewal for cardiomyopathy should include the following:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD 9 Codes for cardiomyopathy	
425.4	Other primary cardiomyopathies (hypertrophic, restrictive, idiopathic, familial, not otherwise specified, congestive, constrictive, obstructive, nonobstructive)
425.9	Secondary cardiomyopathy, unspecified
086.0	Chagas' disease with heart involvement

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WAIVER GUIDE
Updated: Sep 2010
Supersedes Waiver Guide of May 2007
By: Dr Dan Van Syoc
Reviewed by Col John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

CONDITION:
Cataract, Capsular Opacification, And Intraocular Lens Implant (Sep 11)

I. Overview.

A cataract is an opacity of the eye's natural lens. It may be congenital or acquired and can result from multiple etiologies. Congenital cataracts and cataracts that develop within the first year of life (infantile cataracts) are a fairly common finding with a prevalence of about 1 in every 2000 births. They can be from multiple causes to include hereditary, genetic, metabolic, maternal infections, toxic or ocular anomalies. Often, however, congenital and infantile cataracts are idiopathic. They can be bilateral or unilateral and range in severity from complete opacification of the lens that necessitates an early cataract extraction to minor opacification without any visual sequelae. Often very minor congenital cataracts will not be found during childhood examinations and are only noted as incidental findings on later exams. Other opacities can exist on the outer surface of the lens capsule, such as embryonic fetal vasculature remnants but these are not considered cataracts and typically do not cause visual problems.[2]

Acquired cataracts in adulthood are the leading age-related cause of blindness and visual impairment in the world. One study has shown that visually significant cataracts were present in 2.6% of women and 0.4% of men ages 43-54. These numbers increase to 10.0% of women and 3.9% of men ages 55-64 and 23.5% of women and 14.3% of men ages 65-74.[4] An earlier study found even higher prevalence of visually significant cataracts with 4.7% of women and 4.3% of men ages 52-64 and 19.3% of women and 16.0% of men ages 65-74.[5]

The lens undergoes multiple changes as it ages. Since the lens continuously adds new layers to the outside, the inner nucleus is compressed and hardened leading to nuclear sclerosis. Other chemical changes increase the pigmentation, hydration and cause proteins to aggregate, all of which promote scattering of light. These changes increase the refractive index of the lens inducing myopia. Also, hardening of the lens with aging leads to a decrease in the lens' accommodative ability. These nuclear sclerotic changes are a normal occurrence in adults middle aged or older and do not necessarily impair vision. However, if the changes are excessive, a nuclear sclerotic cataract can result, which can significantly impair vision.

Cortical cataracts arise in the outer layers of the lens but outside the nucleus. These cataracts result from hydration of the cortex and often start as visible vacuoles. The cataract progresses to form spoke like opacities from the peripheral lens inward. These opacities can significantly impair vision and lead to glare complaints.

A posterior subcapsular cataract is located between the posterior capsule and the outer lens cortex. Cells inside the peripheral lens capsule migrate to the posterior inner surface of the capsule and develop into granular opacities. This can also occur in the anterior subcapsular region. These changes lead to poor vision and glare that worsens in bright light.

Certain medications also may lead to cataract formation. Long term corticosteroid use has been associated with formation of posterior subcapsular cataracts while other medications such as phenothiazines, miotics and amiodarone have been associated with other types of cataracts. Finally, either blunt or penetrating trauma to the lens or eye, ionizing, infrared or ultraviolet radiation and metabolic diseases, such as, diabetes and Wilson's disease are all associated with cataract formation.[2]

In addition, to glare and declining visual acuity, cataracts can cause other visual complaints. Cataracts may cause visual field depressions or defects. Also, the lenticular color changes associated with certain cataracts (e.g. the yellowing in nuclear sclerosis) can cause acquired color vision deficiencies.

To restore vision compromised from cataract formation, surgery is the best option available. If a cataract and the surrounding lens capsule are extracted, it is called an intracapsular extraction. This procedure, however, is very rarely performed. The most common procedure for cataract extraction today is called extracapsular cataract extraction and leaves a portion of the lens capsule in place in order to support an intraocular lens implant (IOL). This is typically performed using phacoemulsification which uses an ultrasonic device to break up the cataract so that it can be removed through a much smaller incision, often in the cornea. This technology, coupled with foldable intraocular lenses (IOL) has significantly reduced the size of the incision and complications associated with the procedure. Multiple techniques for incisions can be used for these procedures to enter the eye, including entry through the cornea or the sclera. The cataract is then removed and usually an intraocular lens (IOL) is implanted. These lenses may be placed either in the anterior chamber between the iris and cornea or the posterior chamber, behind the iris, typically within the remaining capsular “bag”. . Multiple IOL designs exist of different materials that are rigid or flexible. Some designs are sewn into place while most remain in place without the need for sutures. A new extracapsular procedure on the horizon will utilize femtosecond laser energy to break up the cataract instead of the ultrasonic energy used in phacoemulsification.

After a cataract extraction, the eye can no longer accommodate, and therefore reading and other near work becomes difficult without the use of reading glasses. Some IOLs with varying power have been designed to help mitigate this problem. These multifocal lenses have multiple refractive zones within the lens that attempt to bring images at distance and near into focus at different times depending on the size of the pupil. However, neither distance nor near images are as clear as they would be with a single vision IOL with reading glasses for near work.[2] Another newer option involves a hinged IOL, which moves with contraction of the ciliary body and is thought to provide some accommodative power.[1] Newer IOLs that can correct for residual corneal astigmatism are in use and can eliminate or reduce the need for spectacles to correct distant visual acuity. These implants are known as toric IOLs and are currently not approved for use in aircrew.

Since the eye’s natural lens filters ultraviolet light, many IOLs have UV blocking ability to help prevent retinal damage. There is also a body of literature that suggests that excess light in the blue portion of the visible spectrum may damage the retina and lead to macular degeneration. Because of this, IOLs are currently available that have a yellow tint and act as “blue blocking” filters. These IOLs have been found to cause acquired color vision deficits and are not authorized for use in aircrew.[9]

Only certain IOLs are approved for use in aircrew members. The selection of the procedure and the IOL should be coordinated with the Aeromedical Consultation Service (ACS) [DSN 240-3241, (210) 536-3241] for members on or planning to enter flying status. Generally, the preferred procedure is an extracapsular cataract extraction with implantation of a posterior chamber IOL at either the ciliary sulcus or in the capsular bag. The IOL should have tissue fixable haptics (polypropylene [PP], polyethylene [PE] or polymethylmethacrylate [PMMA]) with a 6-7 mm optic and ultraviolet filtering properties but without blue blocking tints. One piece silicone IOLs are not approved for aircrew use because they do not fix well to the capsular bag. The multifocal IOLs and the newer accommodating IOLs are also not approved for aircrew use. Finally, any IOLs with plate designs, tints in the visual spectrum including blue-blocking chromophores and positioning holes are not approved.

Although cataract surgery is one of the safest surgeries available, it does have complications, some possibly severe and sight threatening. By far the most common complication is posterior capsular opacification (PCO). This occurs when the cells that are present in the periphery of the lens that usually slowly proliferate throughout life remain in the lens capsule after extraction and migrate to the posterior capsule surface. At this location they can proliferate, cause wrinkling and distortion or cause fibrosis of the posterior capsule. The posterior capsular changes can lead to glare and a decline in visual acuity. PCO varies in incidence and severity but appears to occur at visually significant levels in about 28% of pseudophakic patients at 5 years after surgery. Newer IOL materials and surgical techniques have successfully decreased the incidence. The incidence of PCO for PMMA IOLs has been reported to be 56% at three years compared to 40% for silicone IOLs and 10% for acrylic IOLs. The typical treatment for visually significant PCO is a Nd:YAG laser posterior capsulotomy that focuses a laser on the posterior capsule and creates a hole through which the light can travel. The procedure is fairly benign but does increase the risk of retinal detachments, (2.4%-3.2%). About half of these detachments occur within the first year. In addition to PCO, there are other, some potentially serious complications of cataract surgery. Infections can develop in the post-surgical period that are often serious and can lead to loss of vision, even loss of the eye. Retinal detachments can occur, especially when the posterior capsule is disrupted. The patient may have a reaction to the IOL after it has been placed or it may dislocate and require additional surgery. Further, the cornea, retina, iris and other parts of the eye may have iatrogenic injury that can result in significant permanent visual impairment.[2]

Phakic, aphakic and pseudophakic are terms used to describe the status of an individual's lens. Phakic refers to a person with an intact natural lens while a pseudophakic individual had a lens extracted and an IOL placed. A person is aphakic if the natural lens was extracted and no IOL was implanted. Leaving an individual aphakic is still an option for significantly complicated cases, however, often the distortion of vision that accompanies aphakic spectacles or contact lenses is intolerable.[2] For such cases, secondary surgically placement of an IOL, often with scleral fixation, provides the best method of visual rehab.

II. Aeromedical Concerns.

Aeromedically, lens changes are defined as *opacities* (developmental lens defects that do not progress) and *cataracts* (lens opacities with the potential to progress and compromise visual function). Developmental opacities of the lens are not disqualifying, whereas cataracts, including congenital polar cataracts, are. Decreased visual acuity, contrast sensitivity or symptoms of glare associated with cataracts have the potential to adversely affect mission effectiveness and flight

safety. Even if a lens change does not significantly impact vision at present, any of those defined as cataracts have the potential to progress, some relatively quickly. This progression necessitates, at a minimum, monitoring of any potentially progressive cataract to ensure visual functioning remains unaffected. Some cataractous changes become problematic only under certain environmental conditions, such as in bright lights or at night.

As with any medical problem in USAF aircrew, medical treatment to meet the current standard of care is mandated without the necessity to receive permission from the ACS or waiver authority. However, there are some complicating issues with cataracts in aircrew. Typically, civilian patients are not operated on until the patient deems his or her vision is poor enough to require surgery.[2] Often this level of severity is after the patient's vision has declined significantly below the 20/20 Air Force vision standard. USAF aircrew may require surgery at an earlier point than their civilian counterparts.

Like any medical condition, implanted IOLs have additional concerns in the aviation environment that are not present in typical daily use. A review of FAA records done in 1993 examined the accident risks for pseudophakic pilots versus phakic pilots. This study found a statistically significant increased risk of aviation mishaps associated with pseudophakic pilots. The risk was even greater for pseudophakic pilots under the age of 50. When compared to their corresponding phakic counterparts, pseudophakic pilots under the age of 50 had 3.72 times the risk of having a mishap while the pseudophakic pilots over the age of 50 had 1.41 times the risk.[6]

Another concern for IOLs is the theoretical risk of dislocation of IOLs under the extreme G-forces in the aviation environment. According to ACS records, there has been no known dislocation of an IOL during flight duties in the USAF. Further, study animals with implanted IOLs were subjected to G-forces up to +12 Gz without any signs of dislocation.[8] A case report in August 2000 demonstrated that IOLs may be stable under high G-forces when a pilot with an IOL ejected from a T-6A Texan and the IOL remained stable.[7] Stability of toric IOLs both clinically and operationally remains to be seen and as such, are currently not approved for use in aircrew.

III. Waiver Considerations.

Cataract is a disqualifying diagnosis for FC I/IA, II, IIU, and III. For ATC/GBC and SMOD duties, cataract is not specifically mentioned as a disqualifying diagnosis, but it would become relevant if the cataract impaired visual acuity. For all classes, no waiver is required if the lenticular opacity is asymptomatic, visually insignificant, or non-progressive.

Table 1: Waiver potential and required ACS evaluation for cataracts and lenticular opacification.

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Symptomatic, visually significant, or potentially progressive lenticular opacity or cataract, pseudophakic, aphakic, or capsular opacification	No AETC	No
II/III/IIU*	Symptomatic, visually significant or potentially progressive lenticular opacity or cataract	Yes MAJCOM**	Yes, evaluation initially, then possibly review only on subsequent renewals
	Pseudophakic or aphakic	Yes MAJCOM	Yes, evaluation initially, then possibly review only on subsequent renewals
	Asymptomatic, visually insignificant posterior capsular opacification	Yes MAJCOM	Yes, review only or evaluation if requested by MAJCOM initially or on subsequent renewals
	Posterior capsular opacification after treatment, meets vision standards	Yes MAJCOM	Yes†, review with possible evaluation initially with review only on subsequent renewals
ATC/GBC	Cataract affecting visual acuity	Yes MAJCOM	Only at the request of MAJCOM
SMOD	Cataract affecting visual acuity	Yes AFSPC	Only at the request of AFSPC

* For initial flying class II, IIU, and III physicals, waiver is not likely for cataracts deemed potentially progressive or for history of cataract surgery.
**AFMSA is the waiver authority for all FC IIU except for initial certification.
† Waiver can be submitted 30 days post laser treatment.

Jul 2010 AIMWITS search revealed 221 individuals with the diagnosis of cataract and/or cataract with IOL. Of the total, 8 were FC I/IA, 117 were FC II, 91 were FC III, 2 were FC IIU, 2 were

ATC/GBC and there was 1 SMOD case. There were a total of 49 disqualifications dispositions: 7 FC I/IA (the only FC I/IA case approved was via an ETP), 21 FC II, and 21 FCIII. About half of the disqualified cases were directly related to the cataract diagnosis and the remainder were for different diagnoses.

IV. Information Required For Waiver Submission.

The aeromedical summary for an initial waiver for a non-visually significant (asymptomatic and meets vision standards) lenticular opacity without current plans for surgical treatment should include (ACS review required, in-person evaluation may not be required):

A. Any prior history, medical evaluation or treatment of the condition.

B. Full optometry/ophthalmology exam to include:

1. Description of the lens opacity type and severity.
2. Best corrected visual acuities at distance and near
3. Pseudo-isochromatic plate (PIP1 and PIP2) and cone contrast test (CCT) scores for each eye individually
4. Humphrey visual field 30-2 testing for each eye.
5. Low contrast acuity testing with Precision Vision 5% acuity chart.

The aeromedical summary for an initial waiver after definitive surgical extraction should include (ACS in-person evaluation required):

A. Description of any visual complaints.

B. Ophthalmology exam notes prior to and following the surgical procedure.

C. Operative note.

D. Model numbers and types of intraocular lenses, the prescription of aphakic contact lenses or the prescription of aphakic spectacles depending on the optical correction the aircrew member uses.

E. Best corrected visual acuities at distance and near.

F. Dilated retinal exam.

The aeromedical summary for initial waiver after posterior capsule opacification treatment with YAG laser should include (ACS review required, in-person evaluation may not be required):

A. Any interval history, procedures or symptoms since the last waiver was granted.

B. Full optometry/ophthalmology exam to include:

1. Location and stability of the IOL.
2. Best corrected visual acuities at distance and near.
3. Any contact lens or spectacle correction prescriptions.
4. Humphrey visual field 30-2 testing for each eye.
5. Dilated retinal exam.
6. Low contrast acuity testing with Precision Vision 5% acuity chart.

The aeromedical summary for an initial waiver for a visually significant lenticular opacity or

cataract without current plans for surgical treatment should include (ACS in-person evaluation required):

A. Description of any symptoms associated with condition, any noted progression and any prior medical evaluation or treatment for the condition.

B. Full optometry/ophthalmology exam to include:

1. Description of the cataract type and severity.
2. Best corrected visual acuities at distance and near.
3. Pseudo-isochromatic plate (PIP1 and PIP2) and cone contrast test (CCT) scores for each eye individually
4. Humphrey visual field 30-2 testing for each eye.

The aeromedical summary for a renewal waiver for cataract or visually significant lenticular opacity should include (ACS review required, in-person evaluation may not be required):

A. Brief summary of previous history of the condition, any associated symptoms, any changes or progression and any treatment performed.

B. Full optometry/ophthalmology exam to include:

1. Description of the lens opacity type and severity.
2. Best corrected visual acuities at distance and near.
3. Pseudo-isochromatic plate (PIP1 and PIP2) and cone contrast test (CCT) scores for each eye individually
4. Humphrey visual field 30-2 testing for each eye.
5. Low contrast acuity testing with Precision Vision 5% acuity chart.

The aeromedical summary for a renewal waiver after definitive surgical extraction and/or YAG capsulotomy should include (ACS review required, in-person evaluation may not be required):

A. Any interval history, procedures or symptoms since the last waiver was granted.

B. Full optometry/ophthalmology exam to include:

1. Location and stability of the IOL.
2. Best corrected visual acuities at distance and near.
3. Any contact lens or spectacle correction prescriptions.
4. Humphrey visual field 30-2 testing for each eye.
5. Dilated retinal exam.
6. Low contrast acuity testing with Precision Vision 5% acuity chart.

Note: Aeromedical summaries may not be submitted any early than 60 days after extraction and IOL implant. ACS evaluation will not be scheduled until 90 days following the procedure; assuming the aircrew member is stable and off medications. If just YAG laser surgery is done for a posterior capsule opacification then aeromedical summary may be submitted 30 days after procedure if asymptomatic and off any medications.

ICD 9 codes for cataract, cataract surgery	
366	Cataract
379.31	Aphakia
743.30	Congenital cataract
V43.1	Lens replaced by other means
V45.61	Cataract extraction

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WAIVER GUIDE
Updated: Jun 09
Supersedes Waiver Guide of Jun 99
By: Capt Ryan Davis, LtCol Richard Rubin (from ACS Ophthalmology) and Dr. Dan Van Syoc

CONDITION:
Central Retinal Artery Occlusion/Branch Retinal Artery Occlusion (Jun 09)

I. Overview.

Central retinal artery occlusion (CRAO), a complete disruption of blood flow through the central retinal artery, is an uncommon and irreversible condition. It typically presents unilaterally, resulting in an ischemic retina and painless visual loss occurring over seconds[1, 2, 3, 4]. CRAO makes up 57% of ocular arterial occlusions. Bilateral CRAO occurs in only 1-2% of cases.

Branch retinal artery occlusion (BRAO) is an occlusion of a distal branch of the central retinal artery, and presents with a sectoral visual field defect, as opposed to the complete visual field loss seen in CRAO[4]. BRAO makes up 38% of ocular arterial occlusions. Because the distribution of retinal vasculature respects the horizontal midline, branch retinal artery occlusions frequently have an altitudinal pattern to the visual field that does not cross the horizontal midline.

Visual outcome most closely correlates with presenting visual acuity[5,6,7,8] CRAO generally presents with much worse visual acuity than BRAO, and thus patients with CRAO usually have worse final visual acuity as well. Presenting visual acuity with complete CRAO is count fingers or worse in about 90% of cases[1,2]. More than 60% of patients with CRAO will have a final visual acuity worse than 20/200 despite various treatments, with more than half being worse than count fingers[1, 8]. Due to difficulty holding fixation with central visual loss, patients with CRAO generally have poor visual field testing in addition to the poor visual acuity[6]. BRAO has a better visual prognosis, with 80% maintaining 20/40 or better[7]. Final visual fields in BRAO are obviously related to the distribution and area of the occluded branch.

The retinal and choroidal blood supplies derive from the central retinal and ciliary arteries respectively, and are supplied by the ophthalmic artery, the first intracranial branch of the internal carotid artery[1,9]. Ophthalmic artery occlusion, which affects both the central retinal artery and choroidal circulations, generally presents with even worse visual acuity than that seen in CRAO. Thus, no light perception suggests combined retinal and choroidal infarction[2].

Fifteen to thirty percent of patients have a cilioretinal artery arising from the ciliary circulation that supplies a portion of the papillomacular bundle[1]. If this circulation supplies the fovea and is spared during CRAO, a situation occurring in about 10% of cases, then these patients generally retain central vision and have better visual outcomes. On the other hand, some patients may have isolated or bilateral cilioretinal artery occlusion, with associated loss of central vision. This accounts for 5% of ocular arterial occlusions. If isolated, visual prognosis is great, with 90% 20/40 or better and 60% with 20/20 or better. If associated with anterior ischemic optic neuropathy, visual prognosis is poor due to optic nerve damage.

Symptoms of a pending artery occlusion precede a complete central retinal artery occlusion, and present as painless transient visual loss (amaurosis fugax) about 10% of the time. Vision loss

typically lasts 30 seconds to a couple of minutes, and sometimes up to 1 or 2 hours. Immediate diagnostic and therapeutic intervention may prevent subsequent vision loss or stroke with this presentation.

There are a variety of retinal findings consistent with CRAO. Early changes include retinal opacity and edema located over the posterior pole within the temporal arcades, with the peripheral fundus maintaining a normal appearance. The fovea retains an orange reflex from the intact choroidal vasculature (cherry-red spot). Cotton wool spots are much less common, occurring 3% of the time in eyes seen <1 week after onset, and 6% of the time in eyes examined >1 week from onset.[1, 10] Segmentation of the blood column (boxcarring) and/or attenuation of the retinal arterioles and venous sludging are common findings[2]. A marked afferent papillary defect is usually present and may develop within seconds (direct pupillary response to light is reduced or absent but the consensual response remains intact). Optic disk pallor may occur early, and becomes more profound after several weeks. The white retina resolves over 4 to 6 weeks, leaving a pale optic disc and narrowed vessels.

Since central retinal artery obstruction occurs often when the blockage is within the optic nerve substance itself, the site of obstruction is generally not visible on ophthalmoscopy.
It is currently believed that the majority of central retinal artery obstructions are caused by thrombus formation at or just proximal to the lamina cribrosa. Atherosclerosis is implicated as the inciting event in most cases, although congenital anomalies of the central retinal artery, systemic coagulopathies, or low-flow states from more proximal arterial disease may also be present and render certain individuals more susceptible. In only 20–25% of cases are emboli visible in the central retinal artery or one of its branches, suggesting that an embolic cause is not frequent. Further indirect evidence against emboli as a frequent cause of central retinal artery obstruction is the 40% or less probability of finding a definitive embolic source on systemic evaluation and the small incidence (approximately 10%) of confirmed associated ipsilateral cerebral emboli in affected patients[11].

With branch retinal artery obstructions, the site of blockage is distal to the lamina cribrosa of the optic nerve, and emboli may be seen more often. The 10-year cumulative incidence of retinal emboli is 1.5% for patients between the ages of 43-80[12]. There are three main types of emboli that cause retinal artery occlusion: cholesterol, calcium, and platelet-fibrin[2]. Cholesterol emboli, which are frequently asymptomatic, can be seen on ophthalmoscopy as refractile, orange plaques (Hollenhorst plaques) at retinal vessel bifurcations. They generally arise from ulcerated atheromas, most commonly from carotid artery disease, but can also come from the aortic arch, ophthalmic artery or even central retinal artery[13]. Calcium emboli are often larger and commonly cause distal retinal infarction and typically come from cardiac valves. They appear as single, white, non-scintillating plaques located in the proximal retinal vasculature, but can be difficult to distinguish clinically from cholesterol emboli[1]. Platelet-fibrin emboli usually arise from atheromas in the carotid arteries and are seen as small, pale bodies[1, 2].

Other causes of CRAO/BRAO include atherosclerotic changes, hydrostatic arterial occlusion, thrombosis, hypercoagulation disorders, angiospasm, inflammatory endarteritis, giant cell arteritis (GCA), or other collagen-vascular diseases (i.e. systemic lupus erythematosus, polyarteritis nodosa)[1, 2, 13, 14]. Increased intraocular pressure from glaucoma or prolonged direct pressure to the globe can precipitate CRAO. Rarer causes include Behcet's disease, sustained vasospasm from migraine, syphilis, and sickle cell disease[2].

Mean age of CRAO onset is in the early 60's and CRAO occurs more frequently with men than women (2:1) and with older age[12, 15]. A history of hypertension is found in 67% and diabetes in 25% of patients with CRAO.[1] Eighteen percent of cases have carotid artery stenosis of 60% or more. GCA accounts for 1-2% of cases.

In cases associated with retinal emboli, mortality risk was found to be increased 2.4 fold, usually from cardiac disease, and structural cardiac abnormalities were found in approximately 50% of cases[12,16]. Mortality was 56% over 9 years versus 27% in age-matched controls.

For diagnostic purposes, intravenous fluorescein angiogram or electroretinography (ERG) can be performed. With CRAO, fluorescein angiography may demonstrate delayed vascular filling, a detectable arterial front associated with the slowed filling, and delayed arteriovenous transit time (time elapsed from appearance of dye in the arteries of temporal vascular arcade until corresponding veins are completely filled, which is normally less than 11-15 seconds). A prolongation of choroidal filling may be evidence of ophthalmic artery obstruction. Electroretinography may show diminution of the b-wave, with retention of a normal a-wave (electronegative waveform), due to selective ischemia of the inner retina.

A medical work-up for patients diagnosed with CRAO/BRAO should include all lab tests or exams pertinent to the most common causes, as well as an immediate referral to an ophthalmologist. Blood pressure, electrocardiogram, urine analysis, complete blood count (CBC), fasting blood glucose, glycosylated hemoglobin (HgbA1C), and serum cholesterol and triglycerides should be ordered on all patients for baseline evaluation looking for the most common etiologies of thrombosis and emboli[1]. Carotid duplex should be obtained on all patients as carotid disease is a common source of embolic CRAO[1, 13, 14]. It is important to recognize that from an ophthalmic standpoint the presence or absence of carotid plaques is much more important than the degree of carotid stenosis as the majority of ocular symptoms arising from carotid disease are caused by microemboli[4].

Erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and platelets should be ordered if the patient is at an at-risk age (>50-55 years of age) for GCA without visible embolus or if exam findings suggestive of GCA are discovered[1]. If history, exam, or labs are suggestive of GCA, the patient should be started immediately on high-dose steroids, with consideration for initial doses to be given intravenously without delay.

Patients under the age of 40 should get a much more extensive work-up, as the incidence of additional causes of retinal artery occlusion are more likely to be found, including migraine, cardiac disorders, trauma, sickle hemoglobinopathies, coagulopathies, collagen vascular disease, and ocular abnormalities such as optic nerve drusen or prepapillary arterial loops.
Hyperhomocystinemia is a known treatable cause of hypercoagulability and easily treated with folic acid. Therefore, a fasting total plasma homocysteine level and/or oral methionine loading test should be considered. Tests for less common causes such as other vasculitic, hyperthrombotic and hypercoagulable conditions include anti-nuclear antibody (ANA), antineutrophil cytoplasmic antibody (c-ANCA), anti-double stranded DNA, lupus anticoagulant, anticardiolipin antibodies, antiphospholipid antibodies, PT, aPTT, antithrombin III levels, activated protein C resistance, protein C, protein S, plasminogen activator, plasminogen activator inhibitors, fibrinogen, the genetic test for prothrombin G20210A mutation and hemoglobin electrophoresis.

Echocardiography should be obtained on all young patients with retinal artery occlusions, or any patient with cardio-embolic risk factors including history of rheumatic heart disease, endocarditis, mitral valve prolapse, recent myocardial infarction, prosthetic heart valve, cardiac tumor, heart murmur, other structural heart disease or arrhythmias such as atrial fibrillation[17]. Endocarditis and HIV should always be considered if history or exam suggests high risk activities such as intravenous drug use. In cases with retinal emboli, trans-esophageal echocardiography found lesions in 59% of cases, whereas transthoracic echocardiography found lesions in only 27% of cases. Thus, transesophageal echocardiography (TEE) is preferred over transthoracic echocardiography (TTE) for younger patients that are able to tolerate the transesophageal route and in older patients with cardio-embolic risk factors. Of young patients who have structural abnormality on TTE, 27% will require anticoagulation or surgery. Of older patients found to have structural cardiac abnormalities, only 10% required anticoagulation or surgery. Thus, young patients with structural cardiac abnormalities were approximately 3X as likely to require intervention as older patients.

Table 1 – Recommended investigations in CRAO/BRAO patients[1]

ALL PATIENTS	PATIENTS <40 YEARS OLD OR IF EXAM/HISTORY DICTATES
Blood pressure Electrocardiogram Urine Analysis Fasting Blood Glucose Fasting serum cholesterol and triglycerides Erythrocyte Sedimentation Rate Complete Blood Count with Platelets Doppler Studies of the Carotid Vessels Transthoracic echocardiography in young patients or those with cardio-embolic risk factors	Vasculitis screen (ANA, cANCA, anti-double stranded DNA antibody, C reactive protein) Coagulation and platelet activity screen (PT, aPTT, antithrombin III levels, activated protein C resistance, protein C, protein S, plasminogen activator, plasminogen activator inhibitor, fibrinogen, lupus anticoagulant, anticardiolipin antibodies, antiphospholipid antibodies, and the genetic test for prothrombin G20210A mutation. Oral methionine loading test Fasting total plasma homocysteine levels HIV test in at-risk population Hemoglobin electrophoresis

Treatment for CRAO consists of increasing oxygen delivery to the infarcted retina. No randomized clinical trials support one method of treatment over the other or any treatment over observation[3, 18]. Choice of treatment is complicated by the fact that reperfusion might reinjure the already damaged ischemic retina[2]. If the decision to treat is made, it should be done as soon as possible. Lowering the intraocular pressure of the affected eye to 15 mmHg or less, using pharmacologic agents, ocular massage, or anterior chamber paracentesis, can increase the perfusion pressure. Anti-platelet therapy (aspirin) has not been formally evaluated in CRAO, but its use has been suggested to reduce the risk of ischemic stroke in CRAO patients, if there are no contraindications. Blood flow may sometimes be restored to parts of the retina by rebreathing CO2 to dilate peripheral retinal vessels[1, 3]. This is particularly suited to austere settings, where rebreathing into a bag can be rapidly implemented. Another strategy is to attempt to use the intact choroidal circulation to deliver

oxygen to the ischemic inner retina. It is known that breathing 100% oxygen decreases the choroidal and retinal blood flow, but a combination of 5% CO_2 with oxygen (Carbogen) strongly increases pulsatile ocular blood flow while still increasing the amount of oxygen saturation in the blood[19,20] Hyperbaric oxygenation (HBO) has also been suggested to be beneficial[4, 21, 22]. Although there is no consensus on treatment protocols, one study demonstrated that HBO applied three times a day on day #1, twice a day on days #2 and #3, and once a day for at least the next 4 days resulted in an improvement in final visual acuities[21]. Low-dose thrombolytic treatment has recently been shown to have a potential benefit, if administered in the first 6.5 hours of visual loss, although more clinical trials are needed[3,23]. Risks of such therapy will need to be weighed against the benefits, and could be restricted to specific indications, before this treatment is accepted into future practice. Currently a large, multicenter randomized prospective study (EAGLE study) is underway in an attempt to determine the therapeutic efficacy of local intra-arterial fibrinolysis versus conservative therapy[18]. There exists some data from non-randomized, retrospective studies that local intra-arterial fibrinolysis might marginally improve final visual acuities, but much better data is needed to evaluate the risks and benefits[23,24]. Overall, no treatment strategy is preferred over another, and none have adequate evidence-based data for a firm recommendation[3]. In all cases, consultation with an ophthalmologist and internist are strongly recommended for management.

Following CRAO, iris neovascularization (rubeosis irides) may occur as a complication in 15 to 20% of cases. Disc neovascularization occurs less frequently in at about 2-3% of cases. Onset of rubeosis irides is earlier with CRAO, than with retinal venous occlusions. On average, it starts 4 to 5 weeks after onset with CRAO, versus 5 months for central retinal venous occlusions. The greater problem associated with rubeosis irides is the potential for development of neovascular glaucoma. Fortunately, pan-retinal laser photocoagulation causes regression in 65% cases.

II. Aeromedical Concerns.

The primary aeromedical concerns with CRAO/BRAO are final visual acuity, permanent visual field deficits, and management of predisposing medical conditions. With prolonged CRAO the retina becomes infarcted, possibly resulting in permanent loss of vision. The presence of this condition also indicates that the individual may be at increased risk of dying from stroke[12,15]. Long term cumulative cardiovascular mortality was shown to be nearly double in patients with retinal emboli than without; however, after adjusting for age, sex, body mass index, hypertension, diabetes, current smoking status, total cholesterol, HDL cholesterol, and study site no significantly increased cardiovascular mortality was found, demonstrating that the same risk factors for cardiovascular mortality predispose one to have retinal emboli[17]. Even if vision is adequately restored, the underlying conditions may pose serious, potential risks to safe flight. Therefore, investigation of the underlying cause is critical to both management and aeromedical disposition. Because many of these risk factors are treatable, early intervention could possibly reduce mortality.

III. Waiver Considerations.

Central retinal artery occlusion and branch retinal artery occlusion are disqualifying for FC I, IA, II, or III. Aeromedical Consultation Service (ACS) evaluation is required for all initial waivers. The probability of waiver is dependent on the final visual acuity, visual fields, and any associated complications. The consequences of CRAO are generally too serious to waiver, but some branch occlusions may be waiverable after ACS evaluation. Any underlying contributing pathology must also be waiverable for the individual to be returned to flight status. ACS review is required for

waiver renewal; depending on the results of local work-up an ACS evaluation may be required prior to renewal.

Table 2. Waiver Potential for CRAO/BRAO for FC I/IA, II and III.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	CRAO/BRAO with or without residual visual defects	No AETC	No
II	CRAO# BRAO	Unlikely AFMOA Maybe MAJCOM*	Yes Yes
III	CRAO# BRAO	Unlikely MAJCOM No MAJCOM*	Yes Yes

*To AFMOA if a categorical waiver indicated
#CRAO very unlikely to be waived as it almost invariably will result in blindness or significant visual loss

Review of AIMWTS through Dec 2008 initially revealed four cases. Three of them were actually central retinal vein occlusion cases and the fourth was the diagnosis of a Hollenhorst plaque on exam. The AIMTS database only goes back 7.5 years in time.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.
The aeromedical summary for an initial waiver for a Central Retinal Artery Occlusion/Branch Retinal Artery Occlusion should include:
A. Consideration of any potentially underlying disease etiologies, to include hypertension, heart disease, diabetes, hematologic disease, or collagen vascular disease with appropriate work-up and lab testing.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. History of disease, including treatment modalities attempted.
D. Full ophthalmology exam to include:
1. Best corrected visual acuities at distance and near
2. Humphrey visual field 30-2 testing for each eye.
3. Examination of fellow eye with pertinent findings.

4. Determination of presence or absence of macular edema, significant retinal hemorrhage, neovascularization, and glaucoma.

ICD 9 Codes for Retinal Artery Obstructions	
362.30	Retina, artery, arterial
362.31	Central
362.32	Branch or Tributary
362.33	Partial
362.34	Transient

Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

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WAIVER GUIDE
Updated: Jun 09
Supersedes Waiver Guide of Jul 99
By Capt Ryan Davis, Lt Col Richard Rubin (ACS Ophthalmology Branch) and Dr. Dan Van Syoc

CONDITION:
Central Retinal Vein Occlusion/Branch Retinal Vein Occlusion (Jul 99)

I. Overview

Retinal vein occlusion (RVO) is the second most common retinal vascular disorder and a significant cause of loss of vision. Its prevalence is estimated to be between 0.7% and 1.6% of the population, and although it usually occurs over age 50, younger patients can develop RVO as well[1, 2].

RVO is most often associated with compression of a retinal vein by an adjacent atherosclerotic retinal artery, where the artery and vein share an adventitial sheath, or at the lamina cribrosa, which stiffens with age. Arterial atherosclerotic changes cause increased pressure on the retinal vein, increasing turbulent flow in the vein, and thus, the risk of thrombus formation[3, 4].

Hypertension, venous disease, cerebrovascular disease, diabetes, smoking, obesity, dyslipidemia and open-angle glaucoma are all known risk factors for RVO[1-6]. Hypercoagulable conditions, hyperviscosity, dehydration, blood dyscrasias, platelet dysfunction, vasculitides, diuretics, oral contraceptives, optic disc drusen or tilting, and orbital compression/congestion can also predispose an eye to RVO. In particular, high levels of type 1 plasminogen activator and hyperhomocysteinemia appear to be associated with RVO.[3] These less common etiologies should particularly be considered in younger patients who present with RVO. In older patients over age 60, RVO might be associated with a higher risk of stroke[7].

RVO is typically divided into either branch retinal vein occlusion (BRVO), hemiretinal vein occlusion (HRVO), or central retinal vein occlusion (CRVO) depending on where the retinal vein is affected[2].

CRVO is typically classified into two distinct subtypes based on the degree of remaining perfusion. Non-ischemic CRVO is defined by mild tortuosity of the central retinal vein with characteristic dot and flame hemorrhages in all quadrants of the retina[4, 8, 9]. Macular edema and mild optic disc swelling may or may not be present, and prolongation of retinal circulation time with an increase in capillary permeability may be seen with fluorescein angiography[4, 8, 10]. Ischemic CRVO is a much more severe variant, with at least 10 disc areas of retinal capillary non-perfusion on fluorescein angiography. Venous dilation is prominent, and cotton wool spots (nerve fiber layer infarcts) are easily seen[8, 10]. If retinal hemorrhages are severe, classic "blood and thunder" appearance of the retina may be observed[9]. Extensive retinal capillary non-perfusion is a key differentiating factor of ischemic CRVO from non-ischemic CRVO, where there are minimal areas of non-perfusion. Non-ischemic CRVO may progress to the ischemic variety within 4-6 months approximately 30% of the time[11]. Because of this risk, patients should be instructed to immediately report worsening of their vision to their ophthalmologist[8].

CRVO typically presents with sudden, painless loss of vision. Patients may have a history of recurrent episodes of transient loss of vision. However, in mild non-ischemic CRVO the patient

may be unaware of any visual loss and the disease only discovered on routine dilated exam. Symptoms are typically worse in the morning with the patient noticing improvement throughout the day. Final visual acuity in ischemic CRVO was reported in one study to be 20/400 or worse in 87% of patients. Non-ischemic disease is usually much milder than ischemic CRVO, with final visual acuities reported as 20/30 or better in 56% of cases even without treatment[4, 9]. BRVO has a relatively good prognosis, with 50-60% of eyes achieving final visual acuities of 20/40 or better even without treatment. Regardless of the type of RVO, initial visual acuities are highly predictive of final visual acuities.[1, 11].

Differential diagnoses of CRVO include diabetic retinopathy, radiation retinopathy, severe hypertensive retinopathy, papilledema, and ocular ischemic syndrome, associated with carotid occlusive disease. Diabetic retinopathy typically presents bilaterally, and can be differentiated from CRVO by intravenous fluorescein angiography[10]. Any history of irradiation should increase the suspicion for radiation retinopathy, with disc swelling and cotton-wool spots the most obvious clinical features. Acute "malignant" hypertension can also present with disc edema, macular edema, and hemorrhages, but the condition is usually bilateral, unless unilateral carotid artery obstruction, spares the ipsilateral retina from the effects of the hypertension. Papilledema also is most often bilateral, but can be unilateral, if prior optic nerve scarring or atrophy prevents swelling on one side. Carotid occlusive disease with ocular ischemia has dilated and irregular veins, but often with lesser tortuosity. Hemorrhages are found in 80% of cases, but are instead mid-peripheral. Ocular or periorbital pain, mild anterior iritis and/or iris atrophy may occur. Neovascularization of the iris is present in 66% and of the posterior segment in 37% of cases. In addition, with carotid disease, the ophthalmic artery pressure is low and spontaneous pulsations of central retinal artery may occur, whereas in CRVO, the pressure should be normal to increased[10].

Four functional tests (visual acuity, Goldmann visual fields, relative afferent pupillary defect and electroretinography), taken together, are reliable indicators to differentiate ischemic from non-ischemic CRVO[12]. However, high resolution fluorescein angiography (FA) remains the clinical test of choice to help diagnose CRVO. Intraocular pressure by applanation and gonioscopy should be performed to rule out glaucoma as an etiology, to determine the risk of angle-closure glaucoma, and to look for signs of iris neovascularization[4, 7, 9, 10]. The risk for iris neovascularization in ischemic CRVO is highest during the first 7-8 months, reaching a total risk of approximately 45% after 3 years[13]. Hypertension, diabetes, cardiovascular disease, and cholesterol should all be evaluated and treated if determined to be present[2]. Fasting blood sugar, hemoglobin A1C, complete blood count (CBC) with differential, platelets, prothrombin time (PT), partial thromboplastin time (PTT), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), homocysteine, lipid levels, anti-nuclear antibody (ANA), and fluorescent treponemal antibody absorbed (FTA-ABS) are all tests that should be ordered with an initial work-up[8]. In young patients with no obvious cause, or in any patient, when clinically indicated, a more detailed work-up looking for less common etiologies, such as hypercoagulable and hyperviscosity diseases may be indicated. Tests might include hemoglobin electrophoresis, VDRL or RPR, cryoglobulins, antiphospholipid and anticardiolipin antibodies, lupus anticoagulant, serum protein electrophoresis, chest radiograph, protein C and S levels, type 1 plasminogen activator levels, and resistance to activated protein C (which is 90% associated with a single point mutation in the factor V Leiden gene). Antithrombin III levels and/or genetic mutation of the prothrombin gene have not yet been found to be significantly associated with cases of retinal vein occlusion to date[1].

Treatment for RVO is a complex and controversial area with strategies dependent on type, severity, and presence of complications. There are currently no good evidence-based treatment recommendations for RVO. Most current treatment strategies involve close observation with rapid response to any complication[14, 15]. Regardless, control of any underlying disease is paramount, as ischemic and non-ischemic CRVO exist on a spectrum, and worsening of venous outflow can potentially worsen the patient's condition. Swift actions that should be taken include stopping all medications contributing to a hypercoagulable state, such as oral contraceptives, and changing all diuretics to alternative antihypertensive medications[10]. In cases of hyperhomocysteinemia, consideration of vitamin therapy with folic acid, B6 and B12 may be indicated[3]. Intraocular hypertension should also be aggressively treated due to the independent risk factor of open-angle glaucoma contributing to CRVO. Medical therapy with anticoagulants, fibrinolytics, corticosteroids, acetazolamide, and isovolemic hemodilution have all been mentioned in the literature. No clear consensus has emerged for these treatment therapies, and some treatments have been shown to be detrimental[16].

Surgical options for CRVO include pars plana vitrectomy with or without internal limiting membrane peeling, chorioretinal venous anastomosis, direct injection of t-PA into a retinal vein, and radial optic neurotomy[4, 11]. None of these have been shown to be superior to the natural progression of the disease, and the lack of adequate randomized studies on surgical treatment in either CRVO or BRVO do not allow a firm recommendation to be made[1, 8, 14]

Panretinal photocoagulation (PRP) has been proposed by some for treatment in ischemic CRVO to prevent ocular neovascularization and neovascular glaucoma. Prophylactic PRP in high-risk ischemic CRVO was thought to decrease the risk of NVG, but long-term follow up studies have since found that there is no statistical difference in the development of angle neovascularization, NVG, retinal and/or optic disc neovascularization, vitreous hemorrhage, or decrease in visual acuity in eyes treated prophylactically with PRP. Regardless, the decision and management of treating early or prophylactically with PRP should be made by an eye specialist[13, 16, 17]. Recent research with intravitreal anti-vascular endothelial growth factor and angiostatic agents has been utilized to reduce complications. A recent prospective phase 1 study reports that intravitreal Ranibizumab used over a period of one year improved mean visual acuity in patients with CRVO and had low rates of adverse reactions[19].

Macular edema is the most common visual threatening complication of CRVO, and close observation and treatment is required to prevent prolonged loss of vision[20]. Treatment of macular edema has been shown to improve visual acuities. Although the Central Vein Occlusion Study Group M report did not recommend grid laser photocoagulation for CRVO-associated macular edema, with BRVO-associated macular edema, this treatment has been shown to increase visual acuity by 2 or more lines in 65% of treated eyes, and remains the therapeutic option of choice in patients meeting certain indications with this disease[1, 4, 21, 22]. There have also been reports of hyperbaric oxygen improving macular edema and visual acuity in CRVO, but adequate randomized clinical trials sufficient to make a firm recommendation have not yet been done[23]. Several recent non-randomized studies reported that intravitreal bevacizumab injections increased visual acuity and decreased macular edema in both ischemic and non-ischemic CRVO[24, 25]. Another study reported that bevacizumab also appears to be a safe and effective treatment for macular edema associated with BRVO.[22]

II. Aeromedical Concerns

The primary aeromedical concerns with CRVO/BRVO are final visual acuity, permanent visual field deficits, complications of neovascular glaucoma or macular edema, and proper management of any predisposing medical conditions. Persistent, chronic macular edema is not waiverable. Even if vision is adequately restored, the underlying systemic conditions may pose potential serious risks to safe flight. Therefore, investigation of the underlying cause is critical to both management and aeromedical disposition.

III. Waiver Considerations

Central retinal vein occlusion and branch retinal vein occlusion are disqualifying for all aviation duty in the US Air Force. An Aeromedical Consultation Service (ACS) evaluation is required for all initial waivers for CRVO/BRVO. The probability of waiver approval is dependent on the final visual acuity, visual field and absence of other significant pathology or complications. Any underlying contributing pathology must also be waiverable for the individual to be returned to flight status. For waiver renewals, ACS review is required. Depending on the results of local work-up, an ACS evaluation may be required prior to waiver renewal.

Table 1: Waiver potential for Retinal Vein Occlusion

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	RVO resolved without residua	Maybe* AETC	Yes
	RVO with residual visual defects	No AETC	No
II	RVO resolved without residua	Yes MAJCOM	Yes
	RVO with residual visual defects	Maybe MAJCOM	Yes
III	RVO resolved without residua	Yes MAJCOM	Yes
	RVO with residual visual defects	Maybe MAJCOM	Yes

*Visual outcome needs to have returned to baseline without presence of any recognized risk factors

AIMWTS review in Feb 2009 revealed a total of eight cases, zero FC I/IA cases, six FC II cases and two FC III cases. In the FC II category, all were waived except for a pilot with poor visual outcome in the affected eye and in the FC III category, one was disqualified for two unexplained cases of syncope.

IV. Information Required for Waiver Submission.

Waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for an initial waiver for a Retinal Vein Occlusion should include:
A. Consideration of any potentially underlying disease etiologies, to include hypertension, heart disease, diabetes, hematologic disease, or collagen vascular disease with appropriate work-up and lab testing.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. History of disease, including treatment modalities attempted.
D. Full ophthalmology exam to include:
1. Best corrected visual acuities at distance and near.
2. Humphrey visual field 30-2 testing for each eye.
3. Examination of fellow eye with pertinent findings.
4. Determination of presence or absence of macular edema, significant retinal hemorrhage, neovascularization, and glaucoma. Include Optical Coherence Tomography and/or Fluorescein Angiography if available.

The aeromedical summary for a waiver renewal for a Retinal Vein Occlusion should include:

A. Interim History since last waiver and ACS visit.
B. Ongoing treatment modalities.
C. Full ophthalmology exam to include items as noted above:

ICD 9 Codes for Retinal Vein Occlusion	
362.35	Central Retinal Vein Occlusion
362.36	Branch Retinal Vein Occlusion

Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Aug 2007
By: Capt J. Ryan Brewer, ACS Ophthalmology branch, and Dr. Dan Van Syoc
Reviewed by Col John Gooch, chief of the ACS Ophthalmology branch

CONDITION:
Central Serous Chorioretinopathy (Mar 11)

I. Overview.

Central serous chorioretinopathy (CSR) is a condition in which a small area of the central neurosensory retina (macula) fills with fluid and separates from the underlying choroid forming a small elevation of the macula.[1] The retinal pigment epithelial layer (RPE) which lies posterior to the neurosensory retina, functions to prevent fluid accumulation under the retina by pumping fluid across Bruch's membrane and into the choriocapillaris, which is a network of capillaries that supply blood to the outer layers of the retina.[2] In CSR, fluid usually accumulates between the outer layer of the retina and the RPE but occasionally the RPE may also separate from the underlying Bruch's membrane and choroid causing what is referred to as a pigment epithelial detachment (PED). CSR typically affects central vision causing symptoms that include:

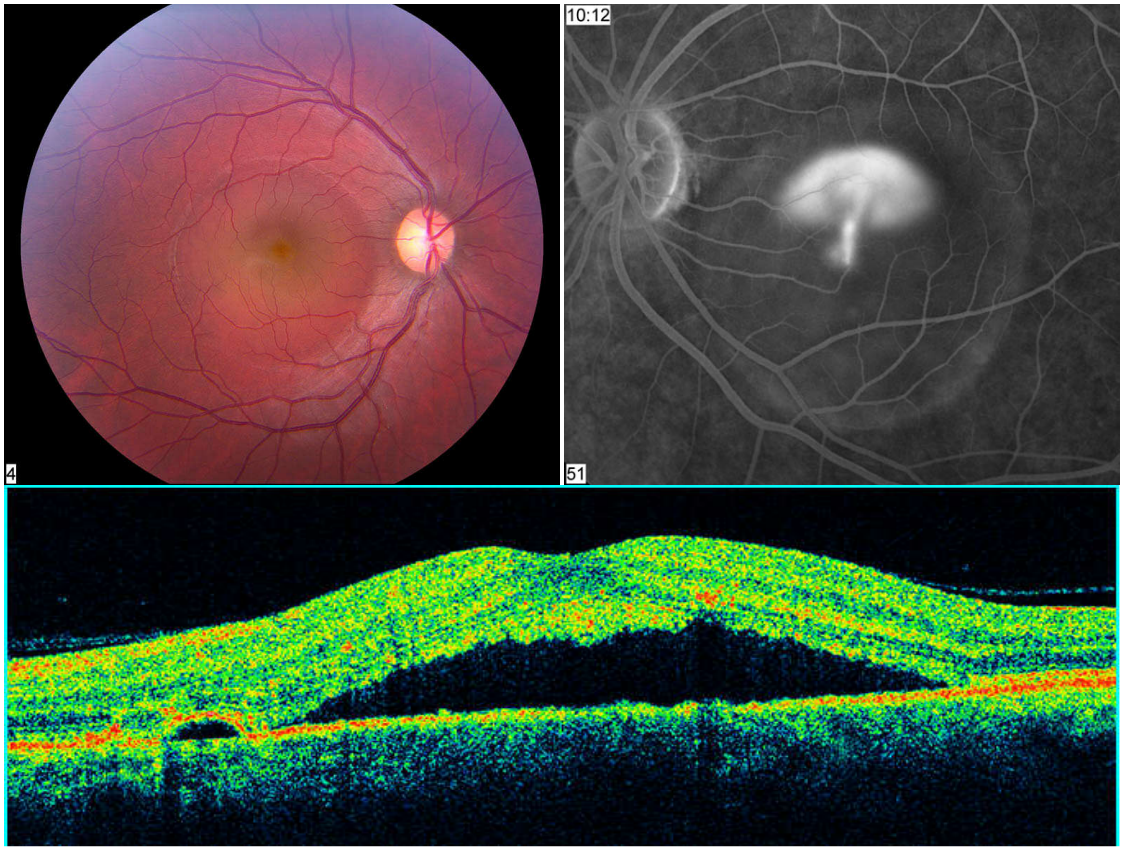
- Metamorphopsia - image distortion or wavy lines on the Amsler grid.
- Blurred or dim vision
- Micropsia -objects appearing abnormally small.
- Color desaturation - colors do not appear as bright in one eye; typically red colors.
- Paracentral scotoma - area of vision that is missing or significantly blurred.

The etiology of CSR is not entirely clear but it appears to be due to abnormal choriocapillary vasculature permeability and RPE defects, leading to leakage from the choroid through the RPE into the sub-retinal space forming a serous detachment. This leaky vasculature produces serous fluid not hemorrhage, therefore, hemorrhage present on fundus exam indicates that a different disease process is likely present.[3] Visual acuity may decline to 20/200 after onset of CSR but is typically preserved around 20/30.

Several factors have been found to have an association with CSR. It tends to occur more commonly between the ages of 25 and 55 and more frequently in males than females in a ratio that ranges from 2:1 to 7:1. Further, use of inhaled, topical, or systemic steroids including Flonase®, has been implicated as a possible associated factor.[1] Many other factors have been considered as possible contributing factors including tobacco, alcohol, sildenafil, psychopharmaceuticals, antibiotics, antihistamines, type-A personalities, hypertension and stress.[3, 4, 5] The pathogenesis is thought to be due to elevated circulating cortisol and epinephrine, which affect the autoregulation of the choroidal circulation.[4]

The diagnosis of CSR is typically made on clinical grounds with ancillary testing used for confirmation. The traditional testing modality of choice is fundus fluorescein angiography. Sodium fluorescein, a dye that fluoresces when exposed to certain wavelengths of blue light, is injected into a vein and fundus photography is performed to photograph the retina as the fluorescein dye flows through the choroid and into the retinal vessels. In CSR, the dye can be seen leaking into the sub-

retinal space through defects in the RPE. Indocyanine green (ICG) angiography can be performed in a similar fashion but uses ICG dye instead of fluorescein. ICG angiography is able to better define the choroid than fluorescein and can be used as a second confirmatory test when a fluorescein angiogram does not yield definitive results.[1, 3] A newer, non-invasive testing modality called optical coherence tomography (OCT) is becoming the new standard for monitoring and detecting CSR. It uses light to image the retina and produces a two dimensional cross sectional image, similar to an ultrasound but with resolution measurable in microns.[1] OCT findings of sub-retinal fluid or thickening of the retina can be used to support the clinical diagnosis of CSR.[3]



Above image: Upper left- clinical funduscopic appearance of CSR, Upper right- fluorescein angiogram displaying typical plume of smoke appearance. Below- OCT generated image of the macula, indicating separation of the neurosensory retina from the underlying RPE. (Images used with permission)[6]

CSR is often a self limiting process with clinical resolution in three to four months in 80-90% of cases with visual acuity returning to normal or near normal levels. However, the full recovery of visual acuity may not occur for a full year. In addition, permanent residual visual symptoms may occur including metamorphopsia, scotoma, color vision deficits and decreased contrast sensitivity. Moreover, 40-50% of affected patients will experience a recurrence either in the same or fellow eye within the first year of initial episode.[1, 3] CSR associated with a pigment epithelial detachment (PED) or non-resolving sub-retinal fluid, pertains a worse prognosis for regaining 20/20 visual acuity in the affected eye. Additionally, vessels from the choroid proliferating into the space between the RPE and Bruch's membrane or between the retina and the RPE, called choroidal neovascularization results in a worse prognosis with the potential for permanent visual loss. Recurrence of CSR in the same eye also increases the likelihood of permanent visual deficits.[7]

Treatment options for CSR are limited to expectant observation or laser photocoagulation. Laser photocoagulation at the site of fluorescein leakage can speed recovery time but typically does not affect the final visual outcome.[1,8] Laser photocoagulation may be considered in patients with persistent of sub-retinal fluid or recurrences in patients with prior visual deficits from CSR.[1, 3] Although laser photocoagulation may speed recovery, there is risk of permanent damage to normal retinal tissue and photoreceptors in the treatment area, and may cause secondary choroidal neovascularization with risk of permanent visual loss. As such, treatment recommendations should be made cautiously given the potential visual and occupational consequences.

II. Aeromedical Concerns.

Normal visual function is crucial in the aerospace environment. Central serous chorioretinopathy (CSR) can adversely impact visual function with symptoms of metamorphopsia (distortion of vision), micropsia (smaller visual images), scotomata (areas of the visual field missing or blurred), blurred vision, color desaturation (reduced brightness of colors), or sub-standard visual acuity. A 1988 Aeromedical Consultation Service (ACS) study that examined 47 rated airmen with 55 eyes affected by CSR found that all but one of the patients was returned to flying status. Fifty-one percent of airmen had recurrent episodes, 86% had better than 20/20 visual acuity after resolution of the CSR, 87% had normal color vision and 90% had normal stereopsis.[9]

The effect of the aerospace environment on active CSR is currently unknown. The presence of sub-retinal fluid introduces new dynamics into the eye that are not present otherwise. The effect of applying G-forces or relative hypoxia upon the pathophysiologic process of CSR is unclear. Further, sub-retinal fluid indicates active disease, which introduces the possibility of fluctuating visual acuity and could have an adverse impact on flight safety. Because of the aeromedical implications of these variables, aircrew members will not be considered for return to flight status until complete resolution of the sub-retinal fluid occurs as demonstrated by ophthalmologic exam and ancillary studies.

For aircrew members that have a history of CSR, regular follow-up care and monitoring are critical for flight safety and continued ocular health. Self administered Amsler grid testing is the primary method for aircrew to assess for recurrence or worsening of CSR. Aircrew members should obtain an Amsler grid from the local optometrist office and test each eye individually, daily for the first year following the CSR. Any new distortion of the lines or missing parts of lines (scotomas) should be immediately reported to the local flight surgeon with subsequent referral to ophthalmology. If no recurrence has occurred within the first year, then weekly Amsler grid testing is appropriate. In addition to Amsler self testing, aircrew members with a history of CSR require annual full local ophthalmology evaluations as follow-up. These exams should specifically note visual acuity, Amsler grid testing, OVT depth perception testing, PIP1 and PIP2 color testing and dilated funduscopic examination results. The result of these exams should be included in the AMS with submission for waiver request.

III. Waiver Consideration.

CSR is disqualifying for all FC I/IA, II, IIU, and III aviators and requires ACS evaluation for waiver consideration. CSR is not specifically disqualifying for ATC/GBC and SMOD duties, but will be disqualifying if it results in visual acuity problems or significantly alters color vision. After

documented resolution of the CSR by a fundus exam and if possible optical coherence tomography (OCT), a waiver may be requested. Even if the airman's vision returns to 20/20 or is correctable to 20/20, a local eye specialist must demonstrate that the sub-retinal fluid has resolved prior to waiver request submission. Waivers may be requested for airmen with best corrected vision less than 20/20 or residual visual symptoms (metamorphopsia, color vision deficits), however, the visual acuity and visual symptoms must be stable (not improving or worsening). If laser photocoagulation is performed the airman must remain DNIF for 30 days following the procedure and requires a full local ophthalmologic exam to include a dilated fundus exam and Humphrey visual field 30-2 testing prior to waiver request submission. The eye exam must demonstrate resolution of the sub-retinal fluid by fundus exam and/or OCT. If CSR recurs in an airman with a known history of prior CSR, it is treated the same as an initial occurrence. The airman will require a new waiver request to be submitted prior to return to flight status with a possible ACS review/evaluation.

Table 1: Waiver potential for central serous chorioretinopathy

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	No
II/IIU/III	Yes* MAJCOM**	Yes
ATC/GBC	Yes MAJCOM	Maybe#
SMOD	Yes AFSPC or GSC	Maybe#

* Waiver in untrained FC II and III individuals is unlikely
** Waiver authority for FC IIU personnel is AFMSA
# ACS review at the request of the waiver authority

AIMWITS search in Jan 2011 revealed a total of 99 individuals with an AMS including the diagnosis of CSR. There were 0 FC I.IA cases, 62 FC II cases (4 disqualifications), 33 FC III cases (6 disqualifications), 1 FC IIU case (0 disqualifications), 3 ATC/GBC cases (1 disqualification), and 0 SMOD cases. All of the disqualified cases were either due directly to the diagnosis of CSR or were for vision-related causes.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for an initial waiver for CSR following resolution of the sub-retinal fluid and stabilization of visual acuity and visual symptoms:
A. Complete history of symptoms (negatives included), medical or laser treatment, and residual visual complaints.
B. Attach studies (optical coherence tomography [OCT], fluorescein angiograms [FA] or indocyanine green angiograms) if performed.
C. Full ophthalmology exam to include:

1. Documentation of resolution of CSR by fundus exam and if possible an OCT.
2. Documentation of visual acuities at or better than 20/20 in each eye or documented stability of a visual acuity less than 20/20.
3. Results from Amsler grid testing.
4. Pseudo-isochromatic plate (PIP1 and PIP2) scores and CCT for each eye individually.
5. OVT-DP results, if not within standards then AO Vectograph results.
6. Humphrey visual field 30-2 testing for each eye if laser photocoagulation was performed (waiver request may not be submitted until 30 days after the procedure).

The aeromedical summary for a renewal waiver for CSR with no intervening episodes, decline in visual acuity or worsening of residual visual symptoms since the last waiver was granted:
A. A brief medical history summarizing the initial occurrence of the CSR, any recurrences and any treatment. Full description of any residual visual complaints.
B. Full ophthalmology exam to include:
1. Documentation of continued resolution of CSR by fundus exam and if possible an OCT.
2. Visual acuity in each eye, uncorrected and corrected.
3. Results from Amsler grid testing.
4. Pseudo-isochromatic plate (PIP1 and PIP2) scores for each eye individually.

ICD 9 code for central serous chorioretinopathy	
362.41	Central serous retinopathy

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WAIVER GUIDE
Updated: Apr 2009
By: Major Maureen Williams (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Cervical Cancer (Apr 09)

I. Overview.

In 2008, the American Cancer Society estimated 11,070 new cases of invasive cervical cancer would be diagnosed in the USA. Non-invasive carcinoma in situ is believed to be four times more common than invasive cervical cancer. For 2008, 3,870 women were predicted to die from cervical cancer which represents 0.13% of all cancer deaths in women in the US[1, 2]. Cervical cancer was once the number one cause of cancer death in women in the US; it now ranks 12th, largely due to improved screening with the Papanicolaou (Pap) test[3]. Prior to the introduction of cervical screening with the Pap test in the 1950's, the overall incidence of invasive cervical cancer was 50/100,000 women in the US. In 1975, the incidence decreased to 14.8/100,000 women then to 7/100,000 women in 2004[4]. This translates to a 74% decline in the cervical cancer death rate between 1955 and 1992. Since 1992, the death rate has declined an additional 4% each year[1]. Cervical cancer rates are higher for areas and populations with limited access to healthcare and screening opportunities. This is vividly demonstrated with the finding that cervical cancer comprises 7% of all female malignancies in developed countries, while it comprises 24% of such malignancies in developing countries[3].

Most cases of cervical cancer develop in women between the ages of 20 and 50. Approximately 20% of cases are diagnosed in women over 65 years of age[1]. The development of cervical cancer begins with infection by at least one of the 15 high risk Human Papillomavirus (HPV) serotypes (especially serotypes 16 and 18)[5, 6, 7]. Persistent infection can progress to cancer precursors that include low-grade intraepithelial neoplasia (LSIL) and high-grade intraepithelial neoplasia (HSIL). LSIL on the Pap test often corresponds to a biopsy pathology report finding of cervical intraepithelial neoplasia (CIN) 1, while HSIL corresponds to CIN 2/3[5]. LSIL and HSIL are Pap test cytology results, while CIN 1/2/3, as well as invasive cervical cancer, are biopsy pathology results. However, it should be understood that the findings do not always correspond. For example, LSIL on a Pap test may have the biopsy confirmed CIN 2/3, while HSIL will often have colposcopy and biopsy confirmed CIN 1.
Women younger than age 25 have the highest rates of HPV infection; 50% of the women in this age group will acquire HPV infection within 2-3 years of beginning intercourse. The vulnerability of this population to HPV infection is believed to result from both behavioral and biological factors. Behavioral factors include multiple sexual partners and low condom use. Biological factors include an immature cervix with greater exposure of columnar and metaplastic tissue, and higher rates of cellular mitosis both of which are favorable to viral infection and propagation. As the cervix matures, the transformation zone between columnar and squamous tissues (squamocolumnar junction) moves from the cervical surface into the cervical os where it is more protected. These factors are surmised to be the reason why the cumulative incidence of HPV infection over 3 years decreases steadily from a high of 35.7% in women age 15-19 to 8.1% in women >age 45[6]. However, most HPV infections resolve spontaneously. For example, one study found that 91% of infections in adolescents and young women resolved within 2 years without treatment[8]. As noted above, cancerous precursors and cervical cancer can develop in infections that do not resolve. One

study of 10,090 Pap tests from women age 12 to age 18 found that 5.7% were LSIL. However, cancer precursors can also spontaneously resolve, although this probability decreases with increasing dysplasia. A study of women age 18-22 with LSIL found that 91% spontaneously resolved while 3% progressed to HSIL[5]. Another study with a median follow-up time of 18 months found that in those women who opted for conservative treatment of CIN II, 65% resolved, 20% remained CIN II, and 5% progressed to CIN III (carcinoma in situ). This study found that no patients progressed to invasive cancer[6]. For ethical reasons, it is difficult to determine the rate of progression from CIN III to invasive cancer since the precancerous lesion is treated. Historical data shows that the latency period between infection and development of carcinoma in situ (CIS) is typically 7-15 years, with invasive cancer requiring an additional 10 years to develop. Also because of the long latency period, cervical cancer in women less than age 20 is rare with an incidence of 0.1/100,000 women[1, 5]. After age 20, the incidence rate of cervical cancer increases linearly to a rate of 16/100,000 women at age 40. Incidence rates remain at 15-17/100,000 women until age 75 when they begin to decline[9].

Risk Factors

Risk factors for cervical cancer include early age at first intercourse (age 13 years or younger), multiple sexual partners, multiparity, lower socioeconomic standing, cigarette smoking, history of sexually transmitted diseases, and immunosuppression (e.g. HIV positive, organ transplant patients, and long-term corticosteroid use)[10]. Race is also a risk factor; cervical cancer occurs twice as often in Hispanic women and 50% more often in black women than in non-Hispanic white women[1]. However, the incidence of cervical cancer decreases for all races with improved access to screening[5]. Cervical cancer is associated with HPV infection, with serotypes 16, 18, 31, 33, 45, and 56 responsible for 80% of invasive cervical cancers[3]. Persistent infection with an oncogenic HPV serotype, especially types 16 and 18 (accounting for 68% of cervical squamous cell carcinoma and 83% of cervical adenocarcinoma), is the single most important risk factor for development of cervical cancer. Penetrative sexual intercourse is the single largest risk factor for acquiring HPV infection[5, 7, 11].

Symptoms

The symptoms depend on the location and extent of the cancer. Oncogenic HPV infection is asymptomatic. Precancerous lesions, such as LSIL or HSIL, and early stage cancer are usually asymptomatic. In some early stage cancers, and as the lesion progresses to invasive disease, the cancerous cervical tissue becomes friable and may cause irregular bleeding and/or post-coital bleeding. The woman may also have a foul-smelling serosanguinous vaginal discharge. As the cancer invades parametrial tissues, the woman may experience back, pelvic, or abdominal pain. Lymph node involvement may also cause pain in the area of the enlarged lymph nodes[12].

Primary prevention

For the majority of women, primary prevention principally involves minimizing or eliminating the risk of HPV infection. Most of this effort relied on behavior management (abstinence, long-term monogamous relationship with an uninfected partner, condom use, etc.)[7, 11]. The introduction of the HPV vaccine has added to the arsenal of primary prevention.

The quadrivalent vaccine protects against HPV serotypes 16 and 18, and against serotypes 6 and 11 (6 and 11cause most cases of genital warts). The vaccine series consists of 3 intramuscular injections- the first given on day 1, the second two months after the first, and the third six months after the first. Catch-up schedules are available. Patients should understand that the vaccine does

not eliminate the need for continued screening. The vaccine does not cure HPV infection, so vaccine efficacy is significantly reduced or eliminated when infection is already present. Therefore, the vaccine is recommended to be given to girls age 11-12 in order to provide adequate protection prior to initiation of sexual intercourse (consider beginning the vaccine in girls as young as age 9 in populations where early sexual activity is a concern).

The vaccine is approved for women age 9-26 and has an efficacy of 89.5% for protection against persistent infection with HPV serotypes 16, 18, 6, and 11 in those women who received all three doses of vaccine and were not infected prior to receiving the vaccine. In phase III clinical trials, the vaccine demonstrated 100% efficacy against HPV 16 and 18-related CIN II/III and adenocarcinoma in situ, and 95.2% efficacy against HPV 16 and 18-related CIN I. Women between the ages of 12 and 26 who have not received the vaccine should be offered vaccination. HPV testing prior to initiation of the vaccine series is not recommended. Although the vaccine is not currently approved or recommended for use in women older than age 26, trials are underway to evaluate the efficacy of the vaccine in this population[7].

Secondary prevention

Secondary prevention consists of efforts through screening to detect early cellular changes before they develop into cancer and early cancers when they are most treatable[1]. The sensitivity of a single Pap smear is 51-90%; the reliability ranges from 43-78%[7]. Nevertheless, Pap screening works because of the high rates of spontaneous resolution of infection and early dysplasia and the long latency between infection and invasive cervical cancer in those women who develop persistent HPV infection.

Current screening practice involves use of Pap smears (conventional cytology or liquid-based) with the addition of HPV testing and/or colposcopy if indicated. In general, guidelines recommend screening begin three years after first intercourse or age 21 years, whichever is sooner[4, 5]. Recommendations for routine cervical cancer screening intervals vary among the American Cancer Society, U.S. Preventive Services Task Force (USPSTF), and the American College of Obstetrics and Gynecologists (ACOG). See table 1 below for a concise summary[7].

Table 1- Cervical cancer screening guidelines - United States[7]

Guidelines	American Cancer Society	US Preventive Services Task Force	American College of Obstetricians and Gynecologists
When To Start	Approximately 3 years after onset of vaginal intercourse, but no later than age 21 years	Within 3 years of onset of sexual activity or age 21 years, whichever comes first	Approximately 3 years after onset of sexual intercourse, but no later than age 21 years
Intervals: Conventional Pap Test	Annually; every 2-3 years for women aged ≥ 30 years with three negative cytology tests*	At least every three years	Annually; every 2-3 years for women aged ≥ 30 years with three negative cytology tests*
Intervals: If liquid-based cytology used	Every 2 years; every 2-3 years for women ≥ 30 years with three negative cytology tests*	Insufficient evidence	Annually; every 2-3 years for women ≥ 30 years with three negative cytology tests*
Intervals: If HPV testing used as an adjunct to cytology	Every 3 years if HPV negative, cytology negative	Insufficient evidence	Every 3 years if HPV negative, cytology negative

*Certain exemptions apply (e.g., women who are immunocompromised, infected with HPV virus, or have history of prenatal exposure to diethylstilbestrol in utero)

In Sept 2006, the American Society for Colposcopy and Cervical Pathology (ASCCP) updated the guidelines for screening and management of abnormal pap smears, cervical intraepithelial neoplasia (CIN), and adenocarcinoma in situ (AIS). The recommendations vary according to patient age, Pap result, HPV testing result, current pregnancy status, and biopsy result (if performed). A comprehensive discussion of these recommendations as well as management algorithms can be found on the ASCCP website (www.asccp.org) and elsewhere[4, 5, 13, 14, 15].

Staging and Treatment

In addition to cervical biopsy and pathology review, the initial evaluation should include a history and physical, complete blood count (CBC, including platelets), and liver and renal function studies. Chest x-ray, PET scan, and CT/MRI should also be done (optional for stage IB1 and less). Treatment is based on staging. Currently, cervical cancer is staged clinically, not surgically (see table 2 for stage definitions). Some stages have fertility-preserving treatment options for those women who desire to preserve their fertility. This is an important consideration since 50% of cervical cancers occur in women less than 40 years old[12, 16]. Table 2 lists the cervical cancer stages and descriptions.

Table 2: International Federation of Gynaecology and Obstetrics (FIGO) staging classification for cervical carcinoma[12, 16]

Stage	Definition	TNM Categories
0	Carcinoma in situ	Tis
IA1	Invasive carcinoma, confined to cervix, diagnosed only by microscopy. Stromal invasion ≤3 mm in depth and ≤7mm in horizontal spread	T1a1
IA2	Invasive carcinoma, confined to cervix, diagnosed only by microscopy. Stromal invasion >3 mm and ≤5 mm in depth and ≤7 mm in horizontal spread	T1a2
IB1	Invasive carcinoma, confined to cervix, microscopic lesion >IA2 or clinically visible lesion ≤4cm in greatest dimension	T1b1
IB2	Invasive carcinoma, confined to cervix, clinically visible lesion >4 cm in greatest dimension	T1b2
IIA	Tumor extension beyond cervix to vagina but not to lower third of vagina. No parametrial invasion	T2a
IIB	Tumor extension beyond cervix. Parametrial invasion but not to pelvic side wall and not to lower third of vagina	T2b
IIIA	Tumor extension to lower third of vagina but not to pelvic side wall	T3a
IIIB	Tumor extension to pelvic side wall or causing hydronephrosis or non-functioning kidney	T3b
IVA	Tumor invasion into bladder or rectum	T4
IVB	Distant metastasis	M1
	Regional Lymph Nodes (N)	
NX	Regional lymph nodes cannot be assessed	
N0	No regional lymph node metastasis	
N1	Regional lymph node metastasis	
	Distant Metastasis (M)	
MX	Distant metastasis cannot be assessed	
M0	No distant metastasis	
M1	Distant metastasis	

Stage IA1: If there is no lymphovascular space involvement, treatment options include simple hysterectomy or cervical conization if the woman desires to preserve fertility[12, 16]. If lymphovascular involvement is present, radical surgery or radiotherapy (RT) is the most common management approach. Radiation Therapy (RT) techniques include brachytherapy (intracavity application is favored over interstitial application) for IA1 disease, however higher stages add external photon beam to the pelvis and areas of nodal involvement[17].

Stages IA2, IB1, and IIA: Either radical hysterectomy or chemoradiation (RT with cisplatin chemosensitization) are options. An important consideration for younger patients is that radical

hysterectomy preserves ovarian function, whereas RT does not. An additional option for women desiring to preserve fertility is radical trachelectomy (pelvic lymphadenectomy followed by removal of the cervix with parametrial tissue). To date, women undergoing this procedure had similar cure rates to radical hysterectomy and a greater than 50% chance of becoming pregnant[12, 16].

Stage IB2: Pelvic RT with cisplatin chemosensitization is generally preferred though in some cases radical hysterectomy may be acceptable[12, 16].

Stages IA1 thru IB2- additional considerations: Women with a large tumor size, deep stromal invasion, or involvement of the lymphovascular space are at intermediate risk of recurrence. For women with at least two of these risk factors, the addition of RT decreases the rate of recurrence, but a randomized controlled trial showed no improvement in survival. Additionally, women have a high risk of recurrence if they have at least one of the following high risk factors; positive lymph nodes, parametrial invasion, or positive surgical margins. These women benefit from the addition of cisplatin-containing chemoradiotherapy[2, 12, 16].

Selected bulky Stage IIB2 and IIA cancers, and Stages IIB, IIIA, IIIB, and IVA: If there is no lymph node involvement by surgical dissection or radiologic imaging, or if lymph node involvement is limited to the pelvic lymph nodes, then treatment consists of pelvic RT, concurrent cisplatin-containing chemotherapy, and brachytherapy. If lymph node involvement extends to the para-aortic area, then RT to the para-aortic area is added. If distant metastases are present, systemic chemotherapy is added, and RT should be individualized based on the areas involved[16].

Stage IVB: Treatment focuses on palliative measures[2, 5].

Complications

The frequency of adverse effects from RT is 3-5% for stage I and IIA disease, 10% for stage IIB, and 15% for stage III. Ovarian failure will occur in women undergoing pelvic RT[2]. Second malignancies can develop in heavily irradiated areas including the colon, rectum, anus, urinary bladder, ovary, and areas of the genitals[17]. Vaginal dryness, dyspareunia, and sexual dysfunction occur more frequently with RT, but can also occur with surgery alone. Additional chronic complications of RT include proctitis/sigmoiditis and strictures; rectal ulcer; colonic perforation/obstruction; small bowel perforation/malabsorption; rectovaginal/vesicovaginal fistula; vaginal retraction, scarring, necrosis, or ulcer; chronic cystitis, urethral stricture, sterilization, leg edema, pelvic fibrosis; and thrombosis of pelvic vessels[2].

Cisplatin can cause chronic peripheral neuropathy, renal insufficiency, and high frequency hearing loss[17].

Surveillance/Follow-up

Surveillance/follow-up guidelines are published by the National Comprehensive Cancer Network (http://www.nccn.org)[16]. Follow-up is focused on early identification for recurrence and monitoring for treatment-related complications. The physical examination should include rectovaginal examination, examination of the lymph nodes (especially the supraclavicular region), and Pap smears. In general, a clinical evaluation and Pap test should be done every 3 months for 1 year, then every 4 months for 1 year, every 6 months for 3 years, then annually. The need for additional studies such as chest x-ray annually; CBC, BUN, and creatinine every 6 months; and CT/PET scan depends on the stage and clinical presentation of the woman[2]. Additionally, the patient should

monitor for and report any pain, vaginal bleeding, genitourinary complaints, abdominal complaints, or bowel problems[12].

Prognosis

The 5-year survival for all stages of cervical cancer combined is 72%. The 5-year survival for the earliest stage is 92%. Surgery and chemoradiotherapy have a 5-year survival rate of 80-95% for Stage I and II cervical cancer, and 60% for Stage III disease. For women who experience recurrence, the prognosis is poor. The 5-year survival for recurrence is less than 5%[1, 12].

II. Aeromedical Concerns.

Cancer diagnoses of any type may lead to emotional distress and this should be adequately assessed and appropriately managed. The emotional and mental state of the flyer must be considered in any DNIF or return to fly decision. Following treatment, aeromedical concerns primarily surround sequelae of treatment (see complications discussed above), the logistics of surveillance, and the potential for local or metastatic disease recurrence. The level of concern increases with advancing stages of disease.

III. Waiver Considerations.

Abnormal Pap tests are not disqualifying and do not require DNIF unless the flyer has physical or emotional symptoms that warrant grounding until resolved. However, for new accessions, current abnormal cervical cytology (excluding the presence of HPV and LSIL) is disqualifying for service entry, as is a current or past history of malignancy (see AFI48-123v2 A3.18.2.11 and A3.32.2). Carcinoma in situ of the cervix which has been adequately excised (as evidenced by pathology report) is exempt from tumor board action (but are reported to the tumor board registry), does not require MEB, and is not disqualifying (see AFI48-123v3 A4.31.1.2 and v2.A2.19). All other cancers of the cervix require MEB and are disqualifying (see AFI 48-123 v2. A2.19.1 and v3. A4.31.1.2).

Table 3. Waiver potential of cervical cancer for FC I/IA, II and III.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages IA1 thru nonbulky IIA	Yes#† AETC	Yes
II	Stages IA1 thru IVA	Yes+*† AFMOA	Yes
III	Stages IA1 thru IVA	Yes+*† MAJCOM	Yes

For FC I/IA individuals waiver may be considered after 5 years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered six months after treatment completed, in remission, and asymptomatic.
* For untrained FC II and III, waiver may be considered after 5 years of remission.
† No indefinite waivers

No waivers will be considered for stage IVB disease.

Review of AIMWITS through mid-March 2009 showed 6 cases of cervical cancer or cervical carcinoma in situ; 1 FC II and 5 FC III The one FC II case did have carcinoma in situ on her original FC I exam which was approved. Of the six cases, only one was disqualified which was for another medical condition. Of the five that received a waiver, one was submitted for CIS extending to surgical margins status post LEEP with no further intervention planned, three were stage IA1, and one did not report a stage.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary, submitted per guidelines in Table 3, for initial waiver for cervical cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Physical – genital, rectovaginal exam, lymph nodes, abdomen.
D. Gynecology/oncology consults to include the six month follow-up - all consistent with National Comprehensive Cancer Network (NCCN) guidelines.
E. Any initial and follow-up labs: minimum of CBC and BUN/creatinine.
F. All follow-up Pap test results (frequency per NCCN guidelines).
G. Pathology reports including initial cervical biopsies as well as surgical specimens.
H. Imaging study reports.
I. Tumor board report, military or civilian, if applicable.
J. Medical evaluation board results.
K. List any and all treatment complications that are expected to be chronic. Include information on the functional impact of these complications and the management plan.

The aeromedical summary for waiver renewal for cervical cancer should include the following:
A. History – interim history since last waiver submission.
B. Physical – genital, rectovaginal exam, lymph nodes, abdomen.
C. Gynecology/oncology consults.
D. Labs – any surveillance tests since previous waiver.
E. Imaging study reports since the previous waiver
F. Discuss the status of any previously indentified treatment complications. Include a discussion of any new complications that developed since the previous waiver. Include information on the functional impact of these complications and the management plan.

ICD9 Codes for Cervical Cancer	
180	Malignant neoplasm of the cervix uteri
233.1	Carcinoma in situ of the cervix uteri

Reviewed: Lt Col Anthony Propst, AF/SG Consultant for OB/GYN and Maj Chad Hamilton, GYN Oncologist at Keesler AFB.

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WAIVER GUIDE
Updated: Feb 2010
Supersedes Waiver Guide of Dec 2006
By: Dr Dan Van Syoc

CONDITION:
Cholelithiasis (Gallstones) (Feb 10)

I. Overview.

Gallstone disease is one of the most common and expensive gastrointestinal diseases in the United States; it the most common abdominal cause for hospital admission, with more than 250,000 hospitalizations and a median charge of $11,584 per admission.[1-3] It is estimated that there are 6.3 million men and 14.2 million women aged 20 to 74 years with the disease, and others state that the disease affects up to 12 percent of the US population. Ethnically, there appear to be higher rates of disease in Caucasian, Hispanic, and Native American populations, and lower rates in African American and Japanese populations. Recognized risk factors include: increased age; gender – females have a higher prevalence by a factor of 3.0 in some cases, and this is most likely a result of pregnancy and estrogen, both of which are known risk factors; family history; obesity; rapid weight loss; diabetes mellitus; cirrhosis; gallbladder stasis; decreased physical activity (those who are physically active have a decreased risk of symptomatic cholelithiasis); and finally, disease prevalence is increased in patients with Crohn's disease.[4, 5] Regarding Crohn's disease, gallbladder disease incidence can be over twice that in non-affected individuals; interestingly, there is no increased incidence in ulcerative colitis patients. The mechanism of disease in Crohn's disease is postulated to be a decreased intestinal reabsorption of bile salts with subsequent secretion of supersaturated bile.[6]

Gallstones form when the solubility of bilirubin or cholesterol is exceeded in the bile. Pigment stones arise from the bilirubin process and cholesterol stones arise due to an imbalance in the mechanisms maintaining cholesterol in solution.[7] In the US cholesterol stones are the most common type of gallstone (about 80% of all stones) with pigmented stones occurring less often. The majority of asymptomatic gallstone patients (who make up a majority of all gallstone patients) will remain asymptomatic for many years. It has been estimated that around 10 percent of patients with gallstones will develop symptoms in the first five years after diagnosis.[2, 5] Symptomatic patients may complain of severe right upper quadrant pain (biliary colic), nausea, vomiting, and fever; occasionally jaundice. In general, the first, and often the only, imaging study recommended in patients with suspected biliary pain is ultrasound of the RUQ.[3, 8]

Many options are available for the management of symptomatic gallstone disease. Improvements in endoscopic, radiologic, and chemical therapies for gallstones have enhanced the overall management of patients with gallstones. Nonetheless, surgery remains the most important therapeutic option, and laparoscopic cholecystectomy has become the standard method for the elective management of patients with biliary pain and complications of gallstone disease, such as acute cholecystitis, gallstone pancreatitis, and choledocholithiasis.[9] The indications for laparoscopic cholecystectomy are symptomatic gallstones manifesting as biliary colic, acute or chronic cholecystitis, and pancreatitis (caused by a stone migrating into the common bile duct). In most cases, the procedure is done on an out-patient basis and the recovery is days to a week or two. Approximately 700,000 procedures are performed annually in the US and it is one of the more

common surgeries performed by general surgeons.[9, 10] An interesting observation in the past decade is that the increase in the rate of elective cholecystectomy procedures after the introduction of the laparoscopic technique in the early 1990s has been associated with an overall reduction in the incidence of severe gallstone disease.[11]

Interest in non-surgical therapies for gallstone disease has decreased over the past two decades due to the popularity and safety of the laparoscopic surgical approach. The primary candidates for such therapies are symptomatic patients who are not good surgical risks. Most of the medical therapies are directed toward management of cholesterol-rich gallstones; two methods are available, used alone or in combination. These are oral bile salt dissolution therapy or extracorporeal shock wave therapy (lithotripsy). Smaller stones (less than 5 mm) are better candidates for dissolution and larger stones are more likely to respond best to lithotripsy. Two bile acids, chenodeoxycholic acid and ursodeoxycholic acid (UCDA) have been used in gallstone treatment. UDCA has significantly fewer side effects such as diarrhea, increased serum cholesterol and hepatotoxicity. Treatment should continue until stone dissolution is documented by two consecutive negative ultrasonograms performed at least 1 month apart. Lithotripsy is more effective in patients with a single gallstone. Centers with great experience in this modality have a 90 to 100 percent clearance rate for a single gallstone and 67 percent for two or more stones. As with other medical therapies, stone recurrence remains a major problem.[9, 12] Some newer medical approaches to reduce the incidence of gallbladder disease include the use of medications such as ezetimibe to reduce intestinal cholesterol absorption and biliary cholesterol secretion.[13]

II. Aeromedical Concerns.

In patients with symptomatic gallstone disease, biliary colic may present abruptly as a sharp, incapacitating abdominal pain that is frequently accompanied with intense nausea and emesis. Asymptomatic gallstones do not appear to present a significant risk for aviation safety and can be followed on an annual basis with the PHA.[8, 14] Patients undergoing a surgical technique need to stay grounded until cleared by the surgeon to resume unrestricted activities, at which time they can be returned to flying duties without a waiver.

III. Waiver Considerations.

The diagnosis of cholelithiasis is disqualifying for all classes of aviation in the US Air Force. For UAS duties, acute, recurrent or chronic cholecystitis is disqualifying, but not specifically cholelithiasis.

Table 1: Waiver potential for Cholelithiasis

Flying Class (FC)	Cholelithiasis Status	Waiver Potential Waiver Authority	ACS Evaluation or Review
I/IA	Asymptomatic	No AETC	No
	Symptomatic	No AETC	No
	S/P surgery and asymptomatic	N/A[#] AETC	No
II/III[*]	Asymptomatic	Yes MAJCOM	Only if requested by MAJCOM
	Symptomatic	No MAJCOM	No
	S/P surgery and asymptomatic	N/A[#] MAJCOM	No
IIU[*]	Asymptomatic	N/A[#] AFMSA	No
	Symptomatic	No AFMSA	No
	S/P surgery and asymptomatic Symptomatic	N/A[#]	No

*untrained FC II and FC III aviators treated same is FC I/IA.
successfully treated gallstone cases do not need a waiver; they are qualified.

AIMWTS review in Oct 09 revealed a total of 56 aviators with waiver submissions containing the diagnosis of cholelithiasis. Of the total, 2 were FC I/IA (both s/p lap choly), 40 were FC II and 14 were FC III. Two cases were disqualified, both FC II, and each for a medical problem not related to gall bladder disease. Of the total of 56 cases, 29 were identified as asymptomatic, 21 were treated with a laparoscopic cholecystectomy, 3 with a cholecystectomy (not specifically described), and 3 treated via other procedures. The 27 treated cases would not necessarily have required a waiver assuming they recovered well and did not require a waiver for any other diagnosis.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for cholelithiasis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history and etiology of the condition and how it was discovered, a detailed G.I. history noting any abdominal pains, and address concerns of underlying pathology and gallbladder function.
C. Consultation report by a gastroenterologist or surgeon.
D. Documentation:
- Imaging studies: discussion of the exams that discovered the condition, nature of the cholelithiasis, and the indication for the original exam.
- Lab studies: CBC and liver function tests.

Waiver Renewal: Most cases will not require a waiver renewal, but if one is necessary, an interim history and exam is required, along with any new test results.

ICD 9 code for Gallstones	
574	Gallstones

Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology, Col David Smith, AF/SG consultant in General Surgery, and by Col Patrick Storms, AF RAM and gastroenterologist.

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Sep 2007
By: *LtCol Craig Pack (RAM 11), and Dr. Dan Van Syoc*
Reviewed by LtCol Mark Boston, AF/SG consultant for otolaryngology and LtCol Carlos Esquivel, director of Otology/Neurotology at WHMC

CONDITION:
Cholesteatoma (Jan 11)

I. Overview

The term "cholesteatoma" is a misnomer that has persisted since the name was first used by Mueller in 1838. Cholesteatomas contain no cholesterol (chole-), no fat (-steat-), and are a non-neoplastic form of tumor (-toma).[1, 2] Cholesteatomas are an abnormal collection of squamous epithelium and keratin debris that usually involve the middle ear and mastoid but may also involve the external auditory canal.[3-5] Commonly, cholesteatomas are described as, "skin in the wrong place." Incidence of cholesteatoma is reported as 3 per 100,000 in children and 9.2 per 100,000 in adults, with a male predominance of 1.4:1.[2] Middle ear cholesteatomas generally occur in individuals younger than 50 years of age, whereas external auditory canal cholesteatomas (EACC) occur within the 40–70 year old age group.[2, 3, 5] Cholesteatomas consists of three elements: 1) a cystic component, which forms the keratin debris, 2) an epithelial component, which produces the keratin debris, and 3) a subepithelial component, also called the perimatrix.[6, 7] The cholesteatoma matrix gradually erodes surrounding bone, destroying the middle and inner ear, with possible destruction of the facial nerve and/or extension into the brain (bone erosion is associated in 80 to 96% of cases).[3, 6-8]

Cholesteatomas are typically classified based upon their pathogenesis, being either acquired or congenital.[4, 9] However, cholesteatomas may be classified upon their location in the tympanic cavity in relation to the tympanic membrane (TM); these include the pars flaccid (attic) cholesteatomas, and the pars tensa (sinus) cholesteatomas; either may be acquired or congenital. Special groups of cholesteatomas include mural cholesteatomas and external auditory canal cholesteatoma.[2]

Acquired cholesteatomas are the most common form of cholesteatoma found in the general population and in USAF aircrews. Acquired cholesteatomas may be further subdivided into primary or secondary. Primary acquired cholesteatomas, which account for up to 80% of all middle ear cholesteatomas, seem to occur behind an intact TM. Secondary acquired cholesteatomas, which account for 18% of middle ear cholesteatoma, seem to "grow" into the middle ear through a perforated TM.[2, 10] Congenital cholesteatomas are rare, and account for only about 2 to 4% of all middle ear cholesteatomas.[1, 11] Mural cholesteatomas create erosions to the middle ear and mastoid, and drain their contents through the TM into the external auditory canal, leaving a matrix behind; this process has been described as an "automastoidectomy."[2] EACC are rare and are typically located on the floor of the external auditory canal. They may be primary or secondary; secondary EACCs have been linked to repeated microtrauma from cotton-tipped applicators and hearing aids; also to decreased circulation (e.g. from smoking).[2, 5, 8]

The pathogenesis of acquired cholesteatoma has been debated for over a century, but the most commonly agreed upon etiological factors include chronic eustachian tube dysfunction, poor pneumatization of the middle ear and mastoid process, and inflammatory conditions (e.g., chronic otitis media with effusion), and subsequent retraction pocket formation.[1]

Specific theories reported for acquired cholesteatoma formation include:[1, 3, 6]
1. Migration of epithelium from the margin of a perforated or retracted TM into the middle ear.
2. Iatrogenic implantation of the middle ear cavity with mucous epithelium, creating mucocutaneous junctions.
3. Metaplasia and hyperplasia from chronic infection and inflammation resulting in the transformation of middle ear cuboidal cells.
4. Tympanic membrane retraction pockets (most common cause), which appear in areas of the TM where the fibrous layer is missing. The pars flaccida in the attic is the most common area of the TM affected.

The most commonly accepted pathogenic theory for *congenital* cholesteatoma is embryonic epithelial rests developing in areas of the fetal temporal bone into cholesteatomas (similar tissue in non-temporal bone areas of the body is responsible for epidermoid cysts).[2, 11]

Diagnosis of cholesteatoma requires a high index of suspicion. Acquired cholesteatomas may appear as a pearly gray or yellow, well-circumscribed lesion, or present as soft waxy discolored inflammatory tissue. Symptoms tend to develop insidiously over long periods of time (weeks to years).[12] Cholesteatoma may be difficult to distinguish from chronic otitis.[3, 12] Presenting symptoms are generally nonspecific, making the diagnosis a challenge. Chronic foul-smelling ear discharge is present in 33 to 67% of cases (culture and sensitivity of the drainage will often grow *Pseudomonas aeruginosa*).[3] Some form of hearing loss is present in 60 to 87% of patients. Otalgia or ear irritation (e.g., itching) is present in 50% of cases. Vertigo occurs in 30 to 60% of cases. Facial nerve paralysis rarely occurs with middle ear cholesteatomas.[2, 8] Congenital cholesteatomas are most commonly seen in children who present with an asymptomatic pearly white mass behind an intact tympanic membrane, without a history of otitis; a conductive hearing loss may also be present.[1, 3, 11]

If cholesteatoma is suspected, an immediate referral to otolaryngology (ENT) is required. Workup for cholesteatoma should include audiometric testing (with air and bone conduction studies), high-resolution computed tomography (CT) with 1-mm cuts in both the axial and coronal views, magnetic resonance imaging (MRI), and surgical exploration if needed.[2, 3] Attention should be given to the status of the scutum and ossicles, evidence of dehiscence of the tegmen (dura), evidence of lateral semi-circular canal fistula, evidence of facial nerve dehiscence, the status of the antrum/mastoid, and the position of the sigmoid sinus.[2, 13] An MRI may help in differentiating cholesteatoma from an encephalocele (brain herniation) into the temporal bone.[2]

Treatment for cholesteatoma is surgical.[6, 14] The most common procedure performed is a tympanomastoidectomy, the success of which is dependent upon surgical skill.[15] Depending on the extent of the disease, patients may require an atticotomy, a canal wall up (CWU), or canal wall down (CWD) procedure. In either case, staging of the ear may be required. Generally, this is done to ensure no residual cholesteatoma is present before reconstructing any ossicular chain deficit.[7, 15-17] Reconstruction is normally done 6 months to 1 year after cholesteatoma removal surgery. For those ears not requiring ossicular reconstruction, a relook may be performed with the use of rigid

endoscopes. However, if a silastic middle ear spacer was placed, endoscopy is of limited value.[4, 7, 14, 18]

Recidivism is classified as either residual or recurrent. Residual is secondary to incomplete removal of the cholesteatoma, and recurrence is due to the formation of a retraction pocket. Recidivism rates range from 14 to 45% with CWU and 2 to 12% with CWD. In children less than 15-years of age, the recidivism rates range from 35 to 50% with CWU procedures. Recidivism can occur as late as 15 years after the initial procedure. As a result, patients are generally committed to extended follow-up.[12, 14, 19]

II. Aeromedical Concerns.

Aeromedical concerns include hearing loss, vertigo, facial paralysis, intracranial suppurations, recidivism, persistent eustachian tube dysfunction, and otalgia (aggravated with headset or helmet use). Improved surgical techniques have decreased morbidity and mortality from this disease; however, patient outcome depends on the extent of the disease at the time of surgery and the skill of the surgeon. Although many patients will have normal ear function for decades after surgical excision, cholesteatoma may recur and require multiple operations and result in diminished hearing.[15] In most patients, the underlying cause, e.g., eustachian tube dysfunction, will persist.[10]

III. Waiver Considerations.

History of cholesteatoma or history of surgical removal of cholesteatoma is disqualifying for flying class duties. Cholesteatoma is not specifically mentioned in the FC IIU, ATC/GBC, and SMOD standard sections, but in the retention section, “Mastoidectomy: Followed by chronic infection requiring frequent or prolonged specialized medical care” and “Infections of ears or mastoids” are disqualifying for retention, so these categories also require a waiver. Due to the requirement for long-term follow-up, it is recommended that initial waivers be limited to one year. Patients with cholesteatoma will require regular and prolonged follow-up with ENT while on flying status. Recidivism is best managed when caught early. Indefinite waivers will be uncommon.

Table 1: Summary of cholesteatoma waiver potential and required post-treatment waiting period.

Flying Class	Waiver Potential Waiver Authority	Waiting Period Post-Treatment
I/IA	Maybe† AETC	> 2 years
II	Yes† MAJCOM	Minimum 3 months*
IIU	Yes† AFMSA	Minimum 3 months*
III	Yes† MAJCOM	Minimum 3 months*
ATC/GBC	Yes† MAFCOM	Minimum 3 months*
SMOD	Yes† AFSPC	Minimum 3 months*

† For FC I/IA, initial FC II/IIU/III/ATC/GBC, and initial SMOD, surgery for cholesteatoma must have occurred at least two years previous to waiver submission with documentation indicating the cholesteatoma was completely removed; hearing profile must be H-1. AETC is the certification authority for all untrained assets waivers go to AFMSA) except for SMOD candidates which go to AFSPC. Indefinite waiver may be considered for cases that occurred years prior to consideration if there has been no recidivism and hearing is excellent.
***** After 3 months, individuals must demonstrate normal eustachian tube function (i.e., a normal valsalva), and a stable or waiverable hearing profile (if a conductive hearing loss is present). For non-trained assets an H-2 hearing profile requires waiver submission, and for trained assets an H-3 requires waiver. Individuals will need close ENT/flight surgeon observation during the first year post-op.

A review of the AIMWTS database through October 2010 revealed 36 cases with a diagnosis of cholesteatoma. The breakdown was as follows: 2 FC I/IA, 11 FC II, 19 FC III, 1 ATC/GBC, and 3 SMOD. Of the 36 cases, four were disqualified; two because of resulting eustachian tube dysfunction, one was an initial-FCIII with a resultant H-3 hearing profile and the fourth case was disqualified for alcohol-related problems.

IV. Information Required for Waiver Submission.

The aeromedical summary for the initial waiver should include the following:
A. History of risk factors (i.e., eustachian tube dysfunction, pressure equalization (PE) tubes, age at first and subsequent PE tube placement, a history of other ear surgeries, episodes of otitis media, smoking status, etc.). Symptoms, including pertinent negatives, should be addressed, (e.g., dizziness, vertigo, facial paralysis, eustachian tube dysfunction, etc., treatments, and prognosis).

B. Physical exam: Valsalva results, status of TM.
C. Audiogram. (If an audiogram profile is not H-1, a full audiology evaluation is needed.)
D. ENT consultation; attach referral report.
E. Copy of surgery report.
F. Results of post-op imaging studies of temporal bone (high-resolution CT with 1-mm cuts axial/coronal, MRI if obtained) to provide a base line.

The aeromedical summary for the waiver renewal should include the following:
A. Assessment for recurrence (e.g., otorrhea, otalgia, hearing loss, etc.).
B. Physical exam: Valsalva results and status of TM.
C. Audiogram. (If an audiogram profile is not H-1, a full audiology evaluation is needed.)
D. ENT consultation; attach referral report.
E. Results of temporal bone imaging studies if ordered by otolaryngologist.

ICD 9 codes for cholesteatoma	
385.3	Cholesteatoma of middle ear and mastoid
385.30	Cholesteatoma, unspecified
385.31	Cholesteatoma of attic
385.32	Cholesteatoma of middle ear
385.33	Cholesteatoma of middle ear and mastoid
385.35	Diffuse cholesteatoma
383.32	Recurrent postmastoidectomy cavity

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WAIVER GUIDE
Updated: Mar 09
By: Lt Col Dai Tran (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Chronic Obstructive Pulmonary Disease (Mar 09)

I. Overview.

Chronic obstructive pulmonary disease (COPD) is the fourth leading cause of death in the U.S., and its incidence is increasing, with about 12 million people currently diagnosed and another 12 million estimated with early undiagnosed disease. It is a syndrome of progressive airflow limitation caused by chronic inflammation of the airways and lung parenchyma. Smoking is the major causal factor for COPD, with alpha-1 antitrypsin deficiency as the etiology in a small number of cases. While there is disagreement regarding classification, COPD as used here encompasses emphysema, chronic bronchitis, or a combination of both. The pathogenesis of COPD involves destruction of the alveoli (emphysema), obstruction of the large and small airways (chronic bronchitis), or an interplay of both mechanisms.

In adults after age 30, the forced expiratory volume in one second (FEV_1) typically declines about 30 ml per year. The development of COPD is associated with an accelerated decline in FEV_1, but the decline is still gradual enough that patients rarely note symptoms early in the course of disease. While most patients have a mixture of emphysema and chronic bronchitis, it is also true that one or the other usually predominates; this has important implications both for presentation and for aeromedical disposition. The classic emphysema patient develops gradual airflow obstruction without associated reactivity or sputum production, and thus tends to present quite late. In those areas of the lung most affected by alveolar membrane destruction, resistance to airflow is accompanied by loss of the capillary bed, such that ventilation and perfusion remain more or less matched and oxygenation is reasonably well maintained. The “moth-eaten” parenchyma is at risk for barotrauma from rapid pressure changes. With predominant chronic bronchitis, the patient will experience significant sputum production, usually accompanied by wheezing and variable obstruction on spirometry. (Since the airflow obstruction is often accompanied by a degree of reversibility, distinguishing chronic bronchitis from moderate or severe persistent asthma can be difficult.) Patients with chronic bronchitis commonly have significant ventilation-perfusion mismatching, so arterial hypoxemia is more usual than with emphysema. Between this and the airway hyper-reactivity, chronic bronchitis is less likely to be waiverable than would be the case with emphysema with an equivalent degree of obstruction.

The major goals of COPD therapy include smoking cessation, symptomatic relief, improvement of physiologic function, and limitation of complications. Smoking cessation is the only intervention known to be effective in modifying the disease, and can lead to a 50% sustained reduction in the decline rate of lung function in COPD patients. Therapies for COPD include inhaled bronchodilators, inhaled anticholinergics, oxygen, antibiotics, short courses of systemic corticosteroids, pulmonary rehabilitation, lung volume reduction surgery, and lung transplantation. Also, COPD patients should receive pneumococcal vaccination and annual influenza vaccination.

II. Aeromedical Concerns.

The aerospace environment includes physiological stressors such as decreased barometric pressures, hypoxic cabin altitudes, and accelerative forces. Patients with COPD, especially chronic bronchitis, have abnormal lung ventilation/perfusion which can cause arterial hypoxemia in the aerospace environment, affecting higher cognitive functions (i.e., sensory perception, judgment, and memory), psychomotor skills, and exercise tolerance.

The aircraft life support environment is designed with the normally oxygenated individual in mind. Cabin altitudes that allow acceptable oxygenation in normal individuals may be insufficient for COPD patients. While several papers have addressed the tolerance of COPD patients to commercial cabin altitudes, they were exploring the issue of acute cardiopulmonary decompensation, and were not designed to address cognitive ability or exercise tolerance. Thus, the USAF requires near normal arterial oxygenation at rest for military aviation. It is important when evaluating baseline oxygenation to account for ambient altitude, so that the aviator in Colorado meets the same standard as the aviator in Delaware. The alveolar-arterial (A-a) gradient is the most reasonable measure of oxygenation. Normal A-a gradient is about 8 mm Hg at age 20, rising to 16 mm Hg in normal 60 year olds. A-a gradients of equal to or less than 20 mm Hg are considered acceptable for FC II.

Dyspnea is a distressing and even frightening symptom, and if present in any significant degree, is likely to be aeromedically incapacitating. In COPD, dyspnea appears to result from a perception of the increased work of breathing. While the likelihood of dyspnea is in part related to the severity of obstruction, an important factor is the rate at which airflow obstruction develops. Thus, the intermittent asthmatic may experience dyspnea whenever he or she becomes even mildly obstructed, whereas the patient with “dry” emphysema will tend to ascribe the gradually decreasing exercise tolerance to deconditioning or age, and not present for evaluation until the disease has become severe.

Accelerative forces can further aggravate ventilation/perfusion defects, causing even more unoxygenated blood to be shunted into the systemic circulation, leading to increased hypoxemia. Furthermore, emphysematous bullae may expand during ascent to altitude or during rapid decompression, compressing on the adjacent lung tissues or causing a pneumothorax, leading to sudden incapacitation. In addition, hypoxia is the single strongest stimulus for increasing the pulmonary vascular resistance, potentially leading to pulmonary hypertension and more serious sequelae such as cor pulmonale, right-sided congestive heart failure, arrhythmia, and syncope.

III. Waiver Considerations.

COPD is disqualifying for all flying classes in the US Air Force. Waiver consideration is based on the extent of the disease process and the degree of pulmonary insufficiency. Most patients with moderate or advanced COPD will not be suited for the aviation environment, though the occasional patient with moderate emphysema may be considered for FCIIA waiver. An aviator with early COPD (likely to be an incidental finding on spirometry performed for another indication) could qualify for flying as long as he or she stops smoking, is reasonably physically fit, has a normal chest x-ray, and has adequate oxygenation.

Table 1 - Waiver potential and required ACS evaluation for COPD

Flying Class	Waiver Potential Waiver Authority	ACS Evaluation Required
I/IA	No AETC	N/A
II	Yes* MAJCOM	Yes
III	Yes* MAJCOM	Yes

*No indefinite waivers; case should be reviewed at least every 2-3 years

AIMWTS review done in February 2009 revealed only four cases with a history of COPD. There were no FC I cases, two FC II cases, and two FC III cases. All of these cases were granted waivers. However, these cases were mild and did not require pharmacologic therapy. In the period before AIMWTS tracking, one pilot with moderate emphysema due to alpha-1antitrypsin deficiency was granted FCIIA waiver. Of note, a FC II navigator applied for and was denied an initial FC I pilot medical certification.

IV. Information Required for Waiver Submission.

The initial waiver package should include:
A. Detailed history and physical to include smoking history and statement that member has discontinued smoking.
B. Consultation report from pulmonary or internal medicine.
C. Spirometry results including pre- and post-bronchodilator challenge.
D. All chest x-ray reports.
E. Arterial blood gas at room air with calculated A-a gradient.
F. Medical evaluation board report if applicable.

The aeromedical summary for waiver renewal for COPD should include the following:
A. Interim history and physical.
B. Consultation report from pulmonologist or internal medicine.
C. Subsequent spirometry results and chest x-ray reports.

ICD9 Codes for COPD	
491.20	Chronic bronchitis
492.8	Emphysema
496	Chronic airway obstruction

Waiver Guide reviewed by Dr Jeb Pickard, former ACS pulmonologist and current AF/SG Consultant for Aerospace Internal Medicine.

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WAIVER GUIDE
Updated: Feb 2011
Supersedes Waiver Guide of Nov 2009
By: Dr Doug Ivan and Dr. Dan Van Syoc
Reviewed by Col John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

CONDITION:
Color Vision Deficiencies (Feb 11)

I. Overview.

Cones are the sensors in the retina of the eye that allow detection of colors. Humans have three different classes of cones that are each sensitive for a different range of visible wavelengths, but with distinctive peak sensitivities in the red, green and blue regions of the visible spectrum. The more acceptable nomenclature refers to red cones as long wavelength sensitive or "L" cones; green cones as middle wavelength cones or "M" cones; and blue cones as short wavelength or "S" cones. The combined input from all three-cone types responding normally to their specific wavelength range is needed to have normal color vision.[1] There is some overlap of these normal sensitivity curves, but in some areas of the visible spectrum, a single cone type may be stimulated exclusively. The interaction generated by stimulation of the individual cone type, or not, provides input signals to the brain which are centrally integrated and processed to determine what colors are being perceived. This three cone system is known as normal trichromacy. Normal trichromacy can be further divided into red-green and blue-yellow systems, both of which must be intact to allow normal full-spectral color perception. Cone channels also provide brightness cues, particularly the red-green system.

In congenital color vision deficiencies, alterations (shifts) in the normal wavelength sensitivities of any of the cone types lead to color vision defects. These deficiencies can be absolute or relative, but all are aberrant. Acquired color vision deficiencies are different pathophysiologically from congenital defectives and can affect the visual pathways multifactorially and anywhere between the cones and the brain. Absolute loss of a particular wavelength sensitivity range of one of the three cone types leads to the condition called dichromatism, meaning that these individuals have only two functioning cone systems providing input. The loss of a particular cone type in congenital deficiencies occurs because its wavelength sensitivity curve shifts completely and overlaps with one of the other cones resulting in only two responsive cone types (dichromat). Such individuals have significantly altered color perception and are called "color blind." They have lost the ability to make universal color determinations because only two cone types are responding. Dichromats make up approximately 2% of the male population.

The largest group of color deficient individuals (6%) is trichromatic, but they have anomalies in their individual cone sensitivity curves. These sensitivity curves have incomplete shifts from their normal position in the visual spectrum towards one of the other cone types.[2] These individuals are considered "color weak" rather than "color blind" because they have a partial overlap with a relative deficiency. Since all three cone types are still present, they are called anomalous trichromats. The partial overlap of the curves produces aberrant input and alters the accuracy of color perception.

Color deficient individuals are classified according to the specific cone type that is anomalous. Deuteranomalous defects arise from abnormalities in the green sensitive cones. Protanomalous

defects arise from abnormalities in the result in the red sensitive cones and tritananomalous defect arise from abnormalities in the blue sensitive cones.[3] Both deuteranomalous and protanomaloous groups have trouble distinguishing between reds and greens, and often confuse reds and greens with yellows and whites, if severe enough.

Congenital color vision defects are overwhelmingly red-green in type and occur almost exclusively in males, being linked to the X-chromosome in many allelic forms. The incidence of congenital red-green color disturbances in males is approximately 8 percent, whereas it is only 0.5 percent in females. Congenital color vision defects are usually symmetric and almost always remain stable. They vary quantitatively and qualitatively depending on the extent of the genetic expression; hence, many variations occur. In essence, no two color defectives are alike.[3]

Most of the older color vision screening tests such as pseudoisochromatic plates (PIP) are designed to only detect the presence of congenital red-green deficiencies based on known inherited color confusion patterns.[4, 5] Newer PIPs have been developed to screen for acquired and congenital deficiencies of all types. Failure of a PIP means the likelihood of a color deficiency is high. PIPs do not reliably determine the exact type or severity of the color vision defect. Current standards for trained aircrew members dictate no more than 2 of 14 of the PIP I plates and no more than 1of 10 on the PIP II can be missed.

The Cone Contrast Test (CCT) is now required for all initial flight physicals (FCI, IA, initial II and initial III). The accurate detection of individuals who have any degree of color deficiency is part of the purpose of FC I physical examination and the follow-on Medical Flight Screening (MFS) processes. It should be emphasized that use of the older Farnsworth Lantern test does not adequately screen out color deficient individuals.[3, 6, 7]

Once PIP test screening shows an individual to have a potential color vision deficiency, the deficiency is confirmed and quantified with other tests, including the anomaloscope and/or CCT. Anomaloscopes are expensive, sensitive pieces of equipment that take extensive training to operate, maintain, and administer properly. Although accurate in confirming color deficiency, they are not suitable for use as a mass screening test.[5] Comprehensive eye exams are required to rule out acquired ophthalmic pathology for all individuals diagnosed with a color vision deficiency. The USAF is in the process of fielding a commercially available CCT for testing trained aircrew. During the implementation period, the PIP tests will remain the standard for trained aircrew; however, CCT testing will be required, in addition to PIP testing, for all aircrew requiring color vision testing. Once a baseline CCT score is documented in the individual aircrew member's medical record, subsequent testing during periodic medical exams will only require CCT testing. The passing score on the CCT is 75 or greater for each of the three cone types. Waiver criteria for color anomalous individuals in specific career fields are being developed.

II. Aeromedical Concerns.

Color deficient individuals are at a distinct disadvantage in terms of receiving information in an efficient manner when using multicolor displays and terrain maps. Color defectives are more vulnerable to low-light and hypoxic effects on color vision than normals. In addition, a color-deficient aviator will need additional time to process color-coded data which can lead to delays in decision making.

Another operational consideration with color defectives is the compounding effect induced by certain required protective or performance enhancing optical appliances that can potentially degrade existing levels of color perception even further. These currently include blue-blocker sunglasses, yellow high-contrast visors, and assorted laser eye protection devices.[8] Whereas the impact of such devices on normal color perception can be predicted, the consequence of their use by individual color defectives is both unpredictable and highly variable. In many cases, these devices generate a chaotic color vision disturbance or can render color weak individuals totally color blind. These filters also affect performance on multi-colored displays and they further disrupt brightness information.

The use of color as a means for rapid and effective transfer of information is proliferating rapidly in modern operational environments. Color vision standards have been part of USAF physical standards for decades. In order to keep pace with new demands placed on the human in modern man-machine interface, color vision standards have undergone some changes. To keep pace with this evolution, the sensitivity and sophistication of the tests for the detection of color deficiencies have changed. The development of multi-color enhanced visual displays are based on the premise that end-users will have normal color vision, therefore, individuals must possess normal color vision to be able to safely and effectively perform their missions.

III. Waiver Considerations.

All color vision deficiencies are disqualifying for FC I/IA, II, IIU, III ATC/GBC, and SMOD personnel, except flight surgeon FCII and initial FC III career fields not requiring normal color vision (see Enlisted/Officer Classification Directory). Color standards for FC III aircrew are a decision made by AFMSA in conjunction with the AFSC career field manager. Trained aircrew can be considered for a waiver for defective color vision. ACS review/evaluation is required as part of the waiver consideration for trained aircrew. Waiver recommendations and management are primarily dependent on the etiology, severity of the color deficiency and can only be made on a case by case basis. For a trained navigator with known color deficiency, a waiver for FC IIU duties will not likely be granted. Also of note, color vision deficiency for the following career fields is NOT waiverable (per Career Field Manager): 1A0, 1A1, 1A2, 1A3, 1A4, 1A6, 1A7, 1U0.

Table 1 is a summary of the flying class waiver considerations.

TABLE 1: Flying Class Waiver Policy and Requirements for Color Vision Deficiencies

Flying Class	Required Testing	Waiver Potential Waiver Authority	Special Circumstances Tests
FC I/IA	CCT	No AETC	All MFS/FC I failures require review by ACS & confirmatory testing with anomaloscope.
Initial FC II (FS)*	CCT	Yes* AFMSA	Initial ACS ophth review if unrestricted FC II waiver is requested; otherwise, FC IIA.
Initial FC II (RPA Pilot)	CCT	No AFMSA	
Initial FC III#	CCT	No# AETC	
FC II (Trained Pilots/RPA Pilots/Navs)**	PIP 1, 2 and CCT	Yes FCIIC@ AFMSA	Initial ACS Ophthalmology review, trained pilots only; RPA Pilots – ACS review at the discretion of AFMSA.
FC III**, ATC/GBC**, and SMOD**	PIP 1, 2 and CCT	Yes# AFMSA	ACS evaluation at the discretion of AFMSA

*Flight Surgeon (FS) candidates with mild color vision defects, as defined by the ACS, will be granted an unrestricted FC II waiver. Those with more severe defects may be considered for FC IIA waiver on a case by case basis. FC IIA waiver authority is delegated to HQ AETC/SG. Controversial cases will be referred

** CCT baseline testing will be required for all trained aircrew for one PHA cycle in addition to PIP plates, and then only the CCT will be required. Document both CCT and PIP scores with the PHA/flight physical and attach the CCT score sheet to the physical exam report. **For trained aircrew/special operational duty** personnel who pass one test but fail the other, DNIF is NOT automatically required but the examining flight surgeon must notify the ACS within 3 duty days. For INITIAL ATC/GBC applicants, waiver for defective color vision will NOT be considered.

FC III waivers may be considered on a case-by-case basis, as approved by AFMSA and the career field manager.

@ Flying Class IIC waiver restricted to all previously flown aircraft. If selected to cross train into a new airframe, or assigned to a previous airframe that has undergone a significant cockpit upgrade that requires interpretation of different color symbology, an operational evaluation is recommended to verify capability to accurately recognize and respond to all display information. This operational evaluation should be performed by an instructor pilot in the new airframe.

$ FC IIU crewmembers will be limited to their current ground control station (GCS) unless a functional assessment has been devised for the new GCS.

Review of AIMWTS in Feb 11 revealed a total of 387 cases. There were 32 FC I/IA cases, 89 FC II cases, 197 FC III cases, 3 FC IIU cases, 31 ATC/GBC cases, and 35 SMOD cases. All but 1 of the FC I/IA cases resulted in a disqualification. In the FC II category, 4 were disqualified, 97 FC III cases were disqualified, all 3 FC IIU cases were disqualified, 16 ATC/GBC cases were disqualified, and 24 SMOD cases were disqualified; this was for a total of 175 disqualified cases. One of the FC III DQ cases was granted an ETP.

IV. Information Required for Waiver Submission.

The aeromedical summary for an initial waiver for color vision defects should include the following:
A. History – history of previous color vision testing results (MEPS, commissioning, initial flying physicals, preventive health assessments), family history of color vision defects, medications, and any impact on job/daily life.
B. Physical – Full eye exam to include fundoscopic results and current color testing status.
C. Optometry/ophthalmology consultation report.
D. ACS report or review.

Waiver renewal, if necessary, requires an interval AMS with particular attention to clinical changes.

ICD 9 Code for color vision deficiency	
368.59	Color vision deficiencies, unspecified

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WAIVER GUIDE
Updated: Jan 09
By: Dr. Dan Van Syoc

CONDITION:
Colorectal Cancer (Jan 09)

I. Overview.

Colorectal cancer (CRC), the fourth most common cancer in the US with about 153,760 new cases in 2007 with about 52,000 expected deaths; it is the second leading cause of cancer death. There is a 5.5% lifetime risk of developing CRC in the US with African Americans having the highest age-adjusted CRC incidence and mortality rate[1]. The racial disparity in incidence and mortality may be due to significant differences in the screening in different US populations[2]. The overall 5-year survival in the US has dramatically improved in past decades and is now approximately 65%[3]. It is a disease of older people with 90% of US cases occurring after age 50 with both incidence and mortality rates higher in men than in women[1].

Most colorectal cancers are adenocarcinomas and arise from existing adenomatous polyps. Hereditary syndromes account for fewer than 10% of cases. Other than increasing age and male gender, predictors of increased CRC risk are alcohol use, smoking and increased body mass index[4]. It was speculated for many years that an increase in fiber in the diet helped to protect people from CRC. A recent large pooled analysis of several studies has shown that high dietary fiber is not associated with a reduced risk of CRC[5]. Unlike some other cancers, tumor size is not as critical as are depth of invasion and nodal status in determining disease prognosis[1].

Colonic adenomas are the precursors to almost all colorectal cancers and are found in up to 40% of all persons by the age of 60. As most colonic polyps are adenomas and more than 90% of adenomas probably do not progress to CRC, it is not currently possible to reliably identify those polyps that will progress. Oncologists have recognized that a larger polyp size and more advanced histologic features are more predictive of progressing to invasive cancer and are now using the term "advanced adenoma" to refer to adenomas larger than 1 cm and have some advanced histologic features (tubolovillous, villous or high-grade dysplasia)[6]. There is also consensus that most subcentimeter polyps are not adenomatous and only a small fraction of all adenomas are advanced which has led to much discussion to more selective alternatives to universal polypectomy[7].

Current screening recommendations are for all Americans to have an initial screening starting at age 50. Options for screening from the US Multisociety Task Force on Colorectal Cancer include: (1) annual fecal occult blood test, (2) flexible sigmoidoscopy every five years, (3) combination of (1) and (2) above, (4) colonoscopy every ten years, and (5) air contrast barium enema very five years. This has led to the reduced mortality for CRC seen in most US populations[8]. If there were polyps removed via sigmoidoscopy or colonoscopy that showed evidence of an advanced adenoma, then the recommendation would be to repeat the test in three years[6]. Screening should begin at age 40 for those with a first degree relative with colon cancer and the interval is every 5 years if that first degree relative was less than 60 when diagnosed (the American College of Gastroenterology treats history of cancer and adenomas the same for the purpose of screening initiation and intervals). A recent analysis of screening intervals concluded that persons previously screening with colonoscopy without evidence of colorectal neoplasia, the 5-year risk of CRC is extremely low[9]. The study did

not go out to ten years, but the findings were not inconsistent with the rationale for a ten-year interval in those screened negative[10]. There has been some shift on how to best screen individuals. There is now advocacy for computed tomographic colonography (CTC) rather than beginning with colonoscopy, but the US Preventative Task Force did not endorse CTC for screening. There is a small, but real risk of colonic perforation with colonoscopy and none with CTC. It has also been shown that both methodologies result in similar detection rates for advanced neoplasia[7]. Detection of polyps smaller than one centimeter is not as high with CTC.

The disease is often insidious in development and common symptoms are fatigue, anemia, altered bowel function and weight loss. The most common acute surgical problem is bowel obstruction. About 5% of CRC patients will have a synchronous cancer and the liver is the most common site for a synchronous metatasis[1].

Staging of Colorectal Cancer

Table 1. American Joint Committee on Cancer (AJCC) Colon Cancer Staging System[11]

Stage (T)	**Primary Tumor (T)**
TX	Primary Tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma in situ: intraepithelial or invasion of lamina propria
T1	Tumor invades submucosa
T2	Tumor invades muscularis propria
T3	Tumor invades through the muscularis propria into the subserosa, or into non-peritonealized pericolic or perirectal tissues
T4	Tumor directly invades other organs or structures, and/or perforates visceral peritoneum
	Regional Lymph Nodes
NX	Regional lymph nodes not assessed
N0	No regional lymph node metastasis
N1	Metastasis in 1 to 3 regional lymph nodes
N2	Metastasis in 4 or more regional lymph nodes
	Distant Metastasis
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Table 2 Stage Grouping for Colorectal Cancer

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)	Dukes	MAC
0	Tis	N0	M0	-	-
I	T1	N0	M0	A	A
	T2	N0	M0	A	B1
IIA	T3	N0	M0	B	B2
IIB	T4	N0	M0	B	B3
IIIA	T1-T2	N1	M0	C	C1
IIIB	T3-T4	N1	M0	C	C2/C3
IIIC	Any T	N2	M0	C	C1/C2/C3
IV	Any T	Any N	M1	-	D

Surgery is the cornerstone of therapy for CRC and 70 to 80 percent of patients with tumors can be resected with curative intent. Among patients who have undergone resection for localized disease, the five-year survival rate is 90%. The survival rate decreases to 65% when metastasis to regional lymph nodes is present. Most recurrences occur within three years, and 90% occurs within five years. The most common sites of recurrence are the liver, the local site, the abdomen and the lung[1, 12]. Prospective studies have demonstrated that the use of chemotherapy in patients with metastatic disease prolongs survival and enhances quality of life in comparison to palliative care alone. Fluorouracil has been the backbone of therapy for CRC for many years. It is normally administered with leucovorin, a reduced folate, which enhances the effectiveness of the fluorouracil. Newer agents are now being used in advanced disease states and the most promising protocol now utilizes fluorouracil, leucovorin and oxaliplatin in a regimen known as FOLFOX, which has quickly become the standard of care for chemotherapy for CRC[13]. The use of oxaliplatin and a similar agent, irinotecan, has significantly prolonged median survival by several months[3]. Adjuvant radiation therapy is frequently used for treatment of rectal cancer, and is considered for cases in which resection of T3 and T4 lesions leaves potentially positive resection margins[1]. Also, the treatment of choice for any metastatic lesion if possible is surgery. Chemotherapy is used in conjunction, but resection of liver, lung, or any recurrent lesion is the standard and no patient should be offered chemotherapy without the consideration for resection. Chemotherapy alone will not cure any patient; up to 50% of patients with liver metastasis are long term survivors post surgical resection.

There has been much debate over the years on how best to follow patients post-treatment for CRC. After it has been concluded that the colon is free of cancer and polyps, colonoscopy is recommended every three to five years in most patients. Physician visits with targeted exams are recommended every 3 to 6 months for the first three years with decreased frequency thereafter for 2 years. There is also consensus that patients be tested every 3 to 6 months for up to 5 years with a carcinoembryonic-antigen test, as most recurrences will first be detected wit this lab[12]. A recent UK study has shown that more intensive follow-up (as outlined above) is cost-effective and results in improved survival with absolute survival effects of 7-9%[14].

II. Aeromedical Concerns.

Of significant concern with CRC is the potential for sudden incapacitation as the initial presentation; emergent obstruction or perforation. Chronic anemia presents more insidiously and can cause in-flight problems if undetected. CRC has a late age onset and slow progression, thereby removing most USAF aviators from the high risk window. Regular screening may decrease late presentations; however this screening begins at an age outside the majority of our aviators.

Once diagnosed and treated, the potential for recurrence becomes an important health and aeromedical concern. It has been shown that 80 to 90 percent of all recurrences following curative resection occur within the first 2-3 years and that 95% occur within five years. The five-year survival point can be used as a reliable mark of cure as most CRC recurrences do so within the first five postoperative years. The presence of colostomy or ileostomy is not compatible with military aviation.

III. Waiver Considerations.

Colorectal cancer or a history of colorectal cancer is disqualifying for all classes of flying in the US Air Force.

Table 3. Waiver potential of colorectal cancer in FC I/IA, II and III

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages I or II	Yes#† AETC	Yes
	Stage IIIA, B, or C	No AETC	No
	Stage IV	No AETC	No
II	Stages I or II	Yes+*† AFMOA%	Yes
	Stage IIIA, B, or C	Maybe$†& AFMOA%	Yes
	Stage IV	No AFMOA%	No
III	Stages I or II	Yes+*† AFMOA%	Yes
	Stage IIIA, B, or C	Maybe$†& AFMOA%	Yes
	Stage IV	No AFMOA%	No

For FC I/IA individuals waiver may be considered after 5 years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered as early as six months after treatment completed, in remission, surveillance is ongoing, and asymptomatic.

* For untrained FC II and III, waiver may be considered after 5 years of remission.
& For trained FC II and III, serial carcinoembryonic-antigen testing must all be normal, all imaging tests normal and a clean colonoscopy; will be considered as early as the six month post-surveillance without evidence of disease or side effects from treatment
$ For untrained FC II and III, serial carcinoembryonic-antigen testing must be all normal, all imaging tests normal and a clean colonoscopy; will be considered after five years from diagnosis and treatment
% All waivers need to go to MAJCOM who will then route them to AFMOA after appropriate review at their level.
† No indefinite waivers.

AIMWTS review in Nov 2008 revealed a total of 14 submitted cases of colorectal cancer. Of this total, 0 were FC I (one was listed as FC I but was actually well into UPT, so actually FC II), 8 were FC II cases and the remaining 6 were FC III cases. Of the 8 FC II cases, two were disqualified and of the 6 FC III cases, one was disqualified.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver for colorectal cancer should include the following:

A. History – initial symptoms, colonoscopy (or CTC) findings, pathology, stage, treatment, surveillance plan, and activity level.
B. Physical – abdominal, rectal, and all imaging studies.
C. GI and surgeon reports to include all follow-up studies.
D. Labs – Serial CBCs and carcinoembryonic-antigen test results.
E. Tumor board report, military or civilian, if applicable.
F. Medical evaluation board results.

The aeromedical summary of waiver renewal of colorectal cancer should include the following:

A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level.
B. Physical – abdominal and rectal exams and imaging studies, if done.
C. Oncology consult(s).
D. Labs – all CBCs and carcinoembryonic-antigen test results since previous waiver.
E. Evidence that the level of follow-up care is consistent with current NCCN standards.

ICD9 Codes for Colorectal Cancer	
153.0	Malignant neoplasm of hepatic flexure
153.1	Malignant neoplasm of transverse colon
153.2	Malignant neoplasm of descending colon
153.4	Malignant neoplasm of cecum
153.6	Malignant neoplasm of ascending colon
153.7	Malignant neoplasm of splenic flexure
153.8	Malignant neoplasm of other specified sites of large intestine
153.9	Malignant neoplasm of colon, unspecified
154.0	Malignant neoplasm of rectosigmoid junction
154.1	Malignant neoplasm of rectum
154.8	Malignant neoplasm of other sites of rectum, rectosigmoid junction, & anus

Reviewed by LtCol Mark G. Scherrrer, AF/SG Consultant in Colorectal Surgery, Col David Smith, AF/SG Consultant in General Surgery, and Col Timothy Cassidy, AF/SG Consultant in Gastroenterology.

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WAIVER GUIDE
Updated: Sep 2011
Supersedes Waiver Guide of Aug 2008
By: Dr Dan Van Syoc
Reviewed by Maj Eddie Davenport, ACS chief cardiologist

CONDITION:
Congenital Heart Disease (Sep 11)

I. Overview.

Congenital heart disease in adults includes common and uncommon defects, with and without correction by surgery or catheter-based interventions. Consideration of waiver for continued military flying duties or training require normal or near-normal cardiovascular status, acceptably low risk of aeromedically pertinent events and no significant residua. Bicuspid aortic valve is discussed in the *Bicuspid Aortic Valve Waiver Guide*. Otherwise, the most common congenital disorders that will require aeromedical consideration are atrial septal defect (ASD) and ventricular septal defect (VSD). Patent ductus arteriosus (PDA) and coarctation of the aorta may also be seen. Hemodynamically significant defects are likely to be detected and corrected during infancy or childhood, especially VSD and PDA. Other, more complicated congenital disorders will be very unusual because most will be detected in infancy or childhood and, even if corrected, will be unacceptable for entrance into military service.

ASD
There are three types of ASD, ostium secundum (75%) [failure of septum primum to cover the fossa ovalis], ostium primum (15%) [inadequate development of endocardial cushion, thus fails to close ostium primum], and sinus venosus (10%) [abnormal embryologic evolution of sinus venous and sinus valves]. ASDs allow shunting of blood flow from the left to right atrium, with resultant right-sided volume overload and enlargement of the right atrium and ventricle. Presence and time course of symptom development depends on the magnitude of the shunt; shunts greater than a 1.5 pulmonary to systemic flow ratio generally produce significant overload with resultant symptoms, including easy fatigue, dyspnea, and arrhythmias, especially atrial fibrillation. Straining, coughing, Valsalva, anti-G straining maneuvers or positive pressure breathing may cause the blood flow to reverse, which could serve as conduit for embolic material. ASDs, even large defects, may not be detected until adulthood. Prognosis after successful and uncomplicated closure of significant secundum and sinus venosus ASD is normal if accomplished before age 25.[1-3] Later closure increases the risk of atrial fibrillation, stroke, and right heart failure.

VSD
Hemodynamically significant defects are likely to be detected and corrected during infancy or childhood. Hemodynamically insignificant VSDs will also likely be detected in infancy or childhood due to the very characteristic murmur, but may not be recommended for closure because of the insignificance of the shunt and the likelihood of spontaneous closure over time. VSDs repaired before age 2 have a good long-term prognosis.[3]

PDA
PDAs classically produce a prominent continuous “machinery” murmur heard at the second left intercostal space. Small PDAs may escape detection until adolescence or adulthood but are

unusual. In the past even small PDAs were often recommended for surgical or catheter-based closure due to anticipated long-term risks of heart failure, endocarditis and pulmonary hypertension. Recently, a trend has developed to follow small PDAs without correction/closure. The proper course of therapy for small PDAs is not yet established in the literature.

Coarctation

Coarctation of the aorta results in elevated blood pressure in the upper limbs, with normal or low pressure in the lower limbs. Associated abnormalities with coarctation include bicuspid aortic valve, congenital aneurysms of circle of Willis, and aortic aneurysms. Unrepaired coarctation with resting gradient $\geq$ 20 mm Hg between upper and lower extremities carries an increased risk for progressive left ventricular hypertrophy and subsequent left ventricular dysfunction, persistent systolic hypertension and premature atherosclerotic cerebrovascular and coronary heart disease. Coarctation of the aorta is usually diagnosed in childhood but up to 20% reportedly are not detected until adolescence or adulthood. Long-term prognosis is related to age of repair, with the best outcome for correction before age 9.[4]

Patent foramen ovale and atrial septal aneurysm

Patent foramen ovale (PFO) and atrial septal aneurysm (ASA) are anatomic anomalies of the interatrial septum. PFO occurs in 25-30% of the general population. At that frequency it may be considered a normal variant. ASA is present in about 1-2% of the general population. PFO and ASA may be present alone or may occur together. Asymptomatic PFO and/or ASA are typically incidental findings on an echocardiogram performed for unrelated indications. These are aeromedically considered normal anatomic variants and therefore are qualifying for all classes of flying duties including initial training.

However, PFO and ASA, alone or in combination, have been associated with possible paradoxical embolic events, notably stroke and transient ischemic attack. Although the relative risk for such an event may be increased, the absolute risk is low. Recent data including the recently published CLOSURE trial show no decrease in recurrent stroke after PFO closure (via percutaneous device) and a possibly significant vascular complication rate and increased risk of atrial fibrillation after PFO closure.[5] More importantly, there was still a 3.1% stroke rate in both the medical and PFO closure arms of the trial. Two more prospective trials are currently being done comparing PFO closure versus medical therapy in cryptogenic stroke; however there is no data to support PFO closure in cryptogenic stroke at this time. Therefore, asymptomatic and hemodynamically insignificant PFO by itself is a normal variant and does not require waiver UNLESS it has been surgically (to include percutaneously) closed. TIA/CVA is not usually waiverable. Aeromedical concerns and recommendations for PFO and/or ASA associated with stroke or transient ischemic attacks are also discussed in the Transient Ischemic Attack (TIA) and Stroke (CVA) Waiver Guide. All aeromedical instructions in this waiver guide regarding PFO associated with CVA/TIA apply equally to ASA associated with CVA/TIA.

II. Aeromedical Concerns.

Aeromedical concerns are primarily related to the long-term effects of shunting with volume overload and include, for example, atrial and ventricular dilation and dysfunction, tachydysrhythmias, endocarditis or endarteritis. For those treated surgically, favorable results need to be well demonstrated.

III. Waiver Consideration.

Congenital heart defects, uncorrected or corrected by surgical or catheter-based procedures, are disqualifying for flying class (FC) I/IA, II, IIU and III. These defects are not specifically disqualifying for ATC/GBC and SMOD duties, but any of the significant sequelae would be disqualifying. Also any history of cardiac surgery or catheter-based therapeutic intervention [including closure of PFO] is disqualifying for all flying classes. ASD, VSD and PDA successfully corrected by surgery or catheter-based techniques, especially in childhood, may be favorably considered for waiver for all classes of flying duties, as may uncorrected but hemodynamically insignificant ASD and VSD. Because the appropriate treatment of hemodynamically insignificant PDA is unsettled; uncorrected small PDAs will be considered on a case-by-case basis. Coarctation of the aorta will also be considered on a case-by-case basis.

Table 1: Waiver potential for congenital heart defects

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Hemodynamically insignificant ASD, VSD, PDA	Yes AETC	Yes
	Hemodynamically significant ASD, VSD, PDA (uncorrected)	No AETC	No
	Hemodynamically significant ASD, VSD, PDA (corrected)	Yes# AETC	Yes
	Coarctation of aorta	Maybe*# AETC	Yes
	PFO surgically closed	Maybe AETC	Yes
	PFO asymptomatic/incidental finding	N/A (not DQ)	No
II/IIU/III Including untrained assets&	Hemodynamically insignificant ASD, VSD, PDA	Yes MAJCOM	Yes
	Hemodynamically significant ASD, VSD, PDA (uncorrected)	No MAJCOM	No
	Hemodynamically significant ASD, VSD, PDA (corrected)	Yes# MAJCOM	Yes
	Coarctation of aorta	Maybe# MAJCOM	Yes
	PFO surgically closed	Maybe*# MAJCOM	Yes
	PFO asymptomatic/incidental finding	N/A (Not DQ)	No
ATC/GBC	Any congenital heart defect	Maybe MAJCOM	No
SMOD	Any congenital heart defect	Maybe AFSPC or GSC	No

Must wait at least six months after surgery before submitting waiver.
* Not waiverable if PFO closed due to TIA or CVA episode. See TIA/CVA Waiver Guide.
& Waiver authority for FC IIU is AFMSA

AIMWITS search in August 2011 revealed a total of 59 cases with a diagnosis of a congenital heart defect. There were 8 FC I/IA cases (1 disqualification), 19 FC II cases (4 disqualifications), 1 FC IIU case (0 disqualifications), 28 FC III cases (5 disqualifications), 1 ATC case (0

disqualifications), and 2 SMOD cases (0 disqualifications). A breakdown by diagnosis further revealed 37 with ASD, 10 with VSD (one also had ASD), 8 with PDA, 3 with a PFO, and 2 with coarctation of the aorta.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary <u>for initial waiver</u> should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, treatment, medications, and activity level.
B. Cardiology consult.
C. Electrocardiogram (ECG).
D. Official report of all local echocardiograms. Also send videotape/CD copy of the images of the most recent echocardiogram to the ACS [if recent surgery, echocardiogram should be done close to six months after surgery]. (Notes 1 and 2)
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
F. Operative report, if recent surgery.
G. Results of medical evaluation board (MEB) (worldwide duty evaluation for ARC members), if congenital abnormalities not satisfactorily treated by surgical correction.

The aeromedical summary for <u>waiver renewal</u> should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, treatment, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 Codes for congenital heart diseases	
745.4	Ventricular septal defect
745.5	Patent foramen ovale and ostium secundum atrial septal defect
745.6	Ostium primum atrial septal defect
745.9	Unspecified defect of septal closure
747.0	Patent ductus arteriosus
747.1	Coarctation of aorta

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WAIVER GUIDE
Initial Version: May 2010
Supersedes Waiver Guides for Medullary Sponge Kidney (Mar 1999) and Cystic and Congenital Abnormalities of the Kidneys and Ureters (Mar 1999)
By: Dr Dan Van Syoc
Reviewed by LtCol Edith Canby-Hagino, AF/SG Consultant for Urology and LtCol Laveta McDowell, AF/SG Consultant for Nephrology

CONDITION:
Congenital Urinary Anomalies (May 10)

I. Overview.

Two previous waiver guides from 1999 discussed medullary sponge kidney and cystic & congenital abnormalities of the kidneys and ureters. This waiver guide is an attempt to consolidate these topics as well as to include other related entities. The diagnoses that will be discussed in this waiver guide include medullary sponge kidney, horseshoe kidney, autosomal dominant polycystic kidney disease, congenitally absent or atrophic kidney, and congenital obstruction of the ureteropelvic junction (UPJ). The kidneys and urinary tract are host to more survivable congenital abnormalities than any other system of the body. Most abnormalities either present early in life with mass, infection or decreased renal function, or remain silent to be discovered incidentally later in life. The most common reasons for discovery of silent cystic and congenital abnormalities of the urinary tract include microscopic hematuria, urinary tract infection, stone formation and investigation of unrelated problems such as during cardiac catheterizations.

Medullary Sponge Kidney
Medullary sponge kidney is a condition which is usually an incidental finding during imaging of the abdomen, commonly by IVP. A significant number of patients with medullary sponge kidney are asymptomatic, and their condition is never diagnosed. As a result, the true incidence of the condition is unknown. Among patients undergoing intravenous urography for various indications, 1 in 200 was found to have medullary sponge kidney. In most cases the renal function is normal. The principal finding is dilated intrapapillary collecting ducts and small medullary cysts, which range in diameter from 1 to 8 mm and give the cross-sectioned kidney the appearance of a sponge; some describe the appearance as that of small brushes or "bouquets of flowers". Although many cases are asymptomatic, it may present with renal colic from stones, urinary tract infection or gross hematuria. Symptoms rarely occur prior to age 20. It is the complications of medullary sponge kidney, calculus formation and infection that require management. It is estimated that medullary sponge kidney is found in up to 20% of stone patients and that more than 70% of patients with medullary sponge kidney will develop stones. Treatment includes antibiotics for acute pyelonephritis and thiazides and potassium citrate to prevent stone formation.[1, 2] Patients with medullary sponge kidney frequently have a renal calcium leak, which can lead to secondary hyperparathyroidism and hypercalcemia in addition to nephrolithiasis.

Horseshoe Kidney
The horseshoe kidney is probably the most common of all renal fusion anomalies, occurring in 0.25% of the population. It should not be confused with asymmetrical or off-center fused kidneys, which may give the impression of being horseshoe shaped. The anomaly consists of two distinct renal masses lying vertically on either side of the midline and connected at their respective poles

(usually the lower poles) by a parenchymatous or fibrous isthmus that crosses the midplane of the body.[3] Horseshoe kidneys are frequently associated with other congenital anomalies, including skeletal, cardiovascular and central nervous system defects, as well as other genitourinary anomalies such as hypospadias, undescended testes, bicornuate uterus and vaginal anomalies. The male to female ratio is approximately 2:1. The most common associated finding in these patients is UPJ obstruction, which occurs in up to 35% of patients. For many patients, the horseshoe kidney remains asymptomatic, and the horseshoe kidney is an incidental finding during radiological examination. Symptoms, when present, are usually due to obstruction, stones, or infection. In children, urinary tract infection is the most common presenting symptom.[4, 5] Aviators with horseshoe kidney pose no threat to flight safety. However, if there is recurrent stone formation, infection, or discomfort, the risk of severe pain in flight due to a stone and the need for frequent treatment of these complications may compel the flight surgeon to ground the flyer and refer for treatment.[6] If stone disease becomes problematic, the waiver guide for Renal Stones will also need to be consulted.

Polycystic Kidney Disease

Autosomal dominant polycystic kidney disease is the most common form of polycystic disease and occurs in about 1 in 800 live births. There may be associated abnormalities in the liver, pancreas, brain, arterial blood vessels, or a combination of these sites (liver cysts develop in up to 80% of these patients). Affected patients have numerous fluid-filled cysts in the kidneys which may become hemorrhagic, and the cysts may also be the site of pyogenic infection. Patients often present with hypertension, hematuria, polyuria, and flank pain, and are prone to recurrent urinary tract infections and renal stones. The development of hypertension signifies that the disease is progressing and should be treated aggressively with target blood pressure levels of 130/80 mm Hg or lower. There are currently no treatments that have been demonstrated to slow the formation of cysts or disease progression.[7, 8] Because so many patients with polycystic kidney disease will develop hypertension, the diagnosis should be considered, especially in younger aviators who are hypertensive but are otherwise healthy. At what point in the course of the disease (the period from the onset of signs and symptoms to the occurrence of severe uremia) an aviator should be permanently disqualified from flying must be judged on an individual basis in close cooperation with a specialist in renal disease. The early presence of mild anemia or proteinuria should not pose a threat to flight safety, but when renal impairment increases or the patient has frequent discomfort or urinary tract infections requiring treatment, continued flight duties become problematic. In particular blood pressure must be carefully monitored and controlled.[6]

Congenitally Absent or Atrophic Kidney

The congenital absence of a kidney occurs in approximately 1 in 1200 live births. Males predominate in a ratio of 1.8:1. The absent kidney is most often from the left side. Even though the anomaly is more common in males, associated anomalies are more common in females; about 30% of females with a congenitally absent kidney have an abnormality of the internal genitalia. In general, there are no specific symptoms heralding an absent kidney. The diagnosis should be suspected during a physical examination when the vas deferens or body and tail of the epididymis is missing or when an absent, septate, or hypoplastic vagina is associated with a unicornuate or bicornuate uterus. There is no clear-cut evidence that patients with a solitary kidney have an increased susceptibility to other diseases.[3] In general, the absence of a kidney is not a contraindication to flight duties as long as the remaining kidney is functioning normally and there is no evidence that its continued normal function is being threatened by underlying disease.[6]

Congenital Obstruction of the Ureteropelvic Junction

The diagnosis of UPJ obstruction results in a functionally significant impairment of urinary transport from the renal pelvis to the ureter. Although most cases are probably congenital, the problem may not become clinically apparent until much later in life. Congenital UPJ obstruction most often results from intrinsic disease. A frequently found defect is the presence of an aperistaltic segment of the ureter, perhaps similar to that found in primary obstructive megaureter. UPJ obstruction may also result from acquired lesions. In children, vesicoureteral reflux can lead to upper tract dilatation with subsequent elongation, tortuosity, and kinking of the ureter. In older children or adults, intermittent abdominal or flank pain, especially during periods of increased hydration or urine production, at times associated with nausea or vomiting, is a frequent presenting symptom. UPJ obstruction may not become apparent until middle age or later. Hematuria, either spontaneous or associated with otherwise relatively minor trauma, may also be an initial symptom. Laboratory findings of microhematuria, pyuria, or frank urinary tract infection might also bring an otherwise asymptomatic patient to the urologist. Radiographic studies should be performed with a goal of determining both the anatomic site and the functional significance of an apparent obstruction. Excretory urography remains a reasonable first-line option for radiographic diagnosis. Intravenous pyelography is performed less commonly now, and a CT Urogram may be a helpful initial study. Ultrasonography is also a useful modality. If UPJ obstruction is suspected, a MAG3 lasix renal scan (nuclear medicine diuretic renography) should be ordered to assess differential renal function and the degree of obstruction.

Contemporary indications for intervention for UPJ obstruction include the presence of symptoms associated with the obstruction, impairment of overall renal function or progressive impairment of ipsilateral function, development of stones or infection, or rarely, causal hypertension. The primary goal of intervention is relief of symptoms and preservation or improvement of renal function. Open operative intervention for UPJ obstruction has historically provided a widely patent, dependently positioned, and well-funneled UPJ. In addition, the option to reduce the size of the renal pelvis is readily available with this approach. Although the procedure has stood the test of time with a published success rate of 95%, several less invasive alternatives to standard operative reconstruction are available. The advantages of endourologic approaches include a significantly reduced hospital stay and postoperative recovery. However, the success rate does not approach that of standard open or laparoscopic pyeloplasty; the success rate has often been less than 70%, and these procedures are declining in popularity.[9] With the refinement of robotic-assisted and laparoscopic techniques, the robotic-assisted laparoscopic pyeloplasty has now supplanted both endourologic and open repairs, enjoying the same high degree of success as open repairs.

II. Aeromedical Concerns.

Depending on the underlying condition, a number of symptoms may occur which could impair flying performance and mission completion. These include flank pain, renal stones, urinary urgency, frequency and dysuria, fever, malaise, and subtle declines in general health and mental clarity. With some conditions, pyelonephritis may occur that can lead to cortical scarring and potentially compromise renal function. In addition, these conditions may require close subspecialty follow-up incompatible with worldwide flying duties.

III. Waiver Consideration.

According to AFI 48-123 each of the congenital urinary anomalies noted above are disqualifying for all flying classes in the US Air Force. After careful evaluation, most of these conditions can be considered for a waiver.

Table 1: Waiver potential for Congenital Urinary Anomalies

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Yes* AETC	At the discretion of AETC
II	Yes* MAJCOM	At the discretion of MAJCOM
IIU	Yes AFMSA	At the discretion of AFMSA
III	Yes* MAJCOM	At the discretion of MAJCOM
GBC/ATC	N/A-not disqualifying	No
SMOD	N/A-not disqualifying	No

*Waiver for initial certification needs to be considered very carefully. If the condition has a very low probability of leading to stone disease or decreasing renal function, then the candidate can be considered for a waiver.

AIMWTS search in Mar 2010 revealed a total of 55 cases submitted with a diagnosis of polycystic kidney, horseshoe kidney, atrophic or congenitally missing kidney, medullary sponge kidney, congenital obstruction of ureteropelvic junction, and other miscellaneous congenital kidney or ureteral obstructions. There were 2 FC I/IA cases, 32 FC II cases, 21 FC III cases and 0 identified as FC IIU or UAS cases. There were at total of 4 disqualifications; one was a FC II pilot with severe polycystic disease that progressed to a kidney transplant and the other 3 disqualifications were initial FC III cases with active disease and could not be initially certified.

IV. Information Required for Waiver Submission.

Information required for an <u>initial waiver</u> for congenital urinary anomalies should include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history. Discuss how condition discovered, all associated symptoms, treatments initiated, and any side effects.
C. Exam: GU exam and result of all imaging tests.
D. Laboratory: urinalysis, BUN, creatinine and all other tests that the particular condition requires. Need careful assessment of renal function and mention of presence or absence of stone disease.
E. Consult: Urology and/or nephrology report.

The following information will be required for <u>waiver renewal</u> for congenital urinary anomalies:
A. Interim history to include change in symptoms (particularly renal function), medication usage, and side effects.
B. Exam: GU exam and result of all imaging tests.
C. Current treatment doses and documentation of therapeutic benefit.

D. Report from treating physician.

ICD 9 codes for congenital urinary anomalies	
753.0	Absence of kidney
753.12/13	Polycystic Kidney
753.17	Medullary Sponge Kidney
753.19	Other specified cystic kidney disease
753.20	Unspecified obstruction of renal pelvis and ureter
753.21	Atrophic kidney
753.3	Horseshoe kidney

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WAIVER GUIDE
Initial Version: Nov 09
By: Capt Ryan Davis (ACS Ophthalmology Branch) and Dr Dan Van Syoc

CONDITION:
Conjunctivitis (Nov 09)

I. Overview.

Conjunctivitis, or inflammation of the conjunctiva, is a general term that refers to a diverse group of diseases and disorders that primarily affect the conjunctiva. It is not a diagnosis but rather a description of a clinical syndrome[1]. Conjunctivitis can be classified as infectious or non-infectious and/or as acute, chronic, or recurrent. Infectious conjunctivitis etiologies include both bacterial and viral pathogens. Non-infectious conjunctivitis is further classified into allergic, mechanical/irritative/toxic, immune-mediated, and neoplastic[2]. Correct diagnosis can usually be made by taking a careful history and performing a basic eye examination. Occasionally, cultures are indicated in chronic or recurrent cases. Key questions to ask include association with pain, history of any preceding trauma, seasonal or recurrent nature of the condition, changes in the eyelid, contacts lens use, and use of any eyedrops[3]. Dry eye syndrome can present with symptoms similar to conjunctivitis. If dry eye syndrome is diagnosed please refer to that waiver guide for specifics on diagnosis, treatment, and proper waiver submission criteria.

Viral conjunctivitis is one of the more common eye conditions seen in primary care settings. These patients present with hyperemia and edema of the conjunctiva, a watery discharge, and a pruritic eye. They may present with aggregates of submucosal lymphocytes on the conjunctiva which are seen clinically as round whitish follicular lesions. Visual disturbances and photophobia are rarely seen in this setting[4]. These patients classically present with preauricular lymphadenopathy and are typically contagious for up to two weeks. Family and friends need to be educated in appropriate hygiene, particularly meticulous hand-washing. Treatment, designed to relieve symptoms, is composed of artificial tears, cold compresses, and vasoconstrictor-antihistamine combinations for severe pruritus. Antibiotics should be avoided in cases of viral infection[5].

Bacterial conjunctivitis is ubiquitous and more common in warmer months and regions. Classic symptoms are tearing, irritation, and a sticky discharge that can cause the eye to be matted shut upon awakening. Lack of preauricular lymphadenopathy, as is seen with viral conjunctivitis, is a key diagnostic clinical exam finding that helps differentiate a viral from bacterial etiology[1]. The most common bacterial pathogens are *Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Haemophilus influenzae*. It is normally a self-limiting infection, but topical antibiotic treatment can speed resolution of symptoms and decrease the chance for recurrent infections. Antibiotic options include ophthalmic bacitracin/polymyxin B, trimethoprim, erythromycin, or tobramycin[4]. Another option is azithromycin 1% which shows adequate bacterial eradication and clinical resolution with a good safety profile[6].

Allergic conjunctivitis is usually one component of a generalized immediate allergic-type response. Many affected patients also have nasal or sinus symptoms, and can also have asthma, urticaria, or eczema. In studies of allergic rhinitis, allergic conjunctivitis is reported in over 75% of patients, while asthma was reported in the range of 10% - 20%. This has led many allergy experts to state that the eye is probably the most common site for the development of allergic inflammatory

disorders[7]. There are numerous subtypes of allergic conjunctivitis, with the most common ones being seasonal and perennial allergic conjunctivitis. Common outdoor allergens to which seasonal sensitivities can develop include trees, grasses, and ragweed, and common perennial allergens include pet hair and dander, molds, and dust mites[8]. Current estimates are that up to 40% of the general population suffers from some aspect of allergic conjunctivitis[9].

The mast cell, as in other forms of allergic inflammation, plays a key role in allergic conjunctivitis. Histamine is also found in fairly high concentrations in the eyes of afflicted individuals, and is most likely the etiology of the intense pruritus these patients can experience. Typical symptoms are low-grade ocular and periocular itching, tearing, burning, stinging, photophobia, and watery discharge. Redness and itching seem to be the most consistent symptoms. Another related disease process is vernal conjunctivitis. This is an IgE mediated Type I hypersensitivity reaction that results in a bilateral, seasonal, external ocular inflammatory disease. These patients have intense itching, tearing, photophobia, and mucous discharge, and usually demonstrate cobblestone papillae on their superior tarsal conjunctiva and limbal conjunctiva. It is normally a self-limiting process, but secondary keratopathy can develop. Corneal scarring leading to decreased vision is a potential complication in inadequately treated eyes. Pharmacotherapy options include mast cell stabilizers, immunosuppressive agents, corticosteroids, and antihistamines[10].

Seasonal and perennial allergic conjunctivitis are the two diagnoses most likely to lead to a waiver request. The most commonly used medications are the ophthalmic antihistamines, mast cell inhibitors, the combination antihistamines/mast cell inhibitors, and topical NSAIDs[8]. As of August 2009, none of the commonly utilized agents from any of these classifications were approved for use in US Air Force aviators. However, Patanol® has recently been approved for use in aviators with a MAJCOM waiver. It is a relatively selective H_1-receptor antagonist and mast cell inhibitor combination agent with over 15 years of use in the US. Aeromedical considerations associated with this product are that it is commonly misused to treat contact lens related over-wear and intolerance, including use with Giant Papillary Conjunctivitis, and it's inappropriate use in other causes of "red eye." It is critical that contact lens overuse and intolerance not be treated with Patanol. Patanol use requires a waiver, which will not be considered if the aircrew member is actively using contact lenses. In addition, the diagnosis of allergic conjunctivitis and the improvement of symptoms on Patanol must be confirmed by an ophthalmologist, preferably a cornea specialist. Patanol use is only waiverable in FC II, FC IIU, and FC III, and is not allowable in FC I/IA applicants.

II. Aeromedical Concerns.

The aeromedical issues relate to the infectious potential, subjective annoyance (i.e. itching and tearing), discomfort, and visual decrements from the progressive nature of the various etiologies. For infectious etiologies, continued aviation duties can create a public health concern with crewmates. The dry air of most cockpits can exacerbate symptoms in some affected airmen, leading to additional decrements in visual performance that might not be apparent during a clinic evaluation. Nasal involvement can lead to ear block and sinus block. Regarding treatment, there are numerous ophthalmic preparations that are effective against most types of conjunctivitis. Infectious conjunctivitis typically requires grounding until the infection has resolved and the aircrew member is free of symptoms and sequelae. Resolved infectious conjunctivitis does not require waiver action unless complications resulted that caused corneal opacification, neovascularization or disrupted normal visual function (i.e. reduced visual acuity, chronic dry eyes

or elevated intraocular pressure) or the natural course of the disease results in recurrence (e.g. herpes simplex).

The vast majority of non-infectious conjunctivitis cases in aircrew will be one of the allergic subtypes. Waiver requirements for allergic conjunctivitis are described below. Other non-infectious causes will not require waiver once the symptoms have resolved and visual function is normal.

III. Waiver Consideration.

Chronic and allergic conjunctivitis are disqualifying for all flying in the US Air Force IAW AFI 48-123. Most cases of infectious conjunctivitis will only need to be placed in a DNIF status and then returned to aviation duties, rather than going through the waiver process.

Table 1: Waiver potential for allergic conjunctivitis

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA[#]	Maybe AETC	On request
II[*]	Yes MAJCOM	On request
IIU[*]	Yes AFMSA	On request
III[*]	Yes MAJCOM	On request

* Use of any ophthalmic medications needs to be on the current Approved Medications List.
\# Medications required to control symptoms is not waiverable.

AIMWTS review in Aug 2009 revealed a total of 63 cases submitted for waiver consideration with the diagnosis of conjunctivitis. There were 3 FC I cases, 35 FC II cases, and 25 FC III cases. Only 2 of the total cases were disqualified; a navigator training student (FC II) was disqualified for keratoconus and an initial FC III applicant was disqualified for the diagnosis of asthma. Of interest, 16 aviators were inappropriately granted a waiver for use of topical medications that were NOT on the approved medication list at the time of the waiver approval: 12 for olopatadine (Patanol®), 2 for levocabastine (Livostin®), and 1 each for ketotifen (Zaditor®) and ketoralac (Acular®). Waiver requests should not be submitted for aircrew on medications unless the medication is on the approved list. There were no waiver requests for infectious conjunctivitis, and there were no FC I waivers requested for non-approved medications.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for an initial waiver for conjunctivitis should include the following:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History – history of all conjunctivitis/red eye symptoms such as itching, discharge, irritation, pain, photophobia, and blurred vision; any underlying causative factors, duration of symptoms, exacerbating factors, history of contact lens wear, all treatments attempted and effectiveness of the therapy (medical and surgical), and any impact on job/daily life.
C. Physical – full eye exam to include visual acuity measurement, an external examination, slit-lamp examination, presence or absence of regional adenopathy, and fundoscopic examination. In addition, results of any special tests such as cultures or allergy testing need to be included.
D. Consultation report from an eyecare specialist.

Waiver renewal, if necessary, requires an interval AMS with particular attention to clinical changes, aeromedical impact, and proper use of medications.

ICD-9 codes for conjunctivitis	
372.0	Acute conjunctivitis
372.1	Chronic conjunctivitis
372.14	Other chronic conjunctivitis
372.30	Conjunctivitis, unspecified

Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

V. References.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Mar 2008
By: Dr William Kruyer, ACS chief cardiologist, and Dr Dan Van Syoc

CONDITION:
Coronary Artery Calcium Testing (Mar 11)

I. Overview.

Coronary artery calcium (CAC) testing has recently emerged as a powerful non-invasive assessment of the future risk of coronary heart disease and related events. The test is commonly misused and results misinterpreted, however, leading to confusion in the clinical and aeromedical arenas.

The pathophysiology of coronary artery calcium is deceptively simple. When cholesterol deposits in the arterial wall, the typical physiological response is an outward thickening of the wall such that the cross-sectional area of the lumen is preserved (positive remodeling).[5] Some of these arterial atheromas undergo a process of calcification. These calcium deposits, if significant enough, can be seen with x-ray-based imaging such as routine chest x-rays, fluoroscopy, and computed tomography (CT scans). In the absence of arterial plaque, however, there is no opportunity for calcification in the arterial wall. *Thus, the presence of any amount of coronary artery calcium confirms the presence of atherosclerotic coronary heart disease.*[2] As such, CAC-testing is simply a non-invasive assessment of the presence of coronary heart disease. It is important to note that while the presence of CAC confirms the diagnosis of coronary heart disease, the converse is not true: it is possible to have coronary atheromas that have not calcified and thus are not detected by this type of testing.

CT-based tests for CAC have emerged as a powerful predictor of future coronary heart events. Although there are many different CT-based types of CAC tests (electron beam CT [EBCT], multi-slice CT [MSCT], multi-detector CT [MDCT], multi-row CT [MRCT]), all produce a unit-less number which correlates to the amount of coronary artery calcium detected. Scoring of the amount of coronary calcium detected has been standardized and is highly reproducible amongst the different CT types and in serial studies. Thus, the higher the number, the greater the amount of calcification detected, and the greater the overall burden of coronary disease.[3] The reported CAC score is a total CAC burden, the sum of the scores of all individual calcium deposits. Recent data has emerged illustrating that even minor amounts of detectable coronary artery calcium result in significant coronary event rates, while more substantial CAC results in higher event rates.[6,7] This predictive value of CAC testing is particularly useful for younger, asymptomatic populations with low to moderate Framingham risk profiles.[4] In particular, recent studies have noted that in a healthy cohort of roughly 2,000 active-duty army personnel, the presence of any amount of detectable coronary artery calcium increased coronary heart events by nearly 12-fold.[7] All the events in this cohort occurred in personnel between ages 40 and 50 years old with a Framingham risk score less than 10%, and with CAC scores as low as 10. Note that because this is a direct anatomic assessment, the typical false-positive and false-negative concerns associated with traditional cardiac testing do not apply. Rather, CT-based CAC testing is best viewed as a direct radiologic assessment of abnormal structures.

The Aeromedical Consultation Service (ACS) has been using the assessment of coronary artery calcium in its non-invasive assessment of aviators since 1982 (cardiac fluoroscopy). In-house data

derived from a cohort of almost 1500 aviators with complete invasive and non-invasive assessments revealed that the presence of coronary artery calcium was the test most predictive of future cardiac events. Thus, current aeromedical policy ties the decision of whether to proceed to cardiac catheterization heavily to the presence of detectable CAC. The published data of comparable clinical cohorts with CT-based CAC testing reveal event rates of roughly 1% per year for individuals with a CAC score of 10 to 99, 2% per year for scores of 100-399, and above 3% per year when the CAC score is 400 or greater.[8] These event rates mirror the event rates in the ACS database for aviators with angiographically proven minimal coronary artery disease (CAD), moderate CAD, and severe CAD, respectively.

II. Aeromedical Concerns.

Because CAC testing is an anatomic assessment of the presence of CAD, and because the event rates for individuals with abnormal CAC tests mirror those of aviators with angiographically proven CAD, the aeromedical concerns surrounding abnormal CAC tests are the same as those for individuals with angiographically proven asymptomatic CAD. The major aeromedical concerns are myocardial ischemia presenting as sudden cardiac death, acute myocardial infarction, stable or unstable angina, or ischemic dysrhythmias, any of which could cause sudden incapacitation or significantly impair flying performance or mission completion. Additional concerns surround the need for invasive cardiac procedures and revascularization, frequent contact with cardiac specialists, and comprehensive medication regimens. At present, there is no reliable method of detecting asymptomatic progression of CAD short of frequent noninvasive monitoring, combined with periodic invasive testing.

III. Waiver Considerations.

Borderline or abnormal noninvasive cardiac studies are disqualifying for all flying classes, to include FC IIU. Coronary artery disease or abnormal noninvasive testing is not listed as disqualifying for ATC/GBC and SMOD personnel, but it may be (if found as part of work-up for symptoms) disqualifying for GBC (history of myocardial infarction, angina pectoris, or other evidence of coronary heart disease including silent ischemia) and SMOD (sudden incapacitation), requiring waiver. *CAC tests with a score of **10 or greater** are considered abnormal and require waiver submission*. For the purpose of aeromedical disposition, scores of 0-9 are considered normal and therefore qualifying for all classes of flying duties. While a positive CAC test is a non-invasive assessment of the presence of CAD, we do not recommend local aeromedical cardiac catheterization for asymptomatic individuals. Aviators who received a CAC test as part of a local evaluation for symptoms suggestive of CAD should complete their evaluation as directed by the local cardiologist.

Table 1. Summary of CAC Test Scores and ACS Requirements

CAC Score	Flying Class	Waiver Potential Waiver Authority	Required ACS Review and/or ACS Evaluation
0-9	FC I/IA, II and III	No waiver necessary†	No
10-99	FC I/IA II, IIU, and III	No AETC Yes MAJCOM	No Yes - evaluation initially and every 1-2 years thereafter*#
100-399	FC I/IA II, IIU, and III+	No AETC Yes MAJCOM	No Yes - evaluation initially and annually*#
400+	FC I/IA II, IIU, and III+	No AETC Yes MAJCOM**	No Yes - evaluation initially with mandatory cardiac cath; re-evaluation dictated as per results#

† Reminder: All cardiology tests (e.g., Holter, CAC testing, echocardiogram, ECG, treadmill, cardiac cath) on FC I/IA and FC II personnel must be sent to the ECG library. Call the ACS for the correct mailing address for the ECG Library.
* Need for cardiac cath will be based on CADE (coronary artery disease equation) score at the ACS evaluation.
** AFMSA is waiver authority for FC IIU personnel.
# If cardiac cath accomplished then follow Coronary Artery Disease waiver guide.
+ Waiver for untrained FC II and III unlikely.

IV. Information Required for Waiver Submission.

The aeromedical summary for <u>initial waiver</u> should contain the following information:
A. Complete history and physical examination – to include detailed description of any symptoms, exercise history, and CAD risk factors (positive and negative). <u>*Also include the reason the CAC test was obtained.*</u>
B. Report of the CAC score. (Notes 1 and 2)
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. echocardiography, treadmill, nuclear stress imaging). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

The aeromedical summary for waiver renewal for abnormal coronary artery calcium should include the following:
A. History – brief summary of previous CT results and findings at ACS. Address interim cardiac symptoms (including negatives), exercise/activity level, and coronary artery risk factors and any medications.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD9 code for coronary artery calcium testing	
V81.2	Special screening for other and unspecified cardiovascular conditions

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WAIVER GUIDE
Updated: Mar 2012
Supersedes Waiver Guide of Dec 08
By: Capt Jason W. Cromar (RAM 12), Maj Eddie Davenport (ACS chief cardiologist), Dr William Kruyer (*ACS consulting cardiologist*), *and Dr Dan Van Syoc*

CONDITION:
Coronary Artery Disease (Mar 12)

I. Overview.

This waiver guide addresses only asymptomatic coronary artery disease that has not been treated by revascularization (e.g. stent, bypass surgery). Refer to the Coronary Artery Revascularization waiver guide for revascularization cases.

Coronary artery disease (CAD) is the leading cause of death and premature, permanent disability of American males and females. In spite of tremendous progress regarding CAD therapy, about 50% of initial and recurrent acute events continue to be fatal. Initial symptoms may include incapacitating angina, altered consciousness or sudden death. Heat stress, hypoxia, high +Gz maneuvers and other features of the unique military cockpit/aircraft environment may provoke ischemia in individuals with pre-existing coronary artery lesions.

Clinically significant CAD is defined as one or more lesions with ≥50% stenosis (diameter reduction) by coronary angiography. In the clinical literature, such disease is nearly always symptomatic, since it would rarely be identified otherwise. When treated medically, patients with this degree of disease are reported to show >5% per year annual cardiac event rates in favorable prognostic subgroups. Although the term significant coronary artery disease (SCAD) has historically also been applied to aviators discovered to have a maximal stenosis ≥50%, event rates encountered in the clinical population may not accurately predict prognosis in the younger and relatively healthier aviator population with *asymptomatic* CAD.

To evaluate the actual risk associated with asymptomatic CAD, the Aeromedical Consultation Service (ACS) analyzed initial and long-term follow-up data from approximately 1,500 asymptomatic military aviators with coronary angiography. For aviators with SCAD as defined above, average annual cardiac event rates exceeded 2.5% per year at 2, 5 and 10 years of follow-up. To further stratify risk, the SCAD group was divided into two subsets of SCAD severity, SCAD50-70 (worst lesion 50-70%) and SCAD>70 (worst lesion >70%). Detailed examination of the SCAD50-70 subset revealed that extent of disease (aggregate of lesions) at the time of index coronary angiography could further be stratified into a low-risk versus high-risk subjects. Aggregate of lesions is the arithmetic sum of all graded lesions, e.g. 60% lesion + 20% lesion + 30% lesion = aggregate of 110%. Aggregate <120% identified a low-risk SCAD50-70 subgroup with an average annual event rate <1% per year at ten years of follow-up. Subsequent analysis of the group with minimal coronary disease (MCAD, defined at that time as maximal stenosis <50%) also showed that aggregate was significantly predictive of events albeit low.

Because aggregate successfully stratified cardiac risk, all groups with any CAD (combined SCAD and MCAD) with a maximal lesion ≤70%, was submitted to a similar analysis. In this combined group, aggregate was highly predictive of event-free survival ($p<0.00004$). Specifically, aviators

with an aggregate <50% showed an average annual event rate of 0.6% per year, while those with an aggregate ≥50% but <120% had an average annual event rate of 1.1% per year. (Although a rate of 1.1% slightly exceeds the 1%/yr threshold, the data reviewed predated the routine use of lipid-lowering therapy for secondary prevention, which would be expected to reduce events by an additional 30-40%.)

By way of comparison, clinical literature reports annual cardiac event rates of about 0.5% per year in general population studies of apparently healthy asymptomatic males aged 35-54 years. Similarly, follow-up studies of male subjects with normal coronary angiography, who in most cases presented with a chest pain syndrome, report annual cardiac event rates of 0.2-0.7% per year. Annual cardiac event rates in apparently healthy USAF aviators have been reported by the ACS as ≤0.15% per year for males aged 35-54 years.

From this database analysis, the current aeromedical classification of asymptomatic CAD is based on aggregate, with minimal CAD (MinCAD) defined as an aggregate <50%, and moderate CAD (ModCAD) defined as an aggregate ≥50% but <120%. Significant CAD is now defined as an aggregate ≥120%. Maximum lesion >70% is also considered SCAD.

Graded lesions in the left main coronary artery are treated more cautiously due to the unfavorable prognosis associated with left main disease. Left main coronary artery lesions <50% stenosis are defined as ModCAD, assuming that other criteria for that classification are met. Left main lesions ≥50% stenosis are considered SCAD.

An additional category of CAD was more recently identified from the ACS database – luminal irregularities (LI) only. LI only describes coronary angiography with irregular arterial edges due to atherosclerotic plaque but less than gradable 10-20% stenosis (diameter reduction). LI only represents a subset of CAD with event rates higher than those with truly normal coronary angiography (smooth arterial edges). A review of the ACS database showed that aviators with LI only on coronary angiography had no events in the first five years after diagnosis. However, between 5 and 10 years follow-up, cardiac event rates were 0.54% per year compared to 0.1% per year for those with truly normal coronary angiography. This represents a risk similar to minCAD in the first five years of follow-up.

II. Aeromedical Concerns.

The aeromedical concern is myocardial ischemia presenting as sudden cardiac death, acute myocardial infarction, stable or unstable angina or ischemic dysrhythmias, any of which could cause sudden incapacitation or significantly impair flying performance. At present, there is no reliable method of detecting asymptomatic progression of CAD short of frequent noninvasive monitoring, combined with periodic invasive testing.

Because cardiac catheterization of asymptomatic aviators with abnormal noninvasive testing is only recommended if the risk of CAD exceeds a predetermined threshold, local catheterization of asymptomatic aircrew for aeromedical indications alone is strongly discouraged. Where catheterization is indicated for clinical reasons, then of course the aviator should be managed as any other clinical patient would be.

III. Waiver considerations.

CAD is disqualifying for all classes of flying duties(to include ATC/GBC personnel; it is not specifically noted as disqualifying for SMOD personnel or for retention, but the following statement may encompass CAD: “Any medical condition, the natural history of which is to incapacitate an individual suddenly and without warning.”). It would, therefore, be advisable for SMOD personnel with diagnosed CAD to apply for a waiver to continue his or her SMOD activities. Waiver is not recommended for FC I/IA or for unrestricted FC II/III duties. Depending on the severity and extent of disease as discussed above, waiver may be considered for categorical FC II/III duties (restricted to low performance aircraft defined as <2.5 sustained +Gz). The only exception is that LI only may be considered for unrestricted FC II/III duties. Additionally, modifiable risk factors **must** be acceptable, including but not limited to no use of tobacco products, no diabetes, controlled hypertension (per ACC/AHA guidelines), acceptable lipid profile (treated or untreated per ACC/AHA guidelines), and compliance with medications. These risk factors **must** be acceptable to both gain **and** maintain the waiver.

Table 1. Summary of CAD Categories and ACS Requirements

CAD Category Classification	Flying Class	Waiver Potential Waiver Authority	Required ACS Review and/or ACS Evaluation
Luminal irregularities (LI) only (no graded % stenoses) $*	FC II/IIU/III ATC/GBC SMOD**	Yes MAJCOM	ACS evaluation initially and four years later, then every two years***
MinCAD$# Aggregate <50%	FC IIA/IIU rated aviators ATC/GBC SMOD** Restricted FC III	Yes AFMSA Yes MAJCOM	ACS evaluation initially and annually*** ACS evaluation initially and annually
ModCAD$+@ Aggregate ≥50% and <120%	FC IIC/IIU pilots, FC IIA navigators, flight surgeons ATC/GBC SMOD** Restricted FC III	Yes AFMSA Yes MAJCOM	ACS evaluation initially and annually*** ACS evaluation initially and annually
SCAD$∫ Aggregate ≥120% or max lesion >70%	All Flying Classes	No AFMSA	N/A
Any CAD	FC I and FC IA Initial FC II/III, ATC/GBC and SMOD**	No AETC	N/A

* Luminal irregularity only is eligible for unrestricted FC II/III waiver.
** Waiver authority for SMOD personnel is AFSPC or GSC.
*** ACS evaluation not indicated for ATC/GBC and SMOD personnel unless specifically requested by waiver authority.
# MinCAD is eligible for FC IIA waiver.
+ ModCAD is eligible for FC IIC waiver for pilots, limited to low performance aircraft with another qualified pilot. For navigators and flight surgeons, waiver is FC IIA.
@ MinCAD and ModCAD are eligible for restricted FC III waiver, limited to low performance aircraft.
∫ SCAD (aggregate ≥120%) is disqualifying without waiver recommended. SCAD with a maximum lesion >70% (SCAD>70) and CAD with a left main coronary lesion ≥50% are also disqualifying without waiver recommended.
$ No indefinite waivers

Individuals with a waiver for LI only will be reevaluated at the ACS four years after diagnosis, then every two years thereafter. Individuals with a waiver for MinCAD and ModCAD will be reevaluated at the ACS annually. Successful modification of cardiac risk factors must be demonstrated for LI only, MinCAD and ModCAD. Additional criteria for waiver of LI only and MinCAD include, but may not be limited to: no history suggestive of ischemic symptoms, no prior cardiac events (e.g. unstable angina, myocardial infarction) and normal left ventricular function. Repeat coronary angiography will not be required for LI only or for MinCAD in the absence of any suggestion of CAD progression or symptoms suggestive of ischemia. Additional criteria for waiver

of ModCAD include, but may not be limited to: only one lesion of 50-70% stenosis, normal nuclear stress imaging study in the distribution of the 50-70% lesion, no history suggestive of ischemic symptoms, no prior cardiac events (e.g. unstable angina, myocardial infarction) and normal left ventricular function. Follow-up coronary angiography will be performed for ModCAD every five years routinely, or sooner depending on degree of risk factor improvement, complexity of disease, or for symptoms suggestive of ischemia or deterioration in noninvasive testing.

AIMWTS review in March 2012 revealed a total of 185 cases with known coronary artery disease. This total includes those with MI and revascularization as well. Breakdown of cases was as follows: 0 FC I/IA cases, 128 FC II cases (47 disqualifications), 2 FC IIU cases (0 disqualifications), 48 FC III cases (19 disqualifications), 3 ATC/GBC cases (2 disqualifications), and 4 SMOD cases (2 disqualifications). Of the total of 70 disqualified cases, the vast majority were disqualified primarily for cardiac disease. There were 2 with minimal disease that were disqualified for diabetes and 1 for multiple medical problems.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for coronary artery disease should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, blood pressure, medications, and activity level.
B. Cardiology consult.
C. Electrocardiogram (ECG).
D. Report and CD copy of coronary angiography to the ACS. (Notes 1 and 2)
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
F. Results of MEB or worldwide duty evaluation (for ARC members), if required (e.g. on medications).

The AMS for waiver renewal should contain the following information:
A. Complete history and physical exam – to include description of any symptoms, medications, and activity level.
B. Electrocardiogram (ECG).
C. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.
D. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 Codes for Coronary Artery Disease	
414	Other forms of chronic ischemic heart disease
414.0	Coronary atherosclerosis
414.8	Other specified forms of chronic ischemic heart disease
414.9	Chronic ischemic heart disease, unspecified

V. References.

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WAIVER GUIDE
Updated Dec 08
By: *LtCol George Waddell (RAM 09B), Dr William Kruyer (ACS chief cardiologist), and Dr Dan Van Syoc*

CONDITION:
Coronary Artery Revascularization (Dec 08)

I. Overview.

Coronary artery revascularization includes coronary artery bypass graft surgery (CABG) and percutaneous coronary intervention (PCI, catheter-based techniques such as angioplasty and stent). It is very important to realize that these procedures are palliative, not curative. If revascularization is deemed successful after short-term follow-up of 6-12 months, future cardiac events are primarily caused by progression of coronary artery disease (CAD) elsewhere. Within two years after interventional therapy, new significant lesions ($\geq$ 50% stenosis) may develop at other sites at rates of 7-15% per year.

Recent trials with up to seven years follow-up are available, usually comparing PCI versus CABG or angioplasty versus stent. Post revascularization annual cardiac event rates seem to be in the range of 1.0%-3.0% per year for cardiac death and nonfatal myocardial infarction (MI) plus an additional 2.0-8.0% per year for second revascularization procedure. These trials include better prognostic subgroups with normal left ventricular function, no prior myocardial infarction, and only single or double vessel disease. Cardiac death plus nonfatal MI event rates are comparable for CABG versus PCI with a trend usually favoring CABG. Regarding next revascularization, rates are significantly lower for CABG versus PCI and for stent versus angioplasty. Most of these papers include any repeat revascularization within the first 6-12 months post procedure. For aeromedical purposes, only revascularization performed after an initial six month observation would be pertinent.

From ACS databases 122 former military aviators with coronary artery revascularization but no prior cardiac events were followed for occurrence of next cardiac event. About half the group had CABG and the other half had PCI, primarily angioplasty. There were no cardiac deaths within five years and only two myocardial infarctions, both beyond two years follow-up. After excluding repeat revascularization within six months of the index revascularization, cardiac event rates were 1.0%, 2.7% and 3.6% per year at one, two and five years follow-up, respectively. Individuals meeting the below waiver criteria have estimated cardiac event rates of 2-3% per year for up to five years after revascularization.

Recently a selected group of 30 aviators that presented to ACS (2000-2008) while on active duty, after having had coronary revascularization, were chosen for a retrospective study to determine the time to event and resulting annual event rate. Out of these, only two progressed to need revascularization. There were no deaths and no MIs. The annual event rate was 2.1% (CI 1.2% - 3.0%). The event free survival was 97% at two years and 88% at 5 years. Both of these patients would have been identified during the annual ACS reevaluation as required by policy. Neither would have manifested as an incapacitating event.

II. Aeromedical Concerns.

The aeromedical concern is myocardial ischemia presenting as sudden cardiac death, myocardial infarction, angina or ventricular dysrhythmias, all of which may cause sudden incapacitation or seriously impact performance of flight duties. Detecting the asymptomatic progression of CAD reliably without frequent invasive testing or noninvasive monitoring is the aeromedical challenge.

III. Waiver Considerations.

Coronary artery disease and coronary artery revascularization are disqualifying for all classes of flying duty. ACS review and evaluation is required for waiver consideration. Waiver restricted to low performance aircraft may be considered for all flying classes.
Waiver for pilots, limited to FC IIC (low performance aircraft with another qualified pilot) was approved by the Aerospace Medicine Corporate Board in 2008. Criteria for waiver consideration include but are not limited to normal left ventricular wall motion and systolic function, complete revascularization (all lesions $\geq$50% stenosis successfully revascularized), sum of nonsignificant lesions <120%, no noninvasive testing evidence of reversible ischemia off cardioactive medications, for PCI no restenosis $\geq$50%, successful risk factor modification and minimum DNIF observation period of six months post procedure. ACS evaluation for initial waiver consideration will include complete noninvasive testing and follow-up coronary angiography. If waiver is recommended and granted, waiver will be valid for one year with annual ACS re-evaluation required for waiver renewal consideration. In addition, routine serial coronary *angiography is required at three year intervals*. Follow-up coronary angiography may be recommended sooner if indicated by symptoms, noninvasive test results or failure to control risk factors.

Table 1: Coronary Artery Revascularization and Waiver Potential

Flying Class	**Waiver Potential** **Waiver Authority**	**ACS** **Review/Evaluation**
I/IA	Not Waiverable	NA
II	Not Waiverable	NA
IIA (flight surgeon) IIC (pilot)	Yes* AFMOA	Yes, Annual
III	Yes* MAJCOM	Yes, Annual

* Aircrew must meet following criteria for consideration: 100% revascularization- <50% single lesion-- <120% aggregate-- NL LVEF, no wall motion abnormality-- Adequate medical mgmt: statin, asa, SL NTG (PRN), ACE inhibitor as clinically appropriate-- Low performance aircraft defined as <2.5 sustained G with another qualified pilot-- No altitude restriction in low performance aircraft-- Controlled hypertension -- No diabetes or other co-morbidities

AIMWTS review in November 2008 revealed 28 submitted cases with a history of revascularization. There were 0 FC I cases, 19 FC II cases and 9 FCIII cases. Of the 19 FC II cases, 14 were disqualified, most due to the fact that their cases came under consideration before there was an opportunity for them to be waived due to policy at the time. In the FC III category, 4 of the 9 cases resulted in a disqualification, most due to other medical problems or cardiac instability on evaluation.

IV. Information Required for Waiver Submission.

Submit the following to the ACS.

1. Aeromedical summary.
2. Copy of the cardiac catheterization report and copy of the images (CD, cineangiogram or videotape).
3. Copy of the revascularization procedure report (CABG or PCI) and for PCI copy of the images (CD, cineangiogram or videotape).
4. Additional local cardiac testing is not routinely required but may be requested in individual cases.
5. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, nuclear myocardial stress perfusion imaging).
6. Results of MEB returning member to world-wide duty

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 Codes for coronary artery disease	
414.00	Coronary artery disease
36.10	Coronary artery bypass graft (CABG)
36.06	Coronary artery stent placement
36.09	Coronary artery angioplasty

V. References.

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WAIVER GUIDE
Updated: Jun 2010
Supersedes Waiver Guide of Nov 2005
By: Maj Erich Schroeder (RAM X) and Dr Dan Van Syoc
Waiver Guide reviewed by Col David Smith, AF/SG consultant in General Surgery and Col Patrick Storms, AF RAM and gastroenterologist.

CONDITION:
Crohn's Disease (Jun 10)

I. Overview.

Crohn's disease is a chronic, relapsing inflammatory condition of unknown etiology that can affect any portion of the gastrointestinal (GI) tract from mouth to perianal region. It is manifested by a broad spectrum of clinical symptoms and pathological patterns due to its transmural involvement, variability of organ distribution, and extent of disease.[1] Crohn's disease and ulcerative colitis (UC) result from an aggregate effect of genetic and environmental factors leading ultimately to a state of perpetual and inappropriate activation of mucosal T cells driven by the presence of normal enteric flora. The incidence of Crohn's disease is approximately 5/100,000 and the prevalence is 50/100,000. Men and women are equally likely to develop Crohn's disease. The age distribution of Crohn's disease is bimodal with a peak between the ages of 15-40 and then 50-80 years of age. Ten to twenty-five-percent of patients who are affected also have an affected primary relative.[2]

Crohn's disease is manifested by focal, asymmetric, transmural, and occasionally granulomatous inflammation of the GI tract. The pathophysiology of this disease begins with crypt inflammation and abscesses progressing to small focal aphthoid ulcers. These ulcers may progress deep into the tissue and spread longitudinally and transversely with intervening mucosal edema. This process can create the characteristic cobblestoning appearance seen on endoscopy of the bowel. As the inflammation continues, thickening of the bowel wall and mesentery occurs which can result in fibrosis, stricture formation, and ultimately lead to bowel obstruction. Abscesses and fistulae are commonly encountered.[3]

Clinically, Crohn's disease is characterized by intermittent exacerbations of disease with periods of remission. Typical symptoms include diarrhea (most common presenting symptom), colicky abdominal pain, weight loss, and a low-grade fever. However, these symptoms are highly variable and depend on the pattern and severity of disease. Though any segment of the luminal gut may be involved, major anatomical areas of involvement are: 80% with small bowel involvement, 33% exclusively with ileitis, 50% with ileocolitis, and 20% with only colonic involvement.[4] Crohn's may be manifest as aggressive fistulizing disease, or as a predominantly scarring disease characterized fibrostenotic strictures. It is important to note that these divisions are not mutually exclusive and that one can develop both fistulae and strictures. Complications include intestinal obstruction, hemorrhage, acute perforation, development of fistulas and abscesses, and toxic megacolon.[5]

Extraintestinal symptoms can include reactive arthropathies, ankylosing spondylitis, eye involvement with uveitis and episcleritis, erythema nodosum, pyoderma gangrenosum, thromboembolism, and primary sclerosing cholangitis. Malabsorption can lead to anemia, cholelithiasis, nephrolithiasis, vitamin deficiencies, and osteoporosis. Patients with long-term

active Crohn's disease may have an increased (but still rare) risk of small bowel adenocarcinomas, and in the case of longstanding Crohn's colitis, an increased risk of colon cancer.[5]

The differential diagnosis of Crohn's disease is broad. If the disease involves the colon, it must be differentiated from UC based on the involvement of the small bowel, sparing of the rectum, absence of gross bleeding, and the presence of bothersome perianal disease. Also, the focality of gross and microscopic lesions, the presence of granulomas, or the occurrence of fistulae must be considered. Several diseases can present with a clinical picture similar to Crohn's: appendicitis, diverticulitis, ischemic colitis, intestinal tuberculosis, and lymphoma. If the patient presents acutely with a new onset of bloody diarrhea then an infectious etiology must be considered such as Shigella, Salmonella, E. coli 0157:H, and Yesinia, among others.[5, 6]

Diagnosis is based upon the clinical presentation combined with endoscopic findings. Colonoscopy is the procedure of choice for evaluation of the presence and extent of ileocolonic involvement. Intestinal biopsy is confirmatory rather than diagnostic, and is usually nonspecific. Approximately 10-15% of patients with colonic involvement alone will be diagnosed with indeterminate colitis when Crohn's disease cannot be distinguished from UC. Importantly, some patients may be initially diagnosed as having UC with subsequent consideration leading to a change in diagnosis to Crohn's.[3] C-reactive protein can be helpful in determining the degree of inflammation present, and may be a more accurate indicator of intestinal inflammation than the Erythrocyte Sedimentation Rate. As mentioned, the typical course of Crohn's is intermittent exacerbations followed by periods of remission. Approximately 10 to 20% of patients experience a prolonged remission after initial presentation.[7]

Treatment is aimed at restoring well-being and should be individualized. Therapeutic recommendations depend upon anatomic location, severity, and complications. Medical management is used to treat acute disease, while surgical therapy is reserved for intestinal complications and medically intractable disease. Although the mainstay of acute treatment continues to be the 5-aminosalicylate (5-ASA) compounds, maintenance therapy with 5-ASA is of little value in Crohn's disease, unlike UC. If 5-ASA therapy proves inadequate, antibiotics, or immunosuppressive drugs such as corticosteroids, thiopurines, or anti-TNF therapy may be indicated. Immunosuppressive therapy has been shown to result in endoscopic healing, though unlike in UC, this is not the primary determinant of remission in Crohn's. Surgery is frequently required to address complications of stricturing or fistulizing disease. Post-operative disease recurrence is high with a 10-15% per year clinical recurrence rate. After the initial episode, only 10-20% of patients have a prolonged remission. Without therapy, 30% relapse within 1 year and 50% in two years.[6, 8]

II. Aeromedical Concerns

Crohn's disease is incurable, progressive, and unpredictable with the very real potential for progressive systemic degradation. The uncertain nature of the disease, side effects of medication and need for surgery are obvious aeromedical concerns. Crohn's disease can affect any part of the GI tract, and relapses frequently follow remissions. Maintenance drug therapy to prevent relapse has met with mixed results. Issues related to the aerospace environment include, abdominal pain, bowel obstruction, abscesses, chronic diarrhea, anemia, predilection to gallstones and kidney stones, GI perforation, and chronic medication use with its potential side effects. These issues can lead to

impairment secondary to pain and GI upset. Flyers with infrequent symptoms not requiring long-term medical therapy may do well and it may be safe to consider a waiver for such cases.[9]

Bowel obstruction is common, can evolve over a short period of time, and is particularly worrisome as a cause of incapacitation due to severe pain, distention, and vomiting. Between 1970 and 1988, Michelassi's group studied 1379 Crohn's disease patients, 639 of which required at least one surgical procedure. Most common indications for surgery were failure of medical treatment (33%), presence of a fistula (22%), and small bowel obstruction (22%). In 391 patients without previous surgery, the number of sites involved was significantly associated with intra-abdominal recurrence rate. The annualized risk of recurrence was 1.6% of patients with single-site involvement and 4% for those with multiple-site involvement.[10]

There are several other aeromedical concerns with Crohn's Disease: Abscesses occur in 15-20% of patients, fistulae occur in 20-40% of patients, and gallstones occur in 25% of Crohn's patients with the relative risk for gallstones almost double compared with the general population. Hypersensitivity reactions may include rash, fever, aplastic anemia, agranulocytosis, hepatitis, pancreatitis, nephrotoxicity, pulmonary fibrosis and hemolysis. Because most sulfasalazine toxicity is due to the sulfa component, time-pH release formulations of mesalamine (i.e., Pentasa, Asacol) are preferred. Crohn's disease confined strictly to the colon is less problematic from an aeromedical standpoint, and for waiver purposes is handled in a fashion similar to ulcerative colitis.

III. Waiver Consideration.

A history of Crohn's disease is disqualifying for Flying Classes, I, IA, II, and III. It is not specifically mentioned as disqualifying for FC IIU, but "abnormalities of the bowel including, but not limited to, irritable bowel syndrome, diverticular disease, malabsorption syndromes, or chronic diarrhea of sufficient severity to require frequent interventions or to interfere with normal functioning" is disqualifying for these airmen. It is also not specifically mentioned under ATC/GBC and SMOD duties, but the ability to continue in the current duties could potentially be an issue in both of these career fields. Table 1 highlights waiver potential for common situations and the Aircrew Medication List provides an up to date list of aeromedically acceptable medications. After a second exacerbation of Crohn's disease with small bowel involvement, a FC IIC (fly only with another qualified pilot) waiver may be considered after 12 months remission off of all unapproved anti-inflammatory and immunosuppressive medications. Crohn's disease is disqualifying for FC I/IA; waiver is not recommended. It is not mandatory that any Crohn's patient be referred to the ACS, but the waiver authority can send a case to the ACS for review if there are any aeromedical concerns.

Table 1: Waiver potential for Crohn's Disease

Flying Class (FC)	Condition	Waiver Potential*** Waiver Authority
I/IA	History of Crohn's disease at any site	No AETC
II	Crohn's Colitis*&	Yes MAJCOM**
	Crohn's with Small Bowel disease†&	Yes MAJCOM**
IIU	Crohn's Colitis or Crohn's with Small Bowel disease†	Yes AFMSA**
III	Crohn's Colitis*&	Yes MAJCOM**
	Crohn's with Small Bowel disease#&	Yes MAJCOM**
GBC/ATC	Crohn's Disease$	Yes MAJCOM**
SMOD	Crohn's Disease$	Yes AFSPC

*Unrestricted waiver is possible if disease is in complete medical remission for at least three months; no fistulas, strictures or abscess; and use only authorized medications.
**Waiver authority is AETC for untrained applicants.
***No indefinite waivers.
† Must be asymptomatic for 6 months; have no fistulas, strictures, or abscess; no history of more than two surgical procedures; use only authorized medications. If flyer is a pilot, will get a restricted FC IIC waiver restricting flying only with another qualified pilot. For unrestricted FC II waiver, pilot needs to be asymptomatic for 2 years; have no fistulas, strictures, or abscess; no history of surgical resection; use only authorized medications.
#Must be asymptomatic for 6 months; have no fistulas, strictures, or abscess; no history of more than two surgical procedures; use only authorized medications.
& Any extraintestinal manifestations should be addressed as a separate diagnosis and will require individual work-up.
$ Condition disqualifying if unable to complete AFSC-specific duties or misses too much work due to condition and treatment course.

A search of AIMWTS in May 2010 revealed 50 Air Force flyers with waiver dispositions with the diagnosis of Crohn's disease. There were 2 FC I/IA cases (both disqualified), 29 FC II cases (10 disqualified), 0 FC IIU cases, 9 FC III cases (6 disqualified), 7 ATC/GBC cases (2 disqualified0, and 2 SMOD cases (0 disqualified). All of the disqualified cases were due to factors relating to the Crohn's disease process.

IV. Information Required For Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for Crohn's disease should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the condition and all treatments used to date. The AMS needs to address the presence or absence of any extraintestinal symptoms.
C. Consultation from a gastroenterologist to address disease course, current therapy, and documentation of related complications
D. Labs: CBC, C-reactive protein, B_{12}, iron studies (if anemic), folate, LFTs, and albumin should be reported. ESR may be used to follow disease activity. Hypoalbuminemia is an indicator of malnutrition and chronicity of disease.
E. Imaging: Provide results of all imaging tests. Proper imaging studies of the bowel (colonoscopy +/- biopsy, contrast radiography of the small bowel) to delineate disease extent and complications are necessary for initial waiver consideration; imaging studies may or may not be required for renewal waivers depending on disease course.
F. Ophthalmologic evaluation should be obtained to rule out uveal involvement at time of initial waiver and thereafter if ocular symptoms develop.
G. A statement that the aviator is in complete clinical remission, that he/she has not suffered any complications and that he/she is tolerating a regular diet, having normal bowel movements and is capable of normal activities.

The aeromedical summary for waiver renewal for Crohn's disease should include the following:
A. Interval history specifically noting any changes in disease course and treatments since the last waiver submission.
B. All applicable labs and imaging tests as in the initial aeromedical summary.
C. Consultation from a gastroenterologist to address disease course, current therapy, and documentation of related complications.
D. Ophthalmology evaluation as with initial summary.

ICD 9 codes Crohn's Disease	
555.0	Crohn's disease, small intestine
555.1	Crohn's disease, large intestine
555.9	Crohn's disease, not otherwise specified

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WAIVER GUIDE
Updated: Dec 2010
Supersedes Waiver Guide of Mar 2008
By: USAFSAM Hyperbaric Medicine Division Staff, Dr. Steve McGuire (ACS Neurologist), and Dr Dan Van Syoc

CONDITION:
Decompression Sickness and Arterial Gas Embolism (Dec 10)

I. Overview.

Decompression sickness

Decompression sickness (DCS) can occur from decompression during flight, from altitude chamber exposure, from flying at high altitudes, from diving, from working in pressurized tunnels or caissons, or from hyperbaric chamber exposure. The reported incidence of in-flight DCS is fortunately rather rare, possibly because of extremely reliable aircraft pressurization systems. By contrast, DCS is much more commonly reported with altitude chamber operations employed for aircrew training and research (~3/1000 exposures per year). DCS varies widely in its clinical presentation from minor skin itching, through joint or limb pain to serious neurologic, cardiopulmonary, and inner ear involvement. Older classification systems, categorizing less severe DCS symptoms as Type I and more severe as Type II, have been dropped in favor of simple symptom descriptors. Symptoms of severe DCS include any neurologic sign or symptom consistent with injury or dysfunction of the CNS including vertigo, headache, disorientation, slurred speech, incoordination; pulmonary symptoms (chokes) including chest pain, cough, and SOB; and circulatory collapse. Since there are no pathognomonic signs or symptoms or definitive laboratory tests, diagnosis depends on a high index of suspicion and a very careful history for recent credible exposure. Neurologic DCS presents in one of two forms: a peripheral form and a central nervous system form. The central nervous system DCS includes spinal cord DCS and cerebral DCS. The peripheral form often consists of parasthesias in upper or lower limbs (commonly in the same limb affected with musculoskeletal pain), which resolves quickly with treatment. In some case of spinal DCS, what seems like peripheral neurologic symptoms on the trunk can progress rapidly to paraplegia, so caution (in the form of aggressive treatment) is warranted. Involvement of the central nervous system can lead to permanent neurologic deficit if not recognized early and treated appropriately. It is critical to perform a thorough neurologic exam to detect subtle findings including neurocognitive deficits. Oftentimes patients judged to have only peripheral complaints prior to recompression will admit to a "haze" being lifted during recompression – this "haze" (mild disorientation, flat affect, personality change) should be considered a CNS symptom. Current literature suggests it is rare for DCS symptoms to begin more than 24-48 hours following decompression exposure. However, DCS should still be considered in the differential diagnosis for any individual presenting with DCS symptoms even beyond this period of time if they had a credible exposure (i.e. at or above 18,000 ft or hyperbaric exposure). Three factors have been well established through both human use protocols and flight operations as predictors of altitude induced DCS. These are altitude of exposure, duration of altitude exposure, and physical activity level while at altitude. A fourth very important but not quantifiable factor is personal variability, i.e., some personnel are very susceptible whereas other personnel are highly resistant to developing DCS. Exercise enhanced pre-breathing (EEP) with 100% oxygen prior to exposure is an effective countermeasure to developing DCS and is used routinely in U-2 operations. Other factors

commonly mentioned but less well validated include hypoxia, obesity, caffeine, smoking, alcohol consumption and recent injury or trauma.[1-6]

The pathophysiology of decompression illness (both decompression sickness and arterial blood gas formation) is not entirely understood. The pathophysiology behind neurologic DCS is likewise unknown as is the period of increased susceptibility (if any) to recurrent injury following an initial episode of neurologic DCS. In general, inert gas bubbles (most commonly nitrogen) cause harm through vascular obstruction, ischemia, and stimulation of inflammatory processes following damage to the endothelium. Subsequent reperfusion injury may also occur. The bubbles arise as a result of exposure to decreased ambient pressure either following hyperbaric exposure, e.g. SCUBA diving, prolonged exposure to underground environments, or by altitude exposure. It is believed bubbles causing DCS almost exclusively arise within the venous system and are shunted to the arterial circulation through pulmonary shunts or more rarely atrial defects such as a patent foramen ovale (PFO) causing harm through mechanical distortion of tissues, pulmonary vascular obstruction, or stimulation of inflammatory processes that leads to tissue edema, hemoconcentration, and hypoxia.[7] Neurologic deficits may be transient or permanent. Published studies on divers indicate a two-fold increased incidence of white matter hyperintensities (WMH) on brain MRI compared to controls even in the absence of a history of neurological DCS.[8,9] Similar WMH have been noted in 7 of 13 (54%) clinically evaluated high altitude U-2 military fliers that have experienced neurological DCS.[10] Preliminary research data on a very limited pilot sample at the ACS and Research Imaging Center (RIC) of the University of Texas at San Antonio Health Science Center revealed no lesions detected by 3.0 Tesla (T) MRI (research MRI) if the 1.5 T MRI (standard clinical MRI) did not detect lesions. Additional lesions were, however, detected by the 3.0 T MRI when one or more lesions were noted on 1.5 T MRI. Furthermore, these lesions were unique in their morphology and were not seen in the normative data base maintained by the RIC of the 133 age 20 to 40 year-old subjects with no history of neurologic insult, hypertension, hyperlipidemia, or diabetes mellitus nor in the entire study base population of 800 community-based subjects[11]. The clinical significance, both immediate and long term, of these lesions is currently unknown.

Recompression by hyperbaric oxygen therapy is the definitive treatment for DCS. Symptoms of altitude related DCS often resolve upon descent to lower altitudes and/or the administration of 100% oxygen. Less severe cases of DCS manifest as joint or limb pain. When these symptoms of the "bends" resolve on descent or administration of 100% oxygen, they do not mandate hyperbaric therapy. Specific guidelines for treatment of pain only DCS with ground level oxygen can be found in AFI 48-112. However, DCS symptoms that persist or recur after initial recovery, and all cases of neurologic DCS (whether resolved with descent and oxygen or not) and chokes, require hyperbaric treatment as soon as possible. Even in severe cases, expeditious treatment with hyperbaric oxygen has been associated with a high rate of recovery.[2]

Arterial gas embolism

For an air embolism to occur there must be a direct communication between a source of air and the vasculature and a pressure gradient favoring the movement of air into the circulation. Arterial gas embolism (AGE) is seen in trauma, the placement of central lines, surgery, positive pressure breathing, ascent in diving (breath holding), and rarely in aviation ascent (rapid decompression usually associated with positive pressure breathing and/or anti G-straining maneuver). The symptoms may be difficult to separate from DCS; however in AGE the onset of symptoms is in general more rapid (within 10 minutes of ascent) and can be life-threatening with air bubbles

obstructing the systemic or pulmonary arterial circulation. Hyperbaric treatment is the only definitive treatment for AGE.[12]

II. Aeromedical Concerns.

DCS is a normal response to an abnormal condition. If an individual is subjected to conditions sufficient to produce DCS often enough, he or she will eventually develop symptoms. The major aeromedical concern is incapacitation in flight as well as any residual neurologic, neurocognitive, or neuropsychologic impairment. The risk of recurrent injury or increased susceptibility to subsequent injury following an initial episode of DCS is unknown as is the short and long term risk of permanent neurocognitive impairment following repeated episodes of neurologic DCS. Permanent subcortical dementia following a single episode of neurologic DCS in an aviator has been documented at the ACS. The risk of seizures following altitudinal DCS is unknown. In saturation divers 18% of divers were noted to have abnormal EEGs as compared to 5% of controls; however this study did not compare the incidence of seizures of divers compared to controls.[13] Furthermore it is unknown if data from saturation divers can be applied to altitudinal DCS. Seizures are known to occur following stroke in young adults (~ 5-11% incidence over the first 3-years); whether the pathophysiology of DCS with presumed arterial occlusion and/or focal endothelium inflammatory change predisposes to subsequent seizures is unknown.[14, 15] Additionally the MRI lesions noted following altitudinal DCS have a unique morphology and may not present the same risks of seizures as the typical stroke lesions. Recent consensus statement from the 2010 DCS-AGE Workshop noted the risk of seizures is unknown with currently no medical evidence indicating increased risk of seizure. This committee also concluded aspirin 81mg may potentially lessen the incidence of neurologic DCS secondary to its platelet inhibition effect. Large vessel occlusion from AGE in the aviation environment is rare. If it does occur, the pulmonary rupture that caused the AGE needs to heal before returning to flying duties. Furthermore, a pulmonary pathologic condition, a predictor of recurrence, should be ruled out (chest x-ray). While theoretically a PFO could also predispose the risk of DCS, there is no current evidence neurologic DCS is increased in the presence of a PFO in altitude induced DCS. Current practice suggests closure of the PFO does not significantly decrease the risk of subsequent AGE or DCS.[16]

III. Waiver Consideration.

An episode of DCS is disqualifying for all FCI, FCII, FCIIU, FCIII, ATC/GSB, SMOD, and altitude chamber personnel. Waiver is required for any severe episode of DCS/AGE, which would include any event that involves the central nervous system (to include the spinal cord). Any altitude-induced DCS/AGE episode that requires recompression therapy requires a waiver. Altitude chamber induced DCS/AGE without residual symptoms or clinical findings following recompression treatment does not require a waiver but still requires evaluation as listed below.

Current medical knowledge does not permit clear delineation of susceptibility to repeat DCS nor does it allow precise definition of risk of sudden incapacitation or of neurocognitive impairment. As a consequence the Aeromedical Standards Working Group (ASWG) recommended the following pending acquisition of data that will permit further refinement of risks. Current ASWG recommendations are a minimal 72-hours DNIF following a chamber exposure, a minimum 2 week DNIF following an altitudinal exposure with complete resolution of symptoms within 2-weeks of exposure and with acceptable studies as listed below, and a minimal 6-month DNIF following

altitudinal exposure without complete resolution by 2-weeks or without acceptable studies as listed below.

Table 1: DCS RTFS Requirements for FCI, FCII, FC IIU, FCIII, ATC/GSB, SMOD, and altitude chamber personnel.

	DCS/AGE with no CNS* or pulmonary involvement	DCS/AGE categorized as severe, including CNS* or pulmonary involvement
Chamber-induced DCS. All Symptoms Resolved In <2 Weeks	**No Waiver Required** May be RTFS by local flight surgeon after consultation with base SGP, USAFSAM Hyperbaric Medicine Branch and MAJCOM/SGP. Requires a minimum 72-hour DNIF following resolution of all symptoms.	**No Waiver Required** May be RTFS by local flight surgeon after consultation with base SGP, USAFSAM Hyperbaric Medicine Branch and MAJCOM/SGP. Requires a minimum 2 week DNIF following resolution of all symptoms. Required studies: (1) Documentation of symptoms and response to recompression therapy. (2) Neurological exam performed by a neurologist or hyperbaricist. (3) Neurocognitive testing at one month to include Microcog and MAB; results reviewed by ACS. (4) MRI (minimum 1.5T unit) within one month of episode; images reviewed by ACS. (5) Consultation with USAFSAM Hyperbaric Medicine Branch. (6) ACS review required.
Altitude-induced DCS. All Symptoms Resolved In <2 Weeks	**No Waiver Required** May be RTFS by local flight surgeon after consultation with base SGP, USAFSAM Hyperbaric Medicine Branch and MAJCOM/SGP. Requires a minimum 72-hour DNIF following resolution of all symptoms.	**Waiver Required** Requires a minimum 1-month DNIF following resolution of all symptoms if all results below are acceptable upon review at ACS or a minimum 6-month DNIF if not acceptable. In cases of altitude-induced pulmonary AGE, 1-month DNIF is required with CXR (PA and LAT) to rule out parenchymal disease. If AGE includes CNS complaints, the following is required. Waiver request requires: (1) Documentation of symptoms and response to recompression therapy. (2) Neurological exam performed by a neurologist or hyperbaricist. (3) Neurocognitive testing at one month to include Microcog and MAB; results reviewed by ACS. (4) MRI (minimum 1.5T unit) within one month of episode; images reviewed by ACS.

		(5) Consultation with USAFSAM Hyperbaric Medicine Branch. (6) ACS review required.

	DCS/AGE with no CNS* or pulmonary involvement	DCS/AGE categorized as severe including CNS* or pulmonary involvement
Altitude-induced DCS. All Symptoms NOT Resolved In <2 Weeks	Focused symptom workup by appropriate specialty and aeromedical disposition per AFI	**Waiver Required** Requires a minimum 6-month DNIF. Waiver request requires: (1) Documentation of symptoms and response to recompression therapy. (2) Neurological exam performed by a neurologist or hyperbaricist. (3) Neurocognitive testing at one month to include Microcog and MAB; results reviewed by ACS. (4) MRI (minimum 1.5T unit) within one month of episode; images reviewed by ACS. (5) Consultation with USAFSAM Hyperbaric Medicine Branch. (6) ACS review required.

*Although peripheral neurological complaints as presenting symptoms require TT6 treatment, if symptoms completely resolve with recompression, a full 2 week or 1 month DNIF is not warranted. Required studies include examination by neurologist or hyperbaricist and consultation with USAFSAM Hyperbaric Medicine Branch.

Table 2: Waiver potential for DCS and AGE cases.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review or Evaluation
I/IA	DCS/AGE with resolution of symptoms within 2 weeks and no neurological involvement.	N/A	No
	DCS/AGE with residual symptoms for greater than 2 weeks or with CNS involvement	Maybe AETC	Yes
II/III	DCS/AGE with resolution of symptoms within 2 weeks and no CNS involvement.	N/A	No
	DCS/AGE with residual symptoms for greater than 2 weeks or with CNS involvement.	Maybe† MAJCOM+	Yes

† If symptoms resolved (after the two weeks) or not severe enough to interfere with performance of aircrew duties then an indefinite waiver likely, new DCS episode with residual DCS symptoms (i.e. meeting waiver requirement) will require another waiver.
+ If symptoms functionally significant waiver authority is AFMSA.

Review of AIMWTS through September 2010 showed 28 cases of decompression sickness; sixteen were FC II, seven were FC III and five were aerospace physiologist technicians (9C). A total of four were disqualified; two FC II, and three aerospace physiologist technicians. The two physiologist technicians were disqualified because of recurrent DCS during chamber flights, one of the FC II was disqualified due to severe residual neurological deficits and the other was disqualified for other medical problems.
AIMWTS review also showed one case of air embolism in a FC III aviator secondary to diving; waiver granted.

IV. Information Required for Waiver Submission.

The aeromedical summary for the DCS waiver should include the following:

A. History to include risk factors, exposures, initial symptoms, treatment, residual symptoms and signs and functional limitations.
B. Physical – neurological exam.
C. Neurology consult.
D. Neurocognitive testing – Multidimensional Aptitude Battery (MAB), MicroCog
E. MRI (minimum 1.5T unit)
F. Statement that USAFSAM hyperbaric medicine physician consulted.

G. Chest x-ray (PA and LAT) to rule out lung parenchymal pathology in cases of aviation induced pulmonary AGE only.

ICD 9 code for Decompression sickness	
993.3	Caisson disease
958.0	Air embolism

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WAIVER GUIDE
Updated: Sep 2010
Supersedes Waiver Guide of May 2006
By: Maj Theresa Goodman (RAM X), Maj Amy Gammill (ACS internist), and Dr Dan Van Syoc

CONDITION:
Deep Venous Thrombosis/Pulmonary Embolism (Sep 2010)

I. Overview.

Venous thromboembolism (VTE) is the clinical entity that encompasses both deep venous thrombosis (DVT) and pulmonary embolism (PE). The pathophysiology of VTE reflects the interplay of hemostasis, vascular endothelial injury, and hypercoagulability (Virchow's triad).[1] The largest study estimating the incidence of VTE is the Longitudinal Investigation of Thromboembolism Etiology (LITE) study, which estimated the age-standardized incidence of first-time VTE at 1.92/1000 person-years. The incidence was higher in men than women and increased with age.[2] In this particular study, the population was ≥ age 45. Based on the average age of the USAF aviator, it is reasonable to assume that the incidence in our population is considerably lower.

There are several risk factors for VTE. Practically, these have been categorized into major risk factors (malignancy, major surgery and prior VTE) and minor risk factors (immobilization, oral contraceptives, estrogen replacement therapy and pregnancy). Treatment length for VTE is based in part on the underlying etiology; therefore, it is important to distinguish secondary VTE (caused by a major/reversible risk factor) from idiopathic VTE (no identified etiology). The presence of a hereditary thrombophilia, alone, does not constitute a secondary VTE.

Air travel has been studied extensively to determine the risk for VTE. A recent meta-analysis confirmed that flights less than 6 hours do not seem to put individuals at increased risk of symptomatic VTE, but flights greater than 8 hours do increase the risk. The overall risk of VTE, however, is quite low (0.05% with symptomatic DVT and 27 PE per 1 million flights).[3] Of interest, in the rare cases referred to the Aeromedical Consultation Service where aviators had developed VTE after long flights, the individuals had been passengers rather than aircrew.

The incidence of hereditary thrombophilias in patients presenting with DVT is 24 to 37 percent, based on data from various studies, compared to 10 percent in controls.[4] The most common inherited thrombophilias (in order of prevalence, greatest-to-least) are Factor V Leiden, prothrombin gene mutation, protein S deficiency, protein C deficiency and antithrombin deficiency.[5] Presence of an inherited thrombophilia certainly predisposes an individual to VTE, but the thrombophilia remains only one portion of Virchow's triad. Current studies have demonstrated no significant difference in recurrence rates between those with and without identifiable inherited thrombophilias.[6,7] Some authorities would recommend lifelong anticoagulation after one unprovoked thrombotic episode in a patient with antithrombin deficiency or in patients with multiple defects, but consensus does not exist. Multiple defects do seem to increase the risk of recurrence, but combined defects are identified in only 1-2% of those with idiopathic VTE.[4] For these reasons, screening for the hereditary thrombophilias is not generally recommended for the first-time VTE patient, particularly in patients with known risk factors for thrombosis. Evaluation for acquired thrombophilia (antiphospholipid syndrome) should depend on the setting, and if confirmed present would alter duration of therapy. In general, testing for the following

thrombophilias may be indicated in certain patients (such as those who present with abnormal baseline coagulation studies or with a strong family history of VTE): antiphospholipid antibodies, Factor V Leiden, prothrombin gene mutation, and protein C, protein S, or antithrombin deficiency.

Malignancy is a major risk factor for VTE, which raises the question of whether all patients with VTE should be screened for cancer. Most VTE events associated with malignancy occur in patients with known cancer. Therefore, if a detailed history and physical examination and baseline laboratory studies fail to suggest cancer, no additional evaluation for occult neoplasm is required in most situations. Age appropriate cancer screening should be up-to-date, and it may be reasonable to include screening for prostate cancer in males over age 50 years with PSA and digital rectal examination.

The long-term treatment for VTE is systemic anticoagulation with a vitamin K antagonist (warfarin). Once the diagnosis of VTE is made and if no contraindications to anticoagulation are present, rapid treatment with unfractionated heparin, low-molecular-weight heparin, or factor Xa inhibitor (fondaparinux) should be initiated immediately. For most patients, warfarin should be started simultaneously with heparin or factor Xa inhibitor. Treatment with heparin or factor Xa inhibitor should be continued for at least 5 days –and can be discontinued on day 5 or 6 if the INR has been therapeutic (INR 2-3) for 2 days. Aviators should be instructed on the dietary challenges necessary to keep INR levels stable due to the multiple interactions of food and warfarin. The major risk of anticoagulation treatment is hemorrhage. The risk increases directly with increasing INR and precipitously climbs when the INR is greater than 5.[8]

Duration of anticoagulation for VTE is determined by the presence of risk factors and by whether the VTE is primary (initial event) or recurrent. The most recent guidelines published by the American College of Chest Physicians recommend that a first VTE occurring in the setting of a reversible or time-limited risk factor should be treated for at least 3 months with anticoagulation. An idiopathic VTE (first episode) requires at least 6 months of anticoagulation therapy. Recurrent idiopathic VTE should be treated with lifelong anticoagulation.[9]

II. Aeromedical Concerns.

The presence of a symptomatic DVT primarily causes pain and swelling. If either or both of these are present during a critical phase of flight, it is possible that control service inputs could be difficult or inadequate. Additionally, the presence of DVT places the aviator at risk for PE. The aeromedical concerns for PE include dyspnea, hypoxia, chest pain, and (in rare cases of massive PE) hypotension and even death.

Once VTE has been diagnosed, the aeromedical concern revolves around both the risk of bleeding secondary to anticoagulation treatment and the risk of recurrence. In flight, spontaneous hemorrhage could lead to sudden incapacitation. Alternatively, recurrent disease may also lead to acute incapacitation through PE. Given the thin line of optimal anticoagulation, aviators *must* be followed by a specialized anticoagulation management service. Patients followed by these services see a reduction in the annual rate of adverse events by more than 60%.[10]

III. Waiver Consideration.

Deep venous thrombosis and pulmonary embolism are disqualifying for all classes of flying in the United States Air Force. Neither condition is specifically addressed in AFI 48-123 for GBC/ATC or SMOD duties, but the general statement regarding incapacitation "suddenly and without warning" may apply in some situations. For applicants to flying training, waiver will be considered for a history of DVT or PE which occurred in the setting of major reversible risk factors, since the risk of recurrence is acceptably low. These conditions are disqualifying for retention in the Air Force and an MEB may be required.

Table 1: Waiver potential for venous thromboembolism

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Reversible Risk factor	Yes* AETC
	Idiopathic	No AETC
	Recurrent episode	No AETC
II	Reversible Risk factor Anticoagulation therapy: 3 months	Yes MAJCOM
	Idiopathic Anticoagulation therapy: 6 months**	Yes MAJCOM
	Recurrent episode Anticoagulation therapy: Chronic***	Yes, FC IIC MAJCOM
IIU#	Reversible Risk factor Anticoagulation therapy: 3 months	Yes AFMSA
	Idiopathic Anticoagulation therapy: 6 months**	Yes AFMSA
	Recurrent episode Anticoagulation therapy: Chronic***	Yes AFMSA
III	Reversible Risk factor Anticoagulation therapy: 3 months	Yes MAJCOM
	Idiopathic Anticoagulation therapy: 6 months**	Yes MAJCOM
	Recurrent episode Anticoagulation therapy: Chronic***	Yes MAJCOM
GBC/ATC****	Any VTE condition	N/A-not disqualifying
SMOD****	Any VTE condition	N/A-not disqualifying

*For major reversible risk factors as defined above. A history of only minor risk factors will be handled on a case-by-case basis.

**Waiver may be considered after 3 months of therapy provided they are treated in accordance with existing treatment guidelines.

***Must be followed by a specialized anticoagulation management service.

****May be deemed disqualifying if the condition leads to, or is at risk of leading to incapacitation while performing duties.

AETC is waiver authority for initial FC IIU candidates.

Waiver is not allowed during the first 3 months of treatment following diagnosis of VTE for all flying classes except for FC IIU. A FC IIU pilot must be stable on his/her anticoagulation medicine, followed by an anticoagulation management service and have a stable INR for at least 4 weeks prior to waiver consideration. A waiver will be considered after 3 months for primary VTE associated with a reversible, major risk factor, or for aircrew who are continuing therapy provided that they meet the following criteria:

1) The aviator must be followed by a specialized anticoagulation management service.
2) Airman must be non-world-wide qualified while on anticoagulation.
3) A multi-pilot cockpit is required for FC IIC waiver consideration.
4) Airman may not fly in a high-performance aircraft while on anticoagulation therapy.

AIMWTS review in May 2010 revealed that 84 individuals have been reviewed for waiver consideration for VTE. There were 5 FC I/IA cases, 42 FC II cases, 4 FC IIU cases, 27 FC III cases, 1 ATC/GBC case, and 5 SMOD cases. 25 of the 84 cases were disqualified; 4 were FC I/IA, 8 FC II, 2 FC IIU, 9 FC III, 1 ATC/GBC, and I SMOD. Of the 25 disqualified cases, 7 were disqualified for reasons other than VTE or anticoagulation purposes, two were disqualified for uncertain reasons, and the remaining 16 were disqualified due to the diagnosis and/or treatment. Anticoagulation therapy was approved for waiver consideration in 2006, and it is possible that some of those previously disqualified because of their long-term anticoagulation requirement would be eligible for a class FC IIC, FC IIU or FC III waiver today.

IV. Information Required for Waiver Submission.

The aeromedical waiver package should be submitted only after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for VTE should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the VTE event, the risk factors associated with the VTE and the course, duration and complications (if any) of anticoagulation treatment.
C. Current physical exam - should be focused on affected areas as well as signs suspicious for underlying malignancy.
D. Consultation is not routinely indicated, but may be helpful in the interpretation of potential thrombophilias. If so, Internal Medicine or Hematology/Oncology would be the appropriate consultant. If waiver is being submitted *on* warfarin therapy, then include a report from the anticoagulation service on the adequacy/compliance of treatment.
E. Labs: CBC, coagulation studies (PT, aPTT, INR), LFTs, verification of routine cancer screening to include PSA if male over age 50, antiphospholipid antibody screen if there is a high clinical index of suspicion (abnormal initial coagulation studies, thrombocytopenia or multiple premature deliveries or spontaneous abortions).
F. Imaging: Results of compressible ultrasound, CT, and/or pulmonary imaging studies used to diagnose the venous thromboembolism.

The aeromedical summary for waiver renewal for VTE should include the following:
A. Interval history.

B. All applicable physical exam, labs, and imaging tests as in the initial aeromedical summary.
C. Consultation from specialized anticoagulation management service if applicable.

ICD 9 codes for Deep Venous Thrombosis	
453	Venous embolism and thrombosis of deep vessels
453.40	Venous embolism and thrombosis of unspecified deep vessels of LE
415.1	Pulmonary embolism and infarction
415.11	Iatrogenic pulmonary embolism and infarction
415.19	Other pulmonary embolism and infarction

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WAIVER GUIDE
Updated: Mar 2012
Supersedes Waiver Guide of Feb 2008
By: Col John Lynch (RAM 12) and Dr Dan Van Syoc
Reviewed by Col John Gooch, chief of the ACS Ophthalmology branch

CONDITION:
Defective Depth Perception/Stereopsis (Mar 2012)

I. Overview.

The visual perception of depth or the third dimension is derived from the interpretation and integration of a number of monocular and binocular cues.[1] As such, defects or acquired abnormalities in any portion of the visual axis may adversely affect the perception of depth. Monocular depth perception relies on learned cues such as physical appearance of an object or the size relationship of objects. Examples of monocular cues include motion parallax and perspective. Although monocular cues to depth and distance are the primary cues utilized beyond 200 meters (m), they are subject to visual illusion.[2] The precision of monocular depth perception is highly variable, depending on stimulus, lighting and motion of the object, but is generally accepted to be inferior to binocular depth perception (stereopsis).

True binocular stereoscopic vision (stereopsis) represents the finest level of depth determination and refers to the interpretation of depth by detection and interpretation of retinal disparity.[3] The ability to discern depth accurately seems to develop at about three months of age in normal infants. However, this ability is dependent on accurate depiction of an image upon the retina of both eyes simultaneously, and upon the correct interpretation of that stimulus. Any disruption of accurate retinal imaging will adversely affect depth perception. Some individuals are unable to accurately perceive depth secondary to developmental abnormalities of the neuro-retinal pathway. The most common example of such a defect is childhood amblyopia (also called "lazy" eye), which includes strabismic amblyopia (a misalignment of the optical axis), anisometropic amblyopia (due to retinal image size disparity or clarity differences secondary to differential refraction between the two eyes) and deprivation amblyopia (from opacities or blockage of the optical media such as cataract, ptosis or uniocular retinal disorder). Some of these individuals may have transient misalignments of the visual axis sufficient to cause strabismic suppression of one of the misaligned images across such a small portion of the visual axis as to be undetectable by the individual, and detectable only with specific testing.[4] Similarly, acquired disorders, such as imperfect refraction or uniocular visual disruption from ocular conditions, such as a cataract, can adversely affect the depth perception in a previously normal individual. Sources of depth perception defects commonly seen among aviators and aviator applicants include defective ocular muscle balance, uncorrected refractive errors, microtropia, anisometropia and monofixation syndrome.

Although some defects in stereoscopic vision may be ameliorated with correction of the visual abnormality, individuals with corrected childhood amblyopia (by eye patching and/or strabismus surgery) still exhibit a high prevalence of reduced depth perception capability. History of strabismus surgery generally results in fluctuating exam results and variable levels of stereopsis which are prone to decompensate in the aerospace environment. These individuals will not be favorably considered for a waiver to enter aviation training.

Microtropia and monofixation syndrome represent defective forms of binocular vision in which there is preservation of peripheral extramacular fusion but the absence of central macular fusion and fine stereopsis.[5] This results from subtle misalignment of the eyes (microstrabismus), but can also occur in some individuals whose eyes appear straight. Patients with these conditions have the inability to use both foveas simultaneously (bifixation) and must resort to fixating with one eye at a time (monofixation). Failure to have simultaneous bifoveal fusion always results in degraded development of normal stereopsis.

Diagnosis of microtropia is based on the presence of a facultative macular scotoma, a stereopsis deficit (though it may be mild), and a tropia of less than or equal to 8 prism diopters of deviation. In monofixation syndrome no tropia is detected on cover tests.[6] Both microtropia and monofixation syndrome may either present with good visual acuity in the deviated eye, or with reduced best-corrected visual acuity (amblyopia). There is usually no treatment indicated for microtropias and monofixation syndrome. Near stereopsis tests should never be used alone to qualify any aircrew member since many microstrabismus cases may have defective distance stereopsis but normal near stereopsis and vice versa. Distance stereopsis capability is more important aeromedically.

The USAF utilizes the VTA-DP, or its newer replacement, the Optec 2300 (OVT-DP), for assessment of depth perception in aviators.[7] Passing this test requires the ability to discern depth based on a disparity of at least 25 seconds of arc (line D), although the test is capable of scoring as low as 15 seconds of arc (line F). The limit of human stereopsis capability is around 5 seconds of arc. The Verhoeff test, measured intermediate stereopsis test, is no longer authorized as a screening test for USAF aircrew. The AO Vectograph and Howard-Dolman tests are other distant stereopsis that are available, and are utilized by the Aeromedical Consultation Service (ACS) to determine the waiver potential for substandard stereopsis cases. The AO Vectograph is an approved low cost alternate test to monitor stability of stereopsis performance in defective depth perception waiver cases.[8, 9]

Test	**Passing Scores**
OVT-DP and VTA-DP	Line D, E or F
AO Vectograph	4/4 (60 arc secs); in some cases after ACS evaluation 3/4 (120 arc secs)

II. Aeromedical Concerns.

Stereopsis is generally not considered to be a factor in the perception of depth beyond 200 m. Monocular cues prevail beyond 200 m to facilitate perception of depth. In aviation, accurate perception of spacing or depth within 200 m is critical in a number of situations, such as aerial refueling, formation flying, holding hover rescue type operations, taxiing, and parking. Stereopsis also facilitates closure maneuvers and rejoins. Microtropia and monofixation syndrome may be intermittent in nature and susceptible to decompensation in the aerospace environment due to such exposure as relative hypoxia and fatigue over time.[10] Therefore, individuals need to be monitored throughout their aviation career. Fourth cranial nerve (superior oblique) palsy has been shown by ACS experience to more likely decompensate over time in aircrew with resultant diplopia than the horizontal microtropias.

III. Waiver Consideration.

All FC I/IA with VTA-DP or OVT-DP failure (unable to accurately read line D) who are otherwise qualified are required to either be evaluated or have the case reviewed by the Aeromedical Consultation Service (ACS). If these individuals meet waiver criteria they are placed in the Prospective Defective Stereopsis management group. As part of the Prospective Defective Stereopsis management group they will require an ACS case review of current local testing as outlined below prior to waiver renewal after completion of undergraduate pilot or navigator training.

All FC II and FC III aircrew positions that require depth perception to safely clear their aircraft from objects or other aircraft in the air or on the ground within 200 meters (scanner duties), e.g. boom operators, flight engineers, loadmasters and etc., who newly fail the annual required depth perception testing (VTA or OVT) or who have failed in the past and never been evaluated at the ACS for defective stereopsis are required to have an ACS review and possible evaluation before granting of waiver. These aviators will be placed into the ACS Monofixation/Microtropia management group rather than the Prospective Defective Stereopsis management group noted above.

At the annual preventive health assessment, if the trained aviator has previously failed the VTA or OVT, and has been ACS evaluated and waivered and can currently either pass the VTA or OVT, or achieve a passing score (60 arc sec) on the AO Vectograph distance stereopsis test, or achieve a previously waivered baseline score on the AO Vectograph (as determined by the ACS), no further workup is needed. If depth perception capability has declined from the previously waivered level or if binocular fusional control has diminished (i.e., onset of diplopia), full workup should be accomplished as outlined below in the Information Required for Waiver Submission section.

At waiver renewal accomplish tests as outlined below in Section IV. If depth perception capability has declined from previously waivered level or additional abnormalities are found, the ACS should review/evaluate prior to waiver renewal.

Defective depth perception is not waiverable for initial FC III applicants for the following career fields: 1A0, 1A1, 1A2, 1A3, and 1 A7.

For GBC/ATC personnel, only Tactical Air Control Party (TACP) ((1C4X1) and Air Liaison Officers ((13LX) are required to meet depth perception standards. There are no standards for SMOD personnel.

Table 1: Waiver potential for Defective Depth Perception

Flying Class (FC)	Waiver Potential Waiver Authority	Required ACS Review/Evaluation
I/IA	Yes[4] AETC	Yes[2]
II	Yes[4] MAJCOM	Yes[3]
IIU**	Yes*[4] AFMSA	Yes[3]
III[1]	Yes[4] MAJCOM	Yes[3]
ATC/GBC[5]	Yes*[4] MAJCOM	No
SMOD	N/A	N/A

1. Aircrew positions that require depth perception, e.g. boom operators, flight engineers, loadmasters, etc.
2. Member of the ACS Prospective Defective Stereopsis management group (review/evaluation initially and review after UPT, thereafter not required unless ACS determines to be at higher risk for decompensation, or if depth perception or tropia worsens from previously waivered level).
3. ACS review/evaluation required only if new failure on annual depth perception testing and never evaluated at the ACS for this or depth perception declined from previously waivered level or cases determined by the ACS to be at higher risk for decompensation.
4. If spectacles were needed to pass depth perception testing, regardless of unaided visual acuity (e.g. 20/20) then spectacles are required for aviation duties, to meet depth perception standards.
5. Only required for following career fields: 1C4X1 and 13LX.
* Waiver is unlikely for untrained personnel.
**AFMSA remains the waiver authority for all FC IIU cases.

A review of AIMWTS through 13 January 2012 showed 1356 cases of defective depth perception including history of defective depth perception in FCI/IA, II, IIU and III flyers, along with ATC/GBC and SMOD. Of the 171 defective depth perception cases disqualified, 73 were FCI/IA, 27 were FC II, 2 were FC IIU, 67 were FC III, 2 were for ATC/GBC and zero for SMOD.

In a 2005 retrospective study conducted by the Ophthalmology Branch of the ACS, 524 aviators were evaluated for defective stereopsis/depth perception. The final ACS diagnosis in this group ranged from a vergence or phoria in 31%, microesotropia in 29%, monofixation in 24%, microexotropia in 10% and vertical microtropia in 1%. The initial aircrew positions were divided among 345 FC II, 139 FC I/IA and 40 FC III. The outcome for these aviators after their initial ACS visit resulted in a 93% return to flying duties. Many of the waivered aviators shared a clinical history of subtle defects in depth perception not detected until late in their careers.

IV. Information Required for Waiver Submission.

The most common cause of an acquired depth perception defect is uncorrected refractive error. Depth perception testing should not be attempted until optimal correction has been achieved.

Failure of depth perception with best corrected visual acuity is disqualifying, but may be considered for waiver.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

A complete AMS with a local ophthalmologist/optometrist work-up to include all of the following is required for initial waiver consideration and first renewal waiver of Prospective Defective Stereopsis Management group (pilots just completing UPT).
A. Complete ocular history noting particularly any history of eye patching, spectacle wear at an early age, strabismus, eye surgery and previous depth perception testing performance.
B. Ductions, versions, cover test and alternate cover test in primary and six cardinal positions of gaze.
C. Optimal refraction with further testing, including repeat VTA-DP or OVT-DP, to be accomplished with best optical correction of any refractive errors, regardless of unaided visual acuity.
D. AO Vectograph stereopsis test at 6 meters (4 line version) (distant stereopsis)*
E. AO suppression test at 6 meters.
F. Randot or Titmus stereopsis test (near stereopsis tests).
G. Red lens test.
H. Four-diopter base-out prism test at 6 meters.
I. Direct/indirect macula and optic nerve exam.

***Note: Use only the American Optical (AO) version of the vectograph projection slide graded in 60 arc sec increments (60, 120, 180, 240 arc sec).**

The AMS for renewal of defective depth perception waiver (not including first renewal of Prospective Defective Stereopsis Management group (pilots just completing UPT) should include the following:
A. Summary of waiver history (including ACS eval) and pertinent findings (OVT-DP and AO Vectograph).
B. If fails OVT-DP then results of AO Vectograph.
C. If fails AO Vectograph (previous waived value) then eye exam listed above (B, E, F, G, H and I).

ICD 9 Code for Defective Stereopsis (Depth Perception)	
368.3	Other disorders of binocular vision

V. References.

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WAIVER GUIDE
Updated: Nov 2010
Supersedes Waiver Guide of May 2009
By: Maj Amy Gammill (ACS internist) and Dr. Dan Van Syoc
Reviewed by LtCol Tom Sauerwein, AF/SG Consultant in Endocrinology.

CONDITION:
Diabetes Mellitus (Nov 10)

I. Overview.

Diabetes mellitus is an endocrine disorder of blood glucose regulation leading to progressive hyperglycemia if left untreated. This disease is prevalent in many parts of the world, and in the U.S. the prevalence continues to rise. Over 23.8 million Americans (7.8% of the U.S. population) are currently estimated to have diabetes mellitus. Approximately 17.9 million people have been diagnosed with diabetes, while an estimated 5.9 million remain undiagnosed. Diabetes is primarily classified as type 1 or type 2, with the vast majority of cases falling into these two broad categories. Individuals who have hyperglycemia not sufficient to meet criteria for diabetes are still at increased risk for progression and should also be identified. These individuals may be categorized as having impaired fasting glucose (IFG) or impaired glucose tolerance (IGT), or their hemoglobin (Hgb) A1C may be above normal but below the threshold for diagnosis of overt diabetes. At least 57 million Americans are "pre-diabetic" and may develop clinical diabetes if the condition is not diagnosed and treated early.[1]

Type 1: Absolute insulin deficiency related to pancreatic beta cell destruction. In general these folks are younger and thinner, and many have a family history of autoimmune disease. This classification accounts for 5-10% of cases and occurs in <1% of the U.S. population.
Type 2: Characterized by insulin resistance and/or relative insulin deficiency. Traditionally called "adult-onset diabetes." Type 2 diabetes affects 6-7% of the U.S. population, and a family history is often present.
IGT, IFG, Hgb A1C 5.7-6.4%: Intermediate metabolic states between normal glucose homeostasis and diabetes.

In all cases of diabetes, the elevation in blood glucose results from the improper production and/or use of insulin by the body. Insulin is a hormone secreted by the pancreas to regulate blood glucose levels. In diabetes, insulin secretion either becomes deficient secondary to destruction of the pancreatic β-cells, or insulin resistance occurs.[2] Several pathogenic processes are involved in the development of diabetes, ranging from autoimmune destruction of the pancreatic β-cells with consequent insulin deficiency to abnormalities that result in resistance to insulin action. Regardless of the process involved, both type 1 and type 2 diabetes result in hyperglycemia.

The classic symptoms of hyperglycemia include polyuria, polydipsia, weight loss with or without polyphagia, and blurred vision, but the clinical presentation varies in both type 1 and type 2 diabetics. Some patients do not clearly fit either classification. In some individuals adequate glycemic control can be achieved with weight reduction, exercise, and/or oral glucose-lowering agents. Other individuals have some residual insulin secretion but require exogenous insulin for adequate glycemic control. Still other individuals with extensive β-cell destruction require insulin

for survival. Disease progression also varies considerably, and while some patients experience a late onset and slow progression of disease, other patients may progress rapidly.

Uncontrolled diabetes can lead to severe hyperglycemia with acute, life-threatening consequences such as ketoacidosis or nonketotic hyperosmolar syndrome. Diabetes mellitus also results in macrovascular and microvascular disease over time.[3] Examples of chronic complications of diabetes include atherosclerotic cardiovascular disease, nephropathy leading to renal failure, retinopathy with potential loss of vision, peripheral neuropathy with risk of foot ulcers, peripheral artery disease, cerebrovascular disease, and autonomic neuropathy causing gastrointestinal, genitourinary, and cardiovascular symptoms and sexual dysfunction. Generally, diseases of the coronary arteries, peripheral arteries, and carotid vessels are considered to be macrovascular in nature, while nephropathy, neuropathy, and retinopathy are microvascular complications. Because of the chronic morbidity secondary to diabetes, this disease accounts for almost 14 percent of U.S. health care expenditures, and over half are related to complications such as myocardial infarction, stroke, end-stage renal disease, retinopathy, and foot ulcer.[4] Diabetes is presently the sixth leading cause of death in the U.S., with about 50% of individuals with diabetes dying from coronary artery disease.[5]

The diagnosis of diabetes can be made in one of four ways, as listed in Table 1 below. In the absence of unequivocal hyperglycemia, the diagnosis should be confirmed on a subsequent day by repeat measurement, preferably using the same test.

Table 1. *Criteria for the diagnosis of diabetes mellitus[6]

1. Symptoms of diabetes plus random plasma glucose concentration $\geq$200 mg/dl. Random is defined as any time of day without regard to time since last meal. The classic symptoms of diabetes include polyuria, polydipsia, and unexplained weight loss.
2. FPG $\geq$126 mg/dL. Fasting is defined as no caloric intake for at least 8 hours.
3. Hgb A1C > 6.5%.
4. A 2-hr post-load glucose $\geq$200 mg/dL during an OGTT. The test should be performed as described by WHO using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.

*If any of the above criteria are met and confirmed on repeat testing, diabetes can be diagnosed.

Individuals with hyperglycemia who do not meet the above criteria are at increased risk for progression to overt diabetes. The American Diabetes Association defined three categories of increased risk (Table 2) in a 2010 executive summary addressing the standards of medical care in diabetes.

Table 2 – Categories of increased risk for diabetes ("pre-diabetes")[6]

Diagnostic Test/Criteria	Normal	Increased Risk ("Pre-diabetes")	Diabetes
Fasting Plasma Glucose	<100 mg/dL	≥100 and <126 mg/dL (IFG)	≥126 mg/dL
Oral Glucose Tolerance Test (2 hour plasma glucose)	<140 mg/dL	≥140 and <200 mg/dL (IGT)	≥200 mg/dL
Hgb A1C	<5.7%	5.7-6.4%	>6.5%

The importance of identification and treatment of "pre-diabetes" was highlighted by the Diabetes Prevention Program (n=3234) Study. In this study, eleven cases out of 100 person-years with impaired fasting glucose or impaired glucose tolerance developed type 2 diabetes within a 3-year period.[7] Conversely, of those who received lifestyle modification (diet and exercise), only five developed type 2 diabetes. Lifestyle interventions led to a 58% relative reduction in the incidence of diabetes. Obviously, prevention of the development of type 2 diabetes in the flyer with "pre-diabetes" is important for long-term health, but it can also help preserve a flying career. Early intervention with the appropriate lifestyle modifications is paramount. Suggested lifestyle interventions include referral to a dietician to achieve weight loss to an ideal body weight (if the patient is overweight) and a monitored exercise program.

In individuals who have developed type 2 diabetes, multiple aspects of the disease must be addressed to optimize treatment and limit micro- and macrovascular complications. Stable glycemic control should be established in accordance with American Diabetic Association guidelines (goal Hgb A1C < 7%).[6] Current treatment guidelines recommend metformin as first-line therapy in conjunction with diet and exercise. Aggressive control of cardiac risk factors is also warranted. In the Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) from the National Cholesterol Education Program (NCEP), diabetes is designated a coronary heart disease (CHD) equivalent. In other words, diabetes places a patient at similar risk for CHD events (such as myocardial infarction) as a history of CHD itself. Glycemic control alone will not eliminate the additional risk of CHD in diabetic subjects, and blood pressure and lipids should also be targeted. The NCEP ATP III recommends lowering the LDL below 100 mg/dL in diabetics. Triglyceride levels below 150 mg/dL and HDL levels greater than 40 mg/dL in men and greater than 50 mg/dL in women are also desirable.[8] The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommends a goal blood pressure of less than 130/80 mmHg in diabetics.[9] Per the ADA, aspirin (75 to 162 mg daily) should be considered for primary prevention of cardiovascular events in diabetics with a ten-year risk score, such as Framingham, greater than 10 % (generally, males > 50 years and females > 60 years with one additional cardiac risk factor).[10]

Diabetics should be screened on a regular basis for the microvascular complications of the disease: retinopathy, neuropathy, and nephropathy. A dilated retinal exam is recommended annually, as well as a comprehensive foot exam (visual inspection for lesions, assessment of pedal pulses and neurologic sensory testing, such as with a monofilament). The urine albumin-to-creatinine ratio should be measured once a year to screen for microalbuminuria (30 to 300 mg/day) or overt proteinuria (>300 mg/day).[6] Increased urinary protein excretion is an early marker of diabetic nephropathy, and it can be effectively treated with an angiotensin-converting enzyme (ACE)

inhibitor or an angiotensin II receptor blocker (ARB).[11,12] Glycemic control is also important for limiting diabetic nephropathy.[13]

As with patients with "pre-diabetes", those with overt diabetes should be counseled about lifestyle interventions. The importance of weight loss in overweight individuals and of regular exercise cannot be overstated. These changes not only help achieve glycemic control, but also improve many of the cardiovascular risk factors common in diabetics, such as hypertension and hyperlipidemia. Finally, individuals with pre-diabetes or diabetes who smoke must make every effort to stop, in particular to lower their risk of cardiovascular disease.

As the prevalence of diabetes increases in the general population, the likelihood that it will affect the aviation community also increases. In the past, commercial and military pilots have not been allowed to fly with diabetes requiring either insulin or oral medications due to the concern for hypoglycemia with these therapies (and the associated risk of degraded performance or incapacitation). More recently, civil aviation regulations have been updated to allow many pilots with diabetes to be medically certified to operate specific commercial aircraft while on medical management for glycemia, including oral hypoglycemics and even insulin.[14] In the U.S. Air Force, diabetic aviators who are well-controlled with diet and exercise are allowed unrestricted waiver for flying duties. Cardiovascular risk factors must be optimized to the targets set by current guidelines, and appropriate screening for micro- and macrovascular complications of diabetes must be up-to-date for waiver consideration. Aviators who require metformin for glycemic control may also be considered for waiver, but this will be restricted to exclude single-seat aircraft for pilots.

In a recent double-blind, placebo-controlled, 54-week study of metformin and sitagliptin, hypoglycemia was reported at a rate of less than 1% in patients on metformin alone.[15] Vitamin B12 deficiency may occur in some patients taking metformin long-term, a less known but well-established side effect. Metformin reduces intestinal absorption of vitamin B12 in up to 30 percent of patients and lowers serum vitamin B12 concentrations in 5 to 10 percent, although megaloblastic anemia is uncommon.[16] Lactic acidosis is extremely unlikely in those without chronic kidney disease or other significant co-morbidities.[17] Aviators on metformin should simply be monitored with an annual renal panel and a CBC or B12 level. In any diabetic patient who develops neuropathy, B12 deficiency should be investigated before diabetic neuropathy is assumed if the patient is on metformin.

Metformin is the only diabetic medication approved for use in U.S. Air Force flyers (approved by Aircrew Standards Working Group and Corporate Board in Aug 2010). If an aviator is started on Metformin for IFG or IGT, that aviator will also require a waiver for the medication usage, but not for the diagnosis. Other oral agents are not approved, nor is insulin, due to the risk for hypoglycemia even in the best of circumstances. While subcutaneous insulin pumps allow for tight control of blood glucose, hypoglycemia is still a significant concern with this therapy and waiver is not allowed for Air Force aircrew.[18]

II. Aeromedical Concerns.

There is limited evidence for a direct relationship between individuals with diabetes and the occurrence of aviation accidents. Of primary concern is the risk for hypoglycemia in diabetics who require medication to control their blood glucose. Symptoms of hypoglycemia include excess perspiration, shakiness, nervousness or anxiety, dizziness and/or lightheadedness, sleepiness, confusion, difficulty speaking, and weakness. These symptoms are likely with moderate to severe hypoglycemia and are incompatible with flying duties. Prolonged hyperglycemia is an additional concern as it can cause polyuria, dehydration, nausea, fatigue, and changes in visual acuity. Diabetics are at increased for coronary artery disease and related cardiac events, such as myocardial infarction, syncope due to arrhythmia, or stroke.

III. Waiver Considerations.

Diabetes mellitus is disqualifying for all flying duties, as well as for RPA duties (FC IIU) and ATC/GBC duties. It is not listed as disqualifying for SMOD duties, but is disqualifying for retention, therefore requires a waiver.

1. Type 1 diabetes mellitus: Waiver will not be considered.
2. Type 2 diabetes mellitus:

FC I: Waiver will not be considered.
FC II, IIU, III, and ATC/GBC: A waiver will be considered if there is evidence of *good control on diet alone or with metformin. The waiver will reflect the limitations, if any, imposed by the MEB. Those applying for initial training for FC II, IIU, III, ATC/GBC, and SMOD will not be considered for a waiver.
3. Categories of increased risk for diabetes (IGT, IFG, and borderline Hgb A1C): Not disqualifying, no waiver required, unless being treated with Metformin, which does require a waiver.

*Good control is defined as listed below:
A. Fasting blood glucose < 126 mg/dl (report quarterly data points).
B. Hgb A1C < 7% (report bi-annual data points unless therapy changed w/in one year).
C. Lipid panel targeted to NCEP guidelines, currently LDL < 100 mg/dL (annual).
D. Blood pressure controlled to JNC guidelines, currently < 130/80 mmHg.
E. No diabetes-related complications that interfere with safety of flight / mission completion.

Note: Type 1 and 2 diabetes mellitus are disqualifying for continued military service and require a Medical Evaluation Board (MEB). Aircrew will not be considered for waiver until the MEB has been initiated.

Table3: Waiver potential for Diabetes Mellitus

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Type 1 or 2 DM, requiring insulin or oral medication (incl metformin)	No AETC	No
	Type 2 DM, not requiring medications	No AETC	No
II/III ATC/GBC/ SMOD*	Type 1 or 2 DM, requiring insulin or oral medications other than metformin	No# MAJCOM	No
	Type 2 DM, controlled by diet/exercise or requiring metformin for control	Yes†!# MAJCOM***	Yes
IIU*	Type 1 or 2 DM, requiring insulin or oral medications other than metformin	No AFMSA	No
	Type 2 DM, on metformin or not requiring medications	Yes AFMSA	Yes

† Initial waiver duration will be 1 year. If stability is noted at time of waiver renewal, then a 3-year waiver duration is generally appropriate. No indefinite waivers for any type of diabetes.
! FC IIC waiver (no single-seat aircraft) if on metformin. Unrestricted waiver possible if diet-controlled.
*Initial FC IIU and ATC/GBC certification requests are sent to AETC; AFMSA will be the waiver authority for same.
**Even though no waiver is required, MEB action is still mandatory for SMOD personnel.
*** Initial waiver for these aviators is AFMSA, and MAJCOM thereafter.
#AFSPC or GSC waiver authority for SMOD depending on assignment with AFSPC for all initial cases.

A review of the AIMWITS database through September 2010 for DM revealed a total of 193 individuals with an aeromedical summary containing the diagnosis of DM. Of the total, 33 were Type I DM and all but two (both SMOD cases) were disqualified (this is NOT current SMOD policy!). The remaining 160 cases were Type II DM. Within the Type II subset, there were no FC I/IA or FC IIU cases, 67 FC II cases (36 disqualifications), 76 FC III cases (46 disqualifications), 13 ATC/GBC cases (6 disqualifications), and 4 SMOD cases (2 disqualifications). This resulted in a total of 90 disqualifications for Type II DM, most due to the need for an oral hypoglycemic agent (Note that Metformin has recently been approved for use in USAF aircrew).

IV. Information Required for Waiver Submission:

Waiver should only be submitted after the MEB process has been initiated and the member has achieved good control (as previously defined in this waiver guide). Waiver will not be considered

until member has been on metformin for at least 30 days. Waiver modification for dosage increase requires two weeks DNIF prior to waiver submission.

The aeromedical summary for initial waiver for diabetes mellitus must include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History – include symptoms on presentation, dietary history, family history, list of all cardiac risk factors (including smoking and family history of CHD), documentation of appropriate dietary, weight loss and diabetic counseling.
C. Physical – complete physical exam including blood pressure, weight and diabetic foot exam.
D. Endocrinology or Internal Medicine consult.
E. Labs – BUN/Cr, urine albumin-to-creatinine ratio, fasting lipid panel, Hgb A1C and fasting glucose levels. Renal panel and CBC or B12 level if on metformin.
F. Reports of most recent annual eye exam (including dilated retinal exam).
G. ECG.

The aeromedical summary of waiver renewal of diabetes should include the following:
A. History – interim history, changes in weight or diet, medication changes since last waiver.
B. Physical – include blood pressure, weight and diabetic foot exam.
C. Endocrinology or Internal Medicine consult.
D. Labs – Hgb A1C, fasting blood glucose, urine albumin-to-creatinine ratio, BUN/Cr, lipid panel. Renal panel and CBC or B12 level if on metformin.
E. Annual dilated eye exam report.

ICD9 Code for Diabetes Mellitus	
250	Diabetes mellitus

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WAIVER GUIDE
Updated: Jan 09
By: Maj Christopher Hudson (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Diverticular Disease of the Intestine (Jan 09)

I. Overview.

Diverticular disease is nearly exclusive to western developed countries. The disease pattern occurs mostly in the left side of the colon and more than 90% of patients have sigmoid and descending colon involvement[1]. The descending, transverse, and ascending portions of the colon are involved in decreasing order of frequency. Diverticulosis is rare in undeveloped nations and Asian nations, and if present, it tends to be a right side predominant disease[2]. Historically, population-based studies show that diverticular disease has less than a 5% incidence in persons less than 40 years old but the incidence increases rapidly thereafter. Approximately 60% of the general population develops disease by the age of 80[3]. More recent studies indicate an increasing prevalence of diverticular disease, especially in patients under the age of 50[4]. In addition to low dietary fiber intake, elevated BMI and physical inactivity have been linked to diverticulitis[5].

The pathogenesis of diverticular disease requires defects in the colonic wall caused by increased intraluminal pressure. This is commonly seen in western diets that are low in fiber and high in fat. This translates to less bulky stools and higher intraluminal pressures. There are two types of diverticula. The most prevalent are the pseudodiverticula that occur in the sigmoid colon. The prefix pseudo- indicates that they are not complete herniations of the bowel wall, but rather small protrusions of the colonic mucosa through openings in the circular muscle layer where the nutrient blood vessels penetrate the colon wall. Right sided lesions are true diverticula and much less common.

Diverticulosis is asymptomatic in 80% of individuals. The remaining 20% can be divided into two categories: symptomatic diverticulosis and diverticulitis[6]. Symptomatic diverticulosis is characterized by episodic pain, altered bowel habits and a lack of inflammation. Barium studies may outline the diverticula and reveal an underlying motility disorder. Symptomatic diverticulosis may mimic irritable bowel syndrome as well as diverticulitis, so must be differentiated from other causes of rectal bleeding such as carcinoma. Colonoscopy is recommended to rule out neoplastic disease. Recommended medical treatment includes a high-fiber diet consisting of wheat bran and/or commercial bulking agents. Analgesics should be avoided but, if necessary, non-opioid medications are preferred as morphine could increase intracolonic pressure.

Diverticulitis typically consists of nausea, abdominal pain, left lower quadrant tenderness with mass, fever, leukocytosis, and characteristic radiological signs. Plain abdominal films can identify free air in the abdomen indicative of perforation. A CT scan with oral and intravenous contrast is the preferred imaging modality for confirming the diagnosis. Treatment is based on the overall health of the patient and the severity of the disease. Stable, uncomplicated patients who tolerate clear liquids can be treated as outpatients on oral antibiotics. Older patients, those with comorbid conditions, and anyone unable to tolerate oral fluids should be hospitalized with IV antibiotics and fluids. Those with complications such as perforation, abscess formation, fistulization, sepsis or

partial obstruction should be hospitalized for medical and/or surgical treatment. About 10% of hospitalized patients require surgical treatment[1].

After the first episode of acute diverticulitis, approximately 25% of medically treated cases will experience a recurrence[2]. With each additional recurrence, the risk of further recurrence and complications increases. In addition to a high fiber diet, physicians have stressed the avoidance of nuts, seeds and popcorn to reduce the risk of recurrent disease. Recent studies[7] have refuted this notion as a cause of diverticular complications, and these dietary restrictions should no longer be recommended. Historically, surgical resection of the affected colon was recommended after the second uncomplicated episode of acute diverticulitis in those over 50 and after the first episode in those under 50. This was based on studies showing younger patients with more virulent disease and a greater overall risk of recurrence due to a longer lifespan. However, new data has questioned these assumptions and the decision to perform an elective colectomy should be determined based on each patient's own set of circumstances and treatment preference. Such patients should be counseled on the risks and benefits of accepting or declining elective hemi-colectomy for diverticular disease as several studies have shown that up to 25% of patients experienced persistent symptoms after elective surgery[8, 9].

For patients with complicated diverticulitis requiring hospitalization, as well as patients seeking prophylactic colectomies, several surgical options are available. Percutaneous drainage of abscesses can obviate the need for open colectomy in the acute setting. For those requiring colostomy, laparoscopic colon resection has been shown to be as safe and effective, with less complications and shorter hospital stays[10]. The need for staged procedures with initial colostomies is also being questioned, with primary anastamosis now viewed as a safe and acceptable option in some cases.

II. Aeromedical Concerns.

There is a minimal risk of in-flight physical incapacitation. Altered bowel habits, episodic pain, nausea, and flatulence could be a distraction and affect crew availability, both for those with symptomatic diverticulosis and those experiencing complications after partial colectomy. Once resolved and stable, returning the pilot to flying duties should not present a hazard to flying safety, the individual's health, or mission completion[11, 12].

III. Waiver Considerations.

Symptomatic diverticulosis or diverticulitis is disqualifying for all flying duties in the US Air Force. Before waiver consideration, aviators should have complete resolution of symptoms and be taking no medications incompatible with flying.

Table 1: Symptomatic diverticulosis and diverticulitis and waiver potential

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	History of symptomatic diverticulosis or diverticulitis, resolved+	Yes AETC	Maybe#
	Symptomatic diverticulosis or diverticulitis	No AETC	Maybe#
II, including untrained	History of symptomatic diverticulosis or diverticulitis, resolved+	Yes MAJCOM*	Maybe#
	Symptomatic diverticulosis or diverticulitis	No MAJCOM*	Maybe#
III, including untrained	History of symptomatic diverticulosis or diverticulitis, resolved+	Yes MAJCOM*	Maybe#
	Symptomatic diverticulosis or diverticulitis	No MAJCOM*	Maybe#

*waiver authority for untrained aviators is AETC
+can consider indefinite waiver for untrained aviators with remote history of diverticular disease
#ACS evaluation at discretion of waiver authority

A review of AIMWTS through the end of October 2008 showed 52 cases of diverticulitis; one FC I, 33 FC II and 18 FC III. Of the 52 cases, none were disqualified for diverticulitis. However, three were disqualified for unrelated medical conditions; two FC II and one FC III. There were no cases of symptomatic diverticulosis or any disqualifications related to symptoms after surgical treatment for diverticulitis.

IV. Information Required For Waiver Submission.

No waiver is required for the incidental finding of asymptomatic diverticulosis.

The aeromedical summary for initial waiver for diverticular disease should include the following:
A. Complete history of the problem to include all consultants seen, medications used and procedures, if any.
B. Physical exam results.
C. Labs – evidence of no rectal bleeding; any colonoscopy results, if performed
D. Gastroenterology or surgical consultation reports to include any imaging studies.
E. Current treatment to include all medications and dates started.
F. Detail of all other medical problems, if applicable.

The aeromedical summary for waiver renewal for diverticular disease should include the following:

A. Updated history since last waiver
B. Physical exam results.
C. Labs – any new labs, imaging tests and colonoscopy results since last waiver.
D. Any pertinent consults and study results.
E. Current treatment to include all medications and dates started.

Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology.

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WAIVER GUIDE
Initial Version: Nov 09
By: Capt Ryan Davis (ACS Ophthalmology branch) and Dr Dan Van Syoc

CONDITION:
Dry Eye Syndrome (Nov 09)

I. Overview.

Dry eye syndrome refers to a group of disorders of the tear film that are either due to reduced tear production (aqueous tear dysfunction, ATD) or excessive tear evaporation (evaporative tear dysfunction, ETD).[1] It is often associated with ocular discomfort and/or visual symptoms and may cause disease of the ocular surface.[2] Many affected individuals complain of eye discomfort, burning, irritation, photophobia, blurred vision, foreign body sensation, contact lens intolerance, and an inability to produce emotional tears.[3] Dry eye syndrome is a fairly common disease, particularly among older individuals. Current estimates are that it affects approximately 1.0 to 4.3 million people in the 65 to 84 year old age group. Along with older age, female gender and smoking have been identified as risk factors for this condition. Other identifiable risks are arthritis and other autoimmune disorders, hormone replacement therapy, a history of refractive surgery, Vitamin A deficiency, radiation therapy, rosacea, and Hepatitis C infection.[2, 4] A study in 2000 found decreased quality of life for all severity levels of dry eye syndrome, with an effect on quality of life for severe dry eye comparable with that reported for moderate angina.[2]

The ocular tear film is composed of three layers: an outermost lipid layer, an aqueous tear fluid middle layer, and a mucous coating of the epithelium (the inner layer). A deficiency of any layer can result in dry eye syndrome. There are many causes of dry eye syndrome as listed below.[5]

Table 1 – Causes of Dry Eye Syndrome

Layer	**Outer (Lipid)**	**Middle (Aqueous)**	**Inner (Mucin)**
Source	Meibomian glands (minor contribution from glands of Zeis and Moll)	Accessory and main lacrimal glands	Goblet cells of conjunctiva
Cause	Chronic blepharitis Radiation	Bilateral: Congenital lacrimal gland absence Cri du chat syndrome Keratoconjunctivitis sicca Riley-Day Syndrome Multiple endocrine neoplasia Congenital alacrima Systemic autoimmune disease (e.g. rheumatoid arthritis) LASIK Unilateral: Seventh cranial nerve paresis Viral dacryoadenitis Lacrimal gland injury or radiation Anhidrotic ectodermal dysplasia	Hypovitaminosis A Ocular pemphigoid Cicatricial conjunctivitis Stevens-Johnson Syndrome Chemical and thermal burns Drug-induced Trachoma

Dry eyes constitute a significant portion of the symptom profile of many diseases. Sjögren syndrome is one of the three most common systemic autoimmune diseases, afflicting as many as 1 to 2 million Americans, and is defined by the quatrad of ATD, anti-nuclear antibodies, hypergammaglobulinemia, and rheumatoid arthritis.[1] It primarily affects middle-age women and has a mean age of onset of 52.7 years. The pathogenesis of the syndrome is obscure and the classic presentation of the syndrome is the combination of dry eyes and dry mouth. The histological hallmark of Sjögren syndrome is lymphocytic infiltration of the exocrine glands leading to acinar gland degeneration. There is no cure and treatment focuses on relieving the disease symptoms.[6] Dry eye syndrome can also be seen in previously undiagnosed thyroid eye disease (TED). Most TED patients have normal aqueous production and the mechanism of dry eye symptoms in TED remains unclear.[7]

Dry eyes following corneal refractive surgery (specifically PRK and LASIK) can be a significant problem. During the LASIK procedure trigeminal afferent sensory nerves are severed. Afferent corneal nerves are critical in the tearing process as they signal the need for more tears. The nerves are also damaged with PRK, but the symptoms are less common following PRK and the re-innervation process is quicker after PRK since the ablated nerve endings are located close to the epithelial surface.[8]

In addition to the decreased quality of life from eye irritation, dry eye patients often report vague problems such as sensitivity to light, a decrease in reading ability, night driving difficulties, or ocular fatigue. A common clinical finding in dry eye syndrome is a decreased tear breakup time. This can result in a substantial interblink degradation of vision. A tear break-up time of less than ten seconds is highly suggestive of mucin-deficient dry eyes.[5] Individuals with this deficiency tend to blink more frequently to compensate, which leads to increased eye fatigue[4]. In fact, dry eye syndrome is recognized as a growing public health problem and one of the most frequent reasons for seeking eye care. Associated symptoms lead to problems with common tasks such as computer use, professional duties, as well as watching television and spectator sports.[9]

An attempt to grade severity of dry eye symptoms is depicted in Table 2. The results of this grading scheme may drive the level of treatment. However, symptoms of dry eye syndrome do not necessarily reflect the severity of the disease. The lack of concordance between signs and symptoms presents a problem not only in the diagnosis but also in the construction of a treatment plan and when designing adequate clinical trials.[4]

Table 2 - Dry Eye Disease Severity Grading Scheme[4]

Dry Eye Severity level	**1**	**2**	**3**	**4**
Discomfort, severity, and frequency	Mild and/or episodic; occurs under environmental stress	Moderate, episodic, or chronic; stress or no stress	Severe, frequent, or constant without stress	Severe and/or disabling and constant
Visual Symptoms	None or episodic mild fatigue	Annoying and/or activity-limiting, episodic	Annoying, chronic, constant limiting activity	Constant and/or possibly disabling

Conjunctival injection	None to mild	None to mild	Mild	Moderate to Severe
Conjunctival staining	None to mild	Variable	Mild to Moderate	Marked
Corneal staining(severity/ location)	None to mild	Variable	Marked central	Severe punctuate erosions
Corneal tear signs	None to mild	Mild debris, decreased meniscus	Filamentary keratitis, mucus clumping, increased tear debris	Filamentary keratitis, mucus clumping, ↑ tear debris, ulceration
Lid/meibomian glands	MGD variably present	MGD variably present	Frequent	Trichiasis, keratinization, symblepharon
TBUT (seconds)	Variable	$\leq$ 10	$\leq$ 5	Immediate
Schirmer score (mm tears/5 minutes)	Variable	$\leq$ 10	$\leq$ 5	$\leq$ 2
MGD = meibomian gland disease TBUT = tear film break-up time				

The physical exam for patients with symptoms of dry eye includes a visual acuity measurement, an external examination, and slit-lamp examination. The slit lamp exam can identify a decreased tear meniscus along the lower lid margin, an increase in corneal tear film debris, viscous mucin threads, scurf along the lid margins, inspissated or clogged meibomian glands, or other indications of dry eyes.[5] Bulbar conjunctival hyperemia is also a common finding, and it is important not to confuse a "red eye" due to contact lens overuse or infection as a chronic dry eye. In addition, further diagnostic testing should include tear film break-up time, ocular surface dye testing (with rose Bengal, fluorescein, or lissamine green) and the Schirmer tests.

The Schirmer test reflects the adequacy of the aqueous layer only. The tests consist of three basic measurements: Schirmer's test I (measures total basic and reflex tear secretion), basic secretion test (measures basic tear secretion), and Schirmer's test II (measures reflex tear secretion). The Schirmer tests need to be done after any ocular-surface dye staining as they can disrupt tear film stability.[5]

Dry eye syndrome is a difficult condition to treat. Any known causative factors must be identified and addressed. It is important to set realistic therapeutic goals with the patient and to educate them on the nature of their disease process and its prognosis. Early treatment usually involves artificial tear agents. As the severity of the disease progresses it may become increasingly impractical to use them with the increased need. Non-preserved tear substitutes are preferred in most cases. For moderate to severe disease, tear substitutes will not be sufficient to alleviate symptoms. Topical cyclosporine 0.05% (Restasis®) has been used very effectively for the past ten years and has shown significant improvements in both subjective and objective measures. Its action is thought to occur through its effect on reducing subconjunctival and lacrimal gland inflammation.[10] Decreasing the inflammatory component of the dry eyes tear film decreases the destruction of lacrimal acini and increases neural responsiveness (and hence improves lacrimal secretion).[1] Cyclosporine has been

approved for aircrew duties with waiver; however, it cannot be used with punctal plugs in place or while using contact lenses. Other therapeutic options include topical corticosteroids, systemic omega-3 fatty acids, vitamin A eye drops, and application of a lipid layer to lid margins.[11] Cholinergic agents such as pilocarpine can be very effective in severe cases and with Sjögren's syndrome.[2] However, artificial tears, punctual plugs and Restasis are the only current waiverable options for treatment of mild to moderate dry eye syndrome. Severe cases and those requiring other therapeutic options are not eligible for waiver.

Surgical options include punctal occlusion and blepharoplasty.[1,5] Temporary punctual occlusion can be obtained by placing collagen or silicone plugs in the puncti bilaterally. Permanent closure of the puncti can be performed with cauterization. This should only be done on patients with severe dry eyes and should be a joint decision made between the patient and their ophthalmologist.[5] If the underlying cause of the dry eye symptoms is a lid abnormality such as entropion or ectropion, surgical correction can correct the eyelid malposition and decrease dry eye symptoms.[2,8] Another surgical option is to reduce the palpebral aperture through a lateral or medial tarsorrhaphy.

II. Aeromedical Concerns.

The aeromedical issues relate to the subjective annoyance of dry eye symptoms and also with visual performance decrements. In more severe cases individuals can have significant visual impairment and should not participate in military aviation duties. The dry air of most cockpits will exacerbate symptoms in most affected airmen. The increase in use of contact lens among aircrew has significantly increased the incidence of dry eyes, and it is vitally important that new dry eye medications are not inappropriately used to treat contact lens intolerance or contact lens related dry eyes. Most artificial tear drops are safe in the aviation environment, as are punctal plugs if declared stable by the treating ophthalmologist.

III. Waiver Consideration.

Dry eye is disqualifying for all classes of flying per AFI 48-123. Quality of vision can easily be compromised with chronic dry eye syndrome, so visual acuity standards apply. Generally, Grade 1 Dry Eye Syndrome does not require waiver action as it is easily controlled by lid hygiene and occasional use of artificial tears. Grade II and III dry eyes would require waiver action if controlled with artificial tears, waiverable topical medications, or punctual plugs. Chronic topical steroids should not be used to treat Dry Eye Syndrome due to the associated complications and is not a waiverable treatment for aircrew. Grade IV Dry Eye Syndrome would generally not be waiverable.

Table 3: Waiver potential for Dry Eye Syndrome

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Yes* – Grade 1 only (may not be considered disqualifying) No – Grade 2 or worse AETC	At the request of AETC
II	Yes* – Grade 2 and 3 No – Grade 4 MAJCOM	At the request of the MAJCOM
IIU	Yes* – Grade 2 and 3 No – Grade 4 AFMSA	At the request of AFMSA
III	Yes* – Grade 2 and 3 No – Grade 4 MAJCOM	At the request of the MAJCOM

* Vision needs to be stable and the flyer cannot be on any medication not approved for aircrew use.

AIMWTS review in Aug 09 revealed a total of 11 cases submitted for waiver consideration with the diagnosis of dry eye. This included 1 FC I case, 6 FC II cases, and 4 FC III cases. There were 3 disqualifications, all from the FC II category. One case had severe keratitis resulting in surgery and the need for chronic medication to treat the resultant severe dry eyes; another had dry eyes secondary to LASIK and had punctual plugs inserted and will probably resubmit a waiver if the dry eye symptoms improve, and the third was disqualified secondary to rheumatoid arthritis (the suspected cause of the dry eyes). Interestingly, two waived cases (one FC II and one FC III) were being treated with cyclosporine eye drops, not a waiverable medication at the time of their waiver requests.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical assessment has been completed and all appropriate treatments have been initiated using current clinical guidelines/recommendations. **All Dry Eye Syndrome cases treated with Restasis will require waiver approval to return to flight duties**.

The aeromedical summary for an initial waiver for dry eye syndrome should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History – history of all dry eye symptoms; any underlying causative factors, all treatments attempted and effectiveness of the therapy (medical and surgical), and any impact on job/daily life. History of contact lens use, including length and pattern of wear must be included in history.
C. Physical – full eye exam to include visual acuity measurement, an external examination, and slit-lamp examination. In addition, include results of the tear film break-up time, ocular surface dye testing, and the Schirmer test.
D. Ophthalmology consultation report (cornea specialist preferred).

Waiver renewal, if necessary, requires an interval AMS with particular attention to clinical changes.

ICD 9 code for Dry Eye Syndrome	
375.15	Dry eye syndrome

Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Feb 2008
By: Dr Dan Van Syoc
Reviewed by Col Anthony Propst, AF.SG consultant for OB/GYN

CONDITION:
Dysmenorrhea (Mar 11)

I. Overview.

From the Greek "bad-monthly-flow," dysmenorrhea is pain with menstruation. The prevalence of dysmenorrhea is estimated at 40-90% of women, with 15% of adolescent females reporting severe dysmenorrhea.[1, 2] It is considered the leading cause of absenteeism from work or school in female adolescents and young women.[1] Dysmenorrhea is recurrent, crampy lower abdominal pain that occurs during menses. Dysmenorrhea is classified as either primary or secondary based on the absence or presence of an underlying cause. . Primary dysmenorrhea occurs in patients with normal anatomy and without a known cause of pain. Symptoms also may include low back and thigh pain, sweating, tachycardia, headaches, nausea, vomiting, diarrhea, and tremulousness. The symptoms begin just before or during menses, lasting 12 to 72 hours. Primary dysmenorrhea begins with menarche, usually once ovulation starts.[2] Most adolescents experience dysmenorrhea in the first 3 years after beginning menses. Nulliparity (also no prior vaginal deliveries), smoking and heavy menstrual flow are risk factors for dysmenorrhea. Dysmenorrhea improves in most women after a full-term pregnancy.[2, 3]

Secondary dysmenorrhea is associated with pelvic conditions that cause pelvic pain in conjunction with menses, such as endometriosis, adenomyosis, uterine fibroids, and chronic pelvic inflammatory disease. The onset of secondary dysmenorrhea is usually in the patient's 20s to 30s, after relatively painless menstrual cycles in the past. Symptoms can occur at times other than during menses.[3]

A. Pathophysiology – primary dysmenorrhea.

The release of prostaglandin by the endometrium causes the symptoms associated with the menstrual period. The direct effects of prostaglandin on the uterus itself cause ischemia and intense contractions, thus the symptoms of cramping, lower abdominal pain or inner thigh pain. Prostaglandin in the bloodstream causes systemic symptoms, such as headache, nausea, diarrhea and myalgias. However, for this cascade of events to occur, prostaglandin must be produced and activate receptors.[4, 5]

In short, in order for the endometrium to release prostaglandin, estradiol from a developing ovarian follicle stimulates endometrial growth. After ovulation, progesterone from the corpus luteum, converts the endometrium to the secretory phase, and when the progesterone levels drop, the menstrual period begins. Lastly, in order for the released prostaglandin to have an effect, it has to activate prostaglandin receptors. Women with very severe dysmenorrhea appear to both produce more prostaglandin and have more receptors. Conversely, if the cycle is anovulatory (decreased estradiol and progesterone) there is usually little pain.

B. Pathophysiology – secondary dysmenorrhea.

It is useful to view secondary dysmenorrhea as a mechanical problem of the uterus, or as something not involving the uterus at all. Polyps or fibroids in the uterine cavity may cause increased cramping as the uterus tries to push these out. Fibroids or endometrial glands invading the uterine muscle (adenomyosis) may disrupt the blood flow and the uterus may be far more susceptible to ischemia. Endometrial tissue outside of the uterus and growing on the abdominal/pelvic peritoneum (endometriosis) bleed at the time of the menstrual period, causing peritoneal pain. Varicosities in the uterine blood vessels can interfere with uterine blood flow (pelvic congestion syndrome). Cervical stenosis is narrowing of the cervical canal, usually at the level of internal os, which impedes the menstrual flow and thus uterine pressure increases at the time of menses. Severe cramping of the intestines (e.g., irritable bowel syndrome) can be worse during the menstrual period, and misdiagnosed as dysmenorrhea.[4, 5] This waiver guide primarily deals with primary dysmenorrhea; see Uterine Fibroid, Endometriosis, and Pelvic Inflammatory Disease waiver guides for disposition of secondary dysmenorrhea.

C. Treatment.

Understanding the mechanisms above helps clarify the treatment options.

1. Reduce the endometrium. Less endometrium means less prostaglandin produced. Use of hormonal contraceptives, such as oral contraceptives (OCs), Nuva-Ring®, Ortho Evra® patch, Implanon®, or Depo-Provera® result in less endometrium. The estradiol in the combined oral contraceptives prevents ovarian follicle development and results in less ovarian estradiol to stimulate the uterine lining. OCs relieve the symptoms of primary dysmenorrhea in 90% of individuals treated.[3] Progestins also block estrogen receptors and thus inhibits endometrial growth. Contraceptives such as the intrauterine devices (IUDs) containing progestin (Mirena®) are also effective in reducing dysmenorrheal with approximately 50% reduction in prevalence.[6] Contrarily, IUDs without hormones may increase symptoms.

2. Prevent endometrial shedding. The progesterone-primed endometrium does not produce prostaglandin until the progesterone is withdrawn. If the progesterone is not withdrawn, then the uterus does not slough the endometrium and no release of prostaglandin occurs. Continuous progestin exposure, such as Depo-Provera® or continuous (without the one-week pause) cycles of an oral contraceptive, the ring, or the patch, work well for this. The disadvantage of continuous hormone contraception is breakthrough bleeding.

3. Prevent the prostaglandin production. Prostaglandin is not stored, but released at the time of the menstrual flow. Prostaglandin synthesis inhibitors, such as non-steroidal anti-inflammatory drugs (NSAID) and cyclooxygenase (COX-2) inhibitors reduce prostaglandin production. Therefore, these medications should be taken the day before the period begins or as soon as possible once the period begins to be effective. The levels need to stay elevated during the peak flow days, which is generally only 1-2 days. The doses used are at the upper limits for the drugs; typically ibuprofen 800 mg q 6-8 hours, naproxen 500 mg initially and then 250 mg q 6-8 hours, or mefenamic acid 500mg loading dose followed by 250mg q 6 hours.[3] NSAIDs provide relieve in 72% of treated women.[6]

4. Combinations. Most women do well using either NSAIDs or hormonal contraceptives, but some need to combine the two therapies. If hormonal and NSAIDs do not control the symptoms then further evaluation for secondary dysmenorrhea should occur.

5. Surgical. Women with primary or secondary dysmenorrhea that is not responsive to medical therapy should see a gynecologist for further evaluation to search for other causes of pelvic pain such as endometriosis. In the very rare condition when primary dysmenorrhea does not respond to medications and childbearing is not a consideration, the uterus can be removed. If the patient desires to preserve her uterus and the severe dysmenorrhea does not respond to medical management, cutting the pain nerves to the uterus (e.g., presacral neurectomy) has been shown to help some patients.[6]

6. Other. There are other modalities that are commonly used by primary care physicians as well as gynecologists that can be very efficacious. Locally applied heat can be as effective as oral analgesics for relief of pain. There are a few studies indicating that some dietary and vitamin regimens can reduce the severity of menstrual pain, but data is not yet conclusive. Other researchers have shown that exercise reduces menstrual symptoms as well. Behavioral interventions biofeedback and relaxation techniques are useful with some women. Use of alternative medicine modalities such as acupuncture and yoga has been touted by some to be useful, but more data is needed before they can be widely recommended. Lastly, transcutaneous electrical nerve stimulation (TENS) has been found in at least three studies to be more effective than placebo for the treatment of primary dysmenorrhea.[6]

II. Aeromedical Concerns.

Primary dysmenorrhea can cause menstrual pains severe enough to distract or even incapacitate, thus affecting safety and mission completion. The additional symptoms of dysmenorrhea such as nausea, vomiting, diarrhea, headaches, myalgias, etc may interfere with mission completion and safety.

III. Waiver Consideration.

Dysmenorrhea which necessitates recurrent absences of more than a few hours of routine duty requires a waiver for flying classes I/IA, II, IIU, and III. It is not disqualifying for ATC/GBC and SMOD personnel, but retention standards list dysmenorrhea that is incapacitating or not amenable to treatment as disqualifying. Most medications used to prevent or treat dysmenorrhea are compatible with flying duties. Hormonal contraceptives and the use of NSAIDs (ibuprofen, naproxen, and aspirin) for less than 72 hours are approved for flying and do not require waiver.

Table 1: Waiver potential for dysmenorrhea

Flying Class (FC)	Condition†	Waiver Potential Waiver Authority
I/IA	Primary dysmenorrhea controlled with NSAIDs (ibuprofen, naproxen, aspirin) and/or hormonal contraceptives	N/A
	Primary dysmenorrhea not controlled on approved NSAIDs and/or hormonal contraceptives	No AETC
II, IIU, III ATC/GBC	Primary dysmenorrhea controlled with NSAIDs (ibuprofen, naproxen, aspirin) and/or hormonal contraceptives	N/A
	Primary dysmenorrhea not controlled on approved NSAIDs and/or hormonal contraceptives	Maybe* MAJCOM
SMOD	Primary dysmenorrhea controlled with NSAIDs (ibuprofen, naproxen, aspirin) and/or hormonal contraceptives	N/A
	Primary dysmenorrhea not controlled on approved NSAIDs and/or hormonal contraceptives	Maybe* AFSPC or GSC

* Waiver in untrained FC II, FC IIU, and FC III is unlikely; waiver authority for such cases is AETC.

† For dysmenorrhea resulting from secondary causes see waiver guides for Endometriosis, Uterine Fibroid and Pelvic Inflammatory Disease.

AIMWITS search in January 2011 revealed 16 cases with a diagnosis of dysmenorrhea. There was 1 FC I/IA case (no disqualifications), 1 FC II case (no disqualifications), 0 FC IIU cases, 10 FC III cases (3 disqualifications), 1 ATC/GBC case (no disqualifications), and 3 SMOD cases (no disqualifications). Two of the disqualification cases were due to intractable pain and the other was disqualified for a closed head injury.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for primary dysmenorrhea should include the following:
A. History – age of menarche, onset of pain, relation with onset of menstrual flow, severity, location of pain, additional symptoms, impact on activities, presence of pain not related to menses, prior medical and surgical treatment and effectiveness.
B. Pelvic exam.
C. Gynecology consult, if NSAIDs and/or OCs do not control pain or abnormal pelvic exam.

The aeromedical summary for waiver renewal for primary dysmenorrhea should include the following:
A. Interval history since last waiver submission.
B. Pelvic exam.
C. Consultation from treating physician.

ICD 9 code for dysmenorrhea	
625.3	Dysmenorrhea

V. References.

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WAIVER GUIDE
Updated: Oct 2011
Supersedes Waiver Guide of May 2008
By: Maj Patricia Pankey (RAM 12) and Dr. Dan Van Syoc
Reviewed by Col Kent McDonald, chief of the ACS Neuropsychiatry branch and Drs. Wayne Chappelle and Joe Wood from the Neuropsychiatry branch

CONDITION:
Eating Disorders (Oct 11)

I. Overview.

The hallmark of all the eating disorders is a significant disturbance in eating behavior and self image. Three eating disorder diagnoses are recognized: anorexia nervosa, bulimia nervosa and eating disorder not otherwise specified.

Anorexia nervosa patients refuse to eat enough to maintain a minimally normal body weight. This disorder is characterized by disturbances in perception of body weight. The prevalence of anorexia nervosa is ten-fold higher in women than men; 0.3 to 1 percent in women.[1, 2] The age of onset is bimodal, with peak at 14 and 18 years of age; however, patients may present from late childhood through adulthood.[3] Less than 50% of anorexics recover within 10 years, 25% become chronic, and mortality can reach 25%.[4] The standardized mortality ratio (SMR) for anorexia nervosa is 10.5 (95% confidence interval [CI] = 5.5-15.5).[5] The treatment of anorexia nervosa generally involves nutritional rehabilitation, medical monitoring, and psychological treatment.[6, 7]

DSM-IV diagnostic criteria for anorexia nervosa.[8]

- Refusal to maintain body weight at or above a minimally normal weight for age and height (i.e., weight loss or failure to gain weight leading to body weight less than 85 percent of that expected for age and height).
- Intense fear of gaining weight or becoming fat, even though underweight.
- Disturbed experience of one's body weight or shape, undue influence of weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.
- In postmenarcheal females, amenorrhea (i.e., absence of three or more consecutive anticipated menstrual cycles). Menstruation induced by hormonal treatment is excluded.

Bulimia nervosa individuals engage in repeated eating binges followed by compensatory behaviors such as self-induced vomiting, misuse of laxatives or diuretics, fasting, or excessive exercise. The prevalence of bulimia nervosa among adolescent and young adult females is 1-1.5%, with the prevalence among males being about one-third of the female rate.[3] Similar to anorexia nervosa, bulimia nervosa is also characterized by disturbances in perception of body weight, as well as associated with alcohol abuse.[9] Prognosis for bulimics is better than anorexics. However, fewer than 70% recover within 10 years, while 30% continue to binge eat and purge.[10]

DSM-IV diagnostic criteria for bulimia nervosa.[8]

- Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:

    - Eating, in a discrete period of time (e.g., within any two-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.
    - A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating).
- Recurrent inappropriate compensatory behavior to prevent weight gain such as: self-induced vomiting; misuse of laxatives, diuretics or other medications; fasting; or excessive exercising.
- The binge eating and inappropriate compensatory behaviors both occur, on average, at least twice a week for three months.
- Self-evaluation is unduly influenced by body shape and weight.
- The disturbance does not occur exclusively during episodes of anorexia nervosa.
- Specify type:
    - Purging type: the person regularly engages in self-induced vomiting or the misuse of laxatives or diuretics.
    - Nonpurging type: the person uses other inappropriate compensatory behaviors, such as fasting or excessive exercise, but does not regularly engage in self-induced vomiting or the misuse of laxatives or diuretics.

Eating disorder not otherwise specified (ED-NOS), is used for those eating disorders that do not fully meet the diagnostic criteria for anorexia nervosa or bulimia nervosa. For example, individuals who regularly purge but who do not binge eat, individuals who meet criteria for anorexia nervosa but continue to menstruate, and individuals who meet criteria for bulimia nervosa, but binge eat less than twice weekly, all meet criteria for ED-NOS.[8] The prevalence of ED-NOS is 3 to 5 percent of women aged 15 to 30 in Western countries.[11]

Pathology associated with anorexia nervosa includes osteopenia, mitral valve prolapse, prolonged QT interval, arrhythmias, heart failure, amenorrhea, and nutritional emphysema.[12, 13] Eating disorders are associated with anxiety, depression and suicidal ideation.[14] Common skin changes include dry scaly skin, fine, dark, downy hair on back, abdomen and forearms, and acrocyanosis. In bulimia nervosa, the Russell's sign (presence of scar/callus formation over the dorsal surface of the hand, as the hand is used to stimulate the gag reflex to induce vomiting), dental erosions and enlarged salivary glands are seen. Many individuals with bulimia maintain a normal weight despite active symptoms.

Structured cognitive behavioral therapy (CBT) is the first-line treatment of choice for bulimia nervosa. Individuals with bulimia nervosa may also benefit from pharmacological. Among antidepressants with selective serotonin reuptake inhibition activity, fluoxetine is best studied. The goal for treatment of anorexia nervosa is weight restoration and reintegration of the individual into a normal family and social life.[15] To accomplish this, a team approach is usually required: dietitian for nutritional aspects, medical provider for managing medical concerns and mental health provider for CBT and interpersonal therapy. Furthermore, treatment often addresses underlying emotional problems, and developmental experiences that serve as psychogenic contributors to such behavior. The effective treatment for eating disorders such as Anorexia and Bulimia is, in general, over the course of several months, however, relapse rates remain high.

II. Aeromedical Concerns.

A significant concern is the co-morbidity of physical and emotional difficulties that lower the person's stamina for managing the high stress of military flying. For example, eating disorders can cause life-threatening metabolic alkalosis, hypokalemia, dehydration, and hypotension which impact readiness, mission completion, and flying safety. Anxiety and depression are comorbidities highly associated with eating disorders, and there exists an increased risk of suicide. Another area of concern is the level of interpersonal hypersensitivity that often exists within a person with an eating disorder. Such interpersonal reactivity may interfere with crew resource management and other aspects of crew relations essential to successful flying. Further, the course and outcome of these disorders is highly variable and marked by relapse with periods of remission alternating with recurrences. As a result, the psychological disposition of a person with an eating disorder is incompatible with aviation duties.

III. Waiver Consideration.

Eating disorders are specifically mentioned as disqualifying for flying classes I/IA, II/IIU, and III. For SMOD duties, the verbiage in AFI 48-123 states "any psychiatric condition, or history thereof, which, in the opinion of the examining flight surgeon, would interfere with the performance of space and missile operations crew duty" would necessitate a waiver for those individuals. For ATC/GBC duties, similar verbiage states "any personality disorder, or mental condition that may render the individual unable to safely perform controller duties."

Table 1: Waiver potential for eating disorders.

Flying Class (FC)	**Waiver Potential Waiver Authority**	**Waiting Period Post-Treatment**
I/IA	Maybe AETC	> 2 year†*
II/IIU and III, untrained	Yes MAJCOM	> 2 year†*
II/IIU and III, trained	Yes MAJCOM	> 1 year#*
ATC/GBC, trained SMOD, trained†	Yes MAJCOM**	> 1 year#*

† For FC I/IA and all other untrained candidates with a history of eating disorders must have a minimum of two years remission, documentation of successful treatment and not taking any psychiatric medications.
# For trained FC II, III, ATC/GBC and SMOD with a history of eating disorders must have a minimum of one year remission, documentation of successful treatment and not taking any psychiatric medications.
* Patients with eating disorders must meet minimum aviation weight standards.
** Waiver authority for SMOD personnel is either AFSPC or GSC.

NOTE: Recommend initial waiver granted for only one year, due to the high rate of relapse. Do not recommend indefinite waiver.

A review of the AIMWTS database through Aug 2011 revealed 31 cases of eating disorders. Of the 31 cases, 17 (55%) were disqualified. Breakdown of the cases: 4 FC I/IA cases (2 disqualifications), 3 FC II cases (1 disqualification), 17 FC III cases (11 disqualifications), 1 SMOD case (0 disqualifications), and 6 ATC/GBC cases (3 disqualifications). Of the 17 disqualified, 7 were disqualified due to co-morbidities [e.g., depression, anxiety, suicide gesture, cyclothymic disorder] and 3 were disqualified due to other disqualifying conditions. Of the 17 disqualified, 14 had a history of bulimia, 2 with anorexia nervosa and 1 with eating disorder NOS. The 14 granted waivers had demonstrated eating disorder resolution of greater than one to 10 years duration).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for an initial waiver for eating disorders should include the following:
A. History - Address pertinent negatives and positives such as symptoms of amenorrhea, constipation, abdominal pain, cold intolerance, lethargy and excess energy (activity level), and any social, occupational, administrative or legal problems associated with the case. Comment regarding stability of patient's weight.
B. Physical - height and weight, blood pressure, skin, cardiovascular, abdominal and neurologic.
C. Lab work including: complete blood count (CBC), chemistry 16 (electrolytes, glucose, calcium, magnesium, phosphorous, blood urea nitrogen (BUN) and creatinine), urine analysis, and ECG.
D. Psychiatric evaluation and treatment summary by a doctoral level provider. The evaluation should include objective psychological testing of the person's emotional and cognitive disposition, such as the most recent edition of the Minnesota Multiphasic Personality Inventory (MMPI) and the Wechsler Adult Intelligence Scales, fourth edition (WAIS-IV).
E. Dental evaluation for bulimia nervosa and ED-NOS that purge.
F. Medical evaluation board (MEB) reports if applicable.
G. Input from the individual's commander/supervisor regarding the aviator's current status.

The AMS for a renewal waiver should include the following:
A. History - assessment for recurrences. Comment regarding stability of patient's weight.
B. Physical exam: height and weight, blood pressure, skin, cardiovascular, abdominal, and neurologic.
C. Psychiatric evaluation for first renewal and if clinically indicated on subsequent renewals.

ICD-9 codes for eating disorders	
307.1	Anorexia nervosa
307.51	Bulimia nervosa
307.50	Eating disorder, not otherwise specified

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Mar 2007
By: Maj Geoff Ewing (RAM 11) and Dr. Dan Van Syoc
Reviewed by Dr. Bill Kruyer, ACS Chief Cardiologist

CONDITION:
Ectopy, Supraventricular And Ventricular Ectopy And Pairing (Mar 11)

I. Overview.

This waiver guide previously included criteria and waiver submission instructions for very frequent isolated ectopy and frequent pairs. With the release of AFI 48-123, 24 Sep 2009 and policy changes by the USAF Central ECG Library, these findings are still disqualifying but do not require waiver action if local evaluation as directed and reviewed by the ECG Library (at the Aeromedical Consultation Service, ACS) discloses no underlying structural heart disease or other disqualifying findings.

This new "waiver guide" discusses isolated ectopy and paired ectopy (pairs, couplets) and assumes no associated hemodynamic symptoms. Supraventricular and ventricular tachyarrhythmias are discussed in separate waiver guides. Ectopy and pairs include premature supraventricular and premature ventricular contractions (PVCs). In this discussion, the term ectopy will refer to both supraventricular and ventricular ectopy unless otherwise specified. Supraventricular ectopy includes premature atrial contractions (PACs) and premature junctional contractions (PJCs). The term PAC will be used to refer to all supraventricular ectopy.

Ectopy is quantified as a percentage of total beats on a Holter monitor and is graded as rare, occasional, frequent and very frequent. Pairs are graded as rare, occasional or frequent by total number of pairs on a Holter monitor. Aeromedical disposition is determined by the grading of ectopy and pairs on a Holter monitor. Typically, Holter monitor will have been requested to evaluate ectopy on a 12-lead electrocardiogram, ectopy appreciated during physical examination or to evaluate subjective complaints of palpitations.

On 12-lead electrocardiogram (ECG), PACs have been reported in about 0.6% of aviators and 0.4%-3.0% of civilian populations. PVCs have been reported in about 0.8% of aviators and 2.0%-7.0% of various civilian populations. Evaluating ectopy on 12-lead ECG is thus not a problem of large numbers but is nevertheless made difficult by the significant frequency of ectopy reported on 24-hour Holter monitors performed on apparently healthy subjects. Holter findings were reported on 303 male military aviators with no structural heart disease and no referral diagnoses of arrhythmia. Only 12% had no ectopy. Rare and occasional PACs and PVCs occurred in about 75% and 50%, respectively. Frequent PACs and PVCs only occurred in about 2.5% and 3.5%, respectively. PAC pairs occurred in about 15%. Otherwise, more complex ectopy was unusual. The presence of PACs and PVCs on a single page of ECG paper or 12-lead rhythm strip may require additional evaluation with a 24-hour Holter as outlined in the following table. DNIF is not required pending the 24-hour Holter.

Table 1: Guide to necessity for Holter monitor

ECG/Rhythm Strip	24-hour Holter Required[1]
PACs, PJCs < 2 PACs, PJCs ≥2	No Yes
Paired PAC, PJC or PVC ≥ 1	Yes

[1] Holter monitor results to include **interpreted report summary, representative tracings, and patient diary** must be forwarded to ECG library.

In summary, Holter monitor is required for two or more isolated premature beats and for one or more paired premature beats on a single page of ECG paper, 12- lead or rhythm strip, regardless of the age of the aviator/aircrew. Holter monitor is no longer required for one isolated atrial, junctional or ventricular premature beat on a single page of ECG paper, 12- lead or rhythm strip.

The results of the 24-hour Holter will determine requirement for further work-up. IAW AFI 48-123 6G, 6.44.17.1.13. waiver for isolated and paired ectopy is not required for any class of flying duties if local evaluation specified by and reviewed by the ECG Library discloses no other disqualifying findings. By ECG Library review, if isolated ectopic beats on the Holter are frequent or less (< 10% of total beats) and if ectopic pairs are occasional or less (10 total pairs or fewer), no further testing is required and the findings are aeromedically acceptable. In other words, this degree of isolated and paired ectopy is considered normal variant. If ectopic beats are very frequent (>10% of total beats) and/or ectopic pairs are frequent (>10 pairs total), a treadmill test and echocardiogram should be performed with appropriate reports and tracings/images referred to the ECG Library for review. The aviator does not need to be DNIF during this assessment.

II. Aeromedical Concerns.

If isolated or paired ectopy itself causes hemodynamic symptoms, then aeromedical disposition is determined by the symptoms as well as by the presence and severity of underlying heart disease. In the absence of hemodynamic symptoms, there are three basic aeromedical concerns. One, does the ectopy represent a risk for sustained tachydysrhythmias? Two, does the ectopy represent a risk for cardiac events? And three, does the ectopy predict underlying cardiac disease?

In an ACS database of 430 aviators evaluated for nonsustained or sustained supraventricular tachycardia (SVT), frequent PACs, PAC pairs and nonsustained SVT were not predictive of hemodynamically symptomatic SVT or of recurrent sustained SVT. In a similar database of 193 aviators with nonsustained ventricular tachycardia, neither frequent PVCs nor PVC pairs predicted sustained ventricular tachycardia or associated hemodynamic events. These data suggest that frequent isolated ectopy and paired ectopy do not present an increased risk for tachyarrhythmic events in the absence of structural heart disease.

The predictive value of ectopy for underlying cardiac disease is less clear. The considerable frequency and variability of ectopy in normal subjects makes it difficult to determine its predictive value for disease. PACs may occur in association with some disease states, such as mitral valve prolapse, but prognosis is not related to the PACs. On the other hand, frequent and complex PVCs in the presence of coronary and some other heart diseases clearly confer a poorer prognosis. This is

true in clinical populations with significant, usually symptomatic disease. It may be less so in asymptomatic populations such as aircrew. However, some ACS databases do suggest increased prevalence of cardiac disease in the presence of significant ectopy.

III. Waiver Considerations.

Very frequent PACs/PVCs and frequent PAC/PVC pairs are disqualifying for all classes of flying duties. As discussed above, waiver is not required if further evaluation specified by and reviewed by the ECG Library discloses no other disqualifying conditions. For FC IIU, AFI 48-123 states: "Any abnormal or borderline ECG finding, unless recommended evaluation discloses no disqualifying pathology is disqualifying". For ATC/GBC personnel, a "History of dysrhythmia with symptoms of hemodynamic compromise" is disqualifying. SMOD personnel are not disqualified for any of these conditions.

Table 2: Policy for supraventricular and ventricular ectopy and pairing

Findings on 24-hour Holter	**Additional Local Testing**	**Flying Class/ Waiver Required Waiver Authority#**	**ECG Library makes final determination**	**ACS Review/ Evaluation**
PACs/PVCs ≤10% and/or 1-10 pairs	None	FC I/IA No AETC FCII/III/IIU and ATC/GBC No MAJCOM	Yes Yes	No No
PACs/PVCs >10% and/or >10 pairs	Echocardiogram and treadmill test*	FC I/IA No AETC	Yes	No

* Studies to be submitted to the ECG library, if found aeromedically acceptable no further work-up required.
# Waiver Authority for FC IIU is AFMSA.

A review of AIMWTS in January 2011 found a total of 144 cases with PVCs, or PACs. Breakdown of the cases revealed 6 FCI/IA, 97 FC II, 36 FC III and five GBC. Of the 144 cases, 20 were disqualified (3 FCI/IA, 12 FC II, 3 FC III and 2 GBC). Of these 20 cases three were disqualified because of very frequent PVCs or PACs alone and two were disqualified because of associated cardiac conditions (concomitant use of beta blocker for PSVT and long QTc). The remaining cases were disqualified in conjunction with other medical conditions.

IV. Information Required for Waiver Submission.

None, unless other disqualifying findings are found on further evaluation performed clinically or as specified by the ECG Library. In those case, refer to the applicable waiver guide and/or as directed by the ECG Library.

ICD-9 Codes for **Supraventricular And Ventricular Ectopy And Pairing**	
427.60	Premature beats unspecified
427.61	Supraventricular premature beats
427.69	Other premature beats

V. References.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Apr 2007
By: Maj Justin Tingey (RAM 11) and Dr Dan Van Syoc
Reviewed by Col Steven Ritter, AF/SG consultant in Dermatology

CONDITION:
Eczematous Dermatitis (Eczema) including Atopic, Contact, Nummular, Dyshidrotic, and Seborrheic Dermatitis (Mar 11)

I. Overview.

Dermatitis is a generic term that describes inflammatory conditions of the skin, and can have an acute or chronic course. "Eczema" and "dermatitis" are frequently used interchangeably. Eczema (eczematous inflammation) is the most common inflammatory skin disease.[1] The more commonly encountered eczemas (dermatitis) are atopic dermatitis (AD), contact dermatitis (CD), nummular dermatitis, dyshidrotic dermatitis (dishydrosis), and seborrheic dermatitis, History and physical exam are often all that is required to make these diagnoses.

Atopic dermatitis: AD, also known as atopic eczema, is a chronic relapsing skin condition characterized by intense itching, dry skin, and inflammation. AD is one of the most common skin diseases worldwide, with a prevalence up to 30%.[2] Prevalence in the United States is approximately 17%.[3] Over half (60%) of the cases are diagnosed in the first year of life and over 80% by age five.[3, 4] AD develops as a result of a complex interrelationship of environmental, immunologic, genetic, and pharmacologic factors and may be exacerbated by infection, psychologic stress, seasonal/climate changes, irritants, and allergens. The disease often moderates with age, but patients carry a life-long skin sensitivity to irritants, and predisposition to occupational skin disease.

AD is diagnosed based on a constellation of clinical findings, mainly pruritus, chronic/relapsing dermatitis, personal/family history of atopic disease, and facial/extensor involvement in infants/children and flexural lichenification in adults. AD is often intensely pruritic and acutely characterized by erythematous papules with excoriation, vesicles, and exudate, with later scaling and thickened plaques, and chronic disease manifesting with lichenification and fibrotic papules. The disease is exacerbated by dry climates and affected individuals may have an increased susceptibility to contact irritants. Complications include ocular problems (eyelid dermatitis, chronic blepharitis, disabling atopic keratoconjunctivitis, vernal conjunctivitis, intense pruritus, keratoconus, cataracts), recurrent skin infections, hand dermatitis (aggravated by wet work), and potentially life-threatening exfoliative dermatitis. AD is frequently associated (up to 70%) with allergic rhinitis and/or asthma.[5] The strength of this association has been called into question and is currently controversial.[3]

AD is often perceived as a minor condition. However, studies have shown that AD has a greater effect on quality of life than other common skin diseases, such as psoriasis. There is no complete cure for AD, so medical treatment focuses on avoidance of triggers, skin hydration, and reduction of skin inflammation.

Contact dermatitis: CD is a delayed-type reaction to an exogenous substance that serves to "trigger" a skin reaction. Irritant contact dermatitis (ICD) represents about 80% of all contact-

related dermatoses and results from non-immunologic physical or chemical damage to the skin and can occur in any individual.[6] Allergic contact dermatitis (ACD) is an immune system reaction, delayed (type IV) hypersensitivity. While anyone with a normal cell-mediated immune response can develop ACD, it appears that the ability to respond to certain antigens has a genetic predisposition.[7] The most common sensitizer in North America is urushiol found in poison ivy, poison oak and poison sumac.[8] It is estimated that over 70% of the US population would acquire ACD if casually exposed to these plants.[9] Other common sensitizers include nickel (jewelry), formaldehyde (permanent press clothing), fragrances, preservatives (quarternium-15), rubber, latex, and topical antibiotics (neomycin and bacitracin).[7]

ICD is correlated with exposure to offending agents, and may cause a stinging or burning sensation initially followed by induration, blisters, erythema, or chapping in acute stages; it can also progress to the chronic findings listed for AD. ACD may be acute presenting with vesicles and erythema or chronic with lichenification and scale. It is characterized by pruritus and correlates with allergen exposure.

The diagnosis of ACD can be confirmed by patch testing. Confirmatory tests for the diagnosis of ICD are not available, but patch testing can be used to rule out ACD.

Table 1: Characteristics of atopic dermatitis (AD), irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD)

Characteristics	**Atopic Dermatitis**	**Irritant Contact Dermatitis**	**Allergic Contact Dermatitis**
Identifiable, controllable trigger	Possibly	Yes	Yes
Patch test confirms diagnosis	No	No	Yes
Genetic contribution	Yes	No	Yes
Percent of contact dermatology cases	N/A	80%	20%
Environmental, psychological or seasonal variation	Yes	No	Possibly

Nummular dermatitis: Nummular dermatitis/eczema consists of intensely pruritic coined-shaped, erythematous patches, consisting of papules, vesicles, scaling, crusting and some serous oozing (eczematous dermatitis). Lesions can number from a few to as many as 20 to 50, varying in size from 2 to 10 cm diameter, usually on the trunk and extremities. Nummular dermatitis occurs most frequently in individuals in their 50s to 60s and equally among sexes.

Dyshidrotic dermatitis: Dyshidrosis is intensely pruritic chronic recurrent dermatitis involving the lateral sides of the fingers, palms and soles. The typical finding is multiple small vesicles that gradually desquamate over one to two weeks, leaving erosions and fissures that slowly resolve. An "id reaction" to active foot dermatophytosis and scabies must be considered in the differential.

Seborrheic dermatitis: Seborrheic dermatitis is a common problem of erythematous patches with fine, greasy-appearing scales, located usually on the nasofacial area, eyebrows, mid forehead, ears, mid chest/back and scalp. Dandruff of the scalp is a mild form of seborrheic dermatitis with minimal inflammation.[7]

Treatment: Treatment of dermatitis requires a systematic, multi-pronged approach that incorporates careful skin cleaning and hydration, elimination of flare factors and potentially medical therapy. Individualized skin care is essential in dermatitis patients. Regular use of emollients to manage dry skin helps to maintain skin barrier function and prevent flare-ups. Eliminating exposure to a triggering factor or material may not be possible due to the difficulty in determining the factor or removing from a patient's life.

If prevention or over the counter treatment fails, first-line therapy is topical prescription corticosteroids for AD, ICD, ACD, nummular eczema, dyshidrosis, and non-scalp seborrheic dermatitis. For severe cases systemic corticosteroids may be required. Antihistamines have been used to treat the pruritus, however the evidence supporting use is relatively weak.[10, 11] Other immuno-modifying medications such as cyclosporine, azathioprine, mycophenolate and interferon gamma have been used in severe cases of AD.[11] Ultraviolet (UVB or PUVA) light therapy is usually reserved for severe cases of AD and as a second- or third-line treatment. New topical agents for AD such as pimecrolimus and tacrolimus can be used as second-line treatments, and act as cutaneous immunosuppressants by inhibiting calcineurin, a calcium-activated phosphatase. Pimecrolimus (Elidel®) is approved for aircrew, ATC/GBC, and SMOD use for AD. Tacrolimus (Protopic®) is not approved due to plasma levels with topical use that approach those seen in systemic therapy. While evidence of clinical systemic toxicity with topical therapy has been largely limited to constitutional symptoms, subclinical neurotoxicity has not been addressed.[12] Seborrheic dermatitis of the scalp is treated with daily shampooing with an antiproliferative (tar, selenium sulfide, zinc pyrithione) or antimicrobial (ketoconazole, ciclopirox) shampoo. In addition to topical corticosteroids non-scalp seborrheic dermatitis can be treated with topical antifungal agents.

II. Aeromedical Concerns.

Aeromedical concerns include the risk of in-flight distraction/reduced performance as well as disease progression and medical treatment incompatibility due to the military aviation environment. Discomfort from pruritus or pain can be significant and the resulting distraction may jeopardize flight safety or optimal performance. AD is associated with allergic rhinitis and asthma and aircrew require a thorough evaluation of those conditions for compatibility with flying duty. Complications from AD involving the eyes can occur and keratoconus (elongation and protrusion of the corneal surface) is believed to be more common in the atopic patients. Affected skin in areas where there is constant pressure or rubbing from aviation equipment (helmet, gloves, mask, harnesses, and seat) may cause disease progression, and therefore, additional performance decrement.

Use of systemic corticosteroids, high potency topical steroids, and antihistamines may cause side effects that would jeopardize flight safety. In the short term, PUVA light therapy (not UVB) has side effects that include nausea, dizziness, headache, and photosensitivity. Long term side effects include pruritus, skin damage, and increased skin cancer risk. UV therapy may require several treatments per week, and could be unavailable in a deployed setting, and may require excessive time

lost from flying duty. If the trigger or flare factors cannot be identified and avoided, there is a potential for recurrence that may be incompatible with worldwide qualification and/or flying duties.

III. Waiver Consideration.

Atopic dermatitis or eczema after the twelfth birthday is disqualifying for entry into the US Air Force, therefore these individuals would also not qualify for initial training in any career field to include FC I/IA, II, III, ATC/GBC, and SMOD. Flyers that are asymptomatic with minimal potential for flare-ups and those controlled with topical therapy for areas not interfering with aviation equipment can expect a waiver. The following conditions require a medical evaluation board prior to waiver submission: Atopic dermatitis, severe or requiring frequent hospitalization, and eczema, chronic, regardless of type, when there is moderate involvement or when there are repeated exacerbations in spite of continuing treatment.

Those with severe symptoms or triggers that cannot be avoided are unlikely to obtain a waiver even if returned to world wide duty

Table 2: Waiver potential for dermatitis

Flying Class (FC)	Disqualifying Condition/Treatment	Waiver Potential Waiver Authority
I/IA, Initial FC II/III	Any chronic skin disorder, which is severe enough to cause recurrent grounding from flying duties, or is aggravated by, or interferes with, the **wearing of military equipment**.	No AETC
	Atopic dermatitis/eczema controlled with topical steroids, topical pimecrolimus, and/or oral non-sedating antihistamines (Fexofenadine or loratadine).	No AETC
	Atopic dermatitis/eczema controlled with topical tacrolimus, oral steroids, oral cyclosporine, or PUVA.	No AETC
	Eczema, chronic and resistant to treatment	No AETC
	Verified history of atopic dermatitis or eczema after age 12	No AETC
II, III	Any chronic skin disorder, which is severe enough to cause recurrent grounding from flying duties, or is aggravated by, or interferes with, the **wearing of military equipment**.[1]	No[1] MAJCOM
	Atopic dermatitis/eczema controlled with topical steroids, topical pimecrolimus, and/or oral non-sedating antihistamines (fexofenadine or loratadine).	Yes[2] MAJCOM
	Atopic dermatitis/eczema controlled with topical tacrolimus, oral steroids, oral cyclosporine, or PUVA.	No[2] MAJCOM
	Eczema, chronic and resistant to treatment	No MAJCOM
IIU, ATC/GBC, SMOD	Atopic dermatitis/eczema controlled with topical steroids, topical pimecrolimus, and/or oral non-sedating antihistamines (Fexofenadine or loratadine).	No waiver required[2,3]
	Atopic dermatitis/eczema controlled with topical tacrolimus, oral steroids, oral cyclosporine, or PUVA.	No[2] MAJCOM

1. If change in aircraft could eliminate exposure to protective equipment then categorical waiver may be possible and AFMSA is waiver authority.
2. Please see 'Approved Aircrew Medications' and 'Approved Space and Missile Operator Medications' lists for current medication restrictions.
3. DNIF/DNIC/DNIA may be required for ground trial and/or adequate control of symptoms.

AIMWITS search on 20 January 2011 revealed 152 cases of atopic dermatitis/eczema, contact dermatitis, dyshidrotic dermatitis, or seborrheic dermatitis; 25 FC I/IA, 69 FC II, 47 FCIII, two FC IIU, eight ATC/GBC, and one SMOD. Of the 152 cases, 14% (21/152) were disqualified (three FC I/IA, five FC II, 12 FCIII, and one ATC/GBC). Both FC IIU and the one SMOD waivers were approved. Of the 21, nine were disqualified solely for atopic dermatitis/eczema or contact dermatitis. The other 12 were disqualified because of additional aeromedical conditions/issues such as depression, radial keratotomy, vision abnormalities, facial nerve paralysis, and stature. The vast majority of cases were controlled on topical medications.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial and renewal waiver should include the following:
A. A thorough history to include time of onset, location, frequency, identification and ability to avoid flare factors, and treatments.
B. Skin exam describing lesions and locations.
C. Information about deployability, duty limitations, and comments addressing interference with use of aviation equipment or jeopardy to mission safety.
D. Copy of dermatology consultation, in moderate/severe cases.
E. Confirmation of presence or absence of history/current asthma and allergic rhinitis.
F. Optometry/ophthalmology consult if eyes involved.
G. Medical evaluation board (MEB) results if severe atopic dermatitis or chronic moderate/severe eczema with repeated exacerbations in spite of treatment.

ICD-9 codes for dermatitis	
690	Seborrheic dermatitis
691	Atopic dermatitis and related conditions
692	Contact dermatitis and other eczemas

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WAIVER GUIDE
Updated: Sep 2011
Supersedes Waiver Guide of Aug 2008
By: Maj Patricia Pankey (RAM 12) and Dr. Dan Van Syoc
Reviewed by LtCol Geoffrey Towers, AF/SG Consultant for OB/GYN

CONDITION:
Endometriosis (Sep 11)

I. Overview.

Endometriosis occurs when endometrial tissue proliferates outside the endometrial cavity. The ectopic endometrial implants are normally located in the pelvic region, but can occur anywhere in the body.[1] The disease affects 5-10% of reproductive aged women and occurs most commonly between the ages of 25 and 29 and a familial tendency has been identified.[2] Endometriosis is the underlying cause in a significant percentage of patients presenting with pelvic pain. The pain can be located in the lower abdomen and/or lower back, and occurs with exercise, micturition, or defecation. In fact, endometriosis is felt to be the underlying cause in approximately 15% of cases of pelvic pain.[3] Pain is the most common symptom associated with endometriosis and approximately three quarters of symptomatic patients experience pelvic pain and/or dysmenorrhea.[4] The range of symptoms include: chronic pelvic pain, dysmenorrhea, deep dyspareunia, subfertility, abnormal menstrual bleeding, chronic fatigue, low back pain and bowel or bladder symptoms, which are often cyclical (e.g., dyschezia, bloating, constipation, rectal bleeding, diarrhea, and hematuria).[4, 5]

The condition we know as endometriosis was first described in 1860 and has confounded clinicians ever since.[6] Morbidity rates with endometriosis are significant. In the 1990s it was the third most common gynecological diagnosis identified in patient summaries amongst women 15 to 44 years of age.[7] Diagnosis has been greatly enhanced by the use of the laparoscope which has led to a decrease in the diagnostic delay recognized in earlier years.

The etiology of endometriosis is not well understood and is probably multifactorial. Multiple births, extended intervals of lactation, and late menarche (after age 14) decrease the risk of being diagnosed with endometriosis, whereas nulliparity, early menarche/late menopause, short menstrual cycles, prolonged menses, and müllerian anomalies increase the risk.[8, 9] The physical exam may reveal adnexal or uterine tenderness, a pelvic mass, or tender rectovaginal nodules. However, many patients have a normal pelvic examination. Consequently, the diagnosis is made primarily by direct visualization, usually via laparoscopy.

Current guidelines for the treatment of endometriosis recommend combined hormonal contraceptives as first-line treatment agents.[10] Non-steroidal anti-inflammatory drugs (NSAIDS) are commonly utilized to manage pain symptoms. Other medications (danazol, gonadotropin releasing hormone agonists such as Lupron® or Zoladex®, provera, and depoprovera) are effective in treating the symptoms of endometriosis, however, only NSAIDS, estrogen/progesterone combinations (e.g., OCPs, NuvaRing®) and depoprovera are waiverable medications. It is generally recommended to get laparoscopic confirmation of the diagnosis before beginning medication use. Surgical therapy is the preferred treatment for patients with infertility and can be done by removing or destroying the endometriosis lesions. More definitive surgery involves a

hysterectomy and bilateral salpingo-oophorectomy. Surgical management in women with endometriosis-related pain should be reserved for those in whom medical treatment has failed.[10]

II. Aeromedical Concerns.

Pain associated with endometriosis usually begins as low grade discomfort and may progress over hours or days to severe discomfort that is distracting. It is not expected to be acutely incapacitating and continued flying should not be problematic for patients with symptoms that are well controlled by approved medications.[11] Menorrhagia, often associated with endometriosis, can cause a gradual onset anemia. Medical therapy should consist of medications that are aeromedically acceptable, such as NSAIDs and OCPs. It should be pointed out, however, the primary goal is to treat the patient to the standard of care, the secondary goal is to use a treatment that may make the patient's condition/therapy waiverable. If various treatments are equally effective, try to use the one most likely to be waiverable. For patients with endometriosis and dysmenorrhea, please refer to the waiver guide on Dysmenorrhea.

III. Waiver Consideration.

Endometriosis is disqualifying for flying classes II and III when it is symptomatic or requires medical control. A history of endometriosis is disqualifying for FC I/IA. For SMOD and ATC/GBC personnel, it is disqualifying for retention if it is symptomatic and incapacitating which leads to the need for a waiver for these members.

Table 1: Waiver potential for endometriosis

Flying Class	Medication/Treatment Required for Symptom Control of Endometriosis	Waiver Potential Waiver Authority
I/IA	Documented history of endometriosis	No AETC
II/IIU**	NSAIDs, estrogen/progesterone combinations, depoprovera#	Yes MAJCOM
	Danazol, GRH*	No AFMSA
	Surgery	Yes MAJCOM
III ATC/GBC SMOD***	NSAIDs, estrogen/progesterone combinations, depoprovera#	Yes MAJCOM
	Danazol, GRH*	No MAJCOM
	Surgery	Yes MAJCOM

*GRH-gonadotropin releasing hormone agonists.
**Waiver authority for FC IIU is AFMSA.
***Waiver authority for SMOD personnel is AFSPC or GSC.
All medications and medication combinations need to be themselves approved for use in aircrew.

Review of AIMWTS through Aug 2011 showed 43 endometriosis cases. Thirty-two women with endometriosis, asymptomatic with or without medications were granted waivers (one for initial FC I (evaluation by ACS determined member never had true path confirmed endometriosis), five for FC II of which one was FC IIU), twenty-four for FC III, and one each for ATC and SMOD). Eleven of the 43 cases were disqualified; three had symptoms not controlled or on non-waiverable medications, four were initial FC III and diagnosis was either recent and/or length of control of symptoms was short, and four had other disqualifying diagnoses.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for endometriosis should contain the following:
A. Complete history of symptoms and degree to which they incapacitate the patient
B. Treatments used and last symptoms, and any current medications or ongoing treatments.
C. Gynecological evaluation report.
D. Labs to include the most recent hematocrit.
E. MEB results if applicable.

The AMS for waiver renewal for endometriosis should include the following:
A. Interval history since last waiver.
B. All applicable labs, particularly most recent hematocrit.
C. Consultation from gynecologist or primary care physician.

ICD9 Code for Endometriosis	
617.9	Endometriosis, site unspecified

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WAIVER GUIDE
Updated: Feb 2012
Supersedes Waiver Guide of Dec 2007
By: Dr Dan Van Syoc
Reviewed by Col Pat Storms (RAM 05 and USAF Gastroenterologist)

CONDITION:
Eosinophilic Esophagitis and Eosinophilic Gastroenteritis (Feb 12)

I. Overview.

Eosinophils are not distributed homogeneously throughout the gastrointestinal tract. Typically, the highest numbers are found in the cecum and appendix, while esophageal epithelium is unique in being devoid of eosinophils under normal conditions.[1] Eosinophilic inflammation of the GI tract may be secondary to other diseases, or may represent a primary process. Esophageal eosinophils were long thought to be a hallmark of gastroesophageal reflux disease, but it is now acknowledged that esophageal eosinophilia can appear in response to a variety of stimuli.[2] Primary eosinophilic diseases are divided into eosinophilic esophagitis (EE) and eosinophilic gastroenteritis (EG), which may be seen in adults or children.

EE may be associated with allergy (atopic) or may occur in isolated fashion (idiopathic). Esophageal eosinophilia was first reported in an adult patient in 1975, but it was not until 1995 that unique cases were identified and EE described as a clinical entity.[3] Despite being a newly recognized entity, it is likely accelerating in incidence.[2] The majority of cases have been in men and occurs in all ages with a peak in the fifth decade of life; the disease can affect all spectrum of age, race or sex.[4, 5] Individual and/or family histories of allergic diseases (food allergies, atopic dermatitis, asthma, allergic rhinitis, allergic conjunctivitis) have been noted in over 50% of individuals with EE. EE is an underrecognized cause of dysphagia, food-bolus obstruction, and chest pain in adults.[6] Some researchers have pointed to evidence supporting a familial predisposition to EE which may explain the strong male preponderance.[7, 8]

EE may mimic gastroesophageal reflux disease (GERD) and can be differentiated from GERD on the basis of the magnitude of mucosal eosinophilia and the lack of response to acid suppression.[3] Some experts feel that EE and GERD commonly coexist and may be almost indistinguishable from one another.[5] In some cases, the diagnosis was prompted by a poor response to surgical treatment of presumed GERD through fundoplication. Adults usually present with dysphagia, and a history of food impaction is common. Symptoms have usually been present for 4.5 years prior to diagnosis, and are not always associated with a defined esophageal stricture, though proximal strictures in EE may occur. The diagnostic criteria for EE have not been firmly established, but findings of >15-20 eosinophils per high-power field (HPF) on mucosal biopsy, when associated with typical symptoms of substernal distress and dysphagia, is commonly accepted as being diagnostic of the condition. Endoscopic findings seen with EE include strictures (frequently proximal), linear furrows, a small-caliber esophagus and multiple white papules (eosinophilic microabscesses). The diagnosis of EE in a symptomatic patient is strongly supported by demonstrating the absence of GERD, as evidenced by a normal pH monitoring study of the distal esophagus or lack of response to high-dose proton pump inhibitors.[9]

Treatment of EE is based on limited clinical experience, case series and small controlled trials. Even the optimal goal of treatment is unknown (control of symptoms versus resolution of eosinophilic inflammation). Regardless of the endpoint, acid suppression is usually not successful or at best achieves a partial response.[10] It is, however, commonly used in an effort to combat the pyrosis these patients often report. Dilation of strictures may be initial therapy for individuals with dysphagia and food impaction, but care is warranted when dilating patients with EE. Patients with EE have delicate esophageal mucosa, prone to tearing, and they often have narrowed luminal diameters.[11] Post-dilation substernal pain out of relation to the extent of dilation is commonly encountered in EE patients, and repeating EGD after a dilation may reveal long mucosal rents with a very worrisome appearance. No esophageal perforations were reported in one series in which 70 dilations were performed in a group of 36 patients, but post-procedure chest pain and demonstrated mucosal rents warrant a careful approach to dilation in these patients. Systemic or topical corticosteroids have been shown to improve symptoms. Topical corticosteroids have been administered by metered-dose inhaler (MDI), using preparations marketed for asthma control, e.g. fluticasone (220mcg/puff, twice daily). Patients are instructed to actuate the inhaler into the mouth without inhaling, swallow the deposited aerosol, and rinse and gargle afterwards. The high relapse rate (~65%) noted in one study in children suggests that chronic or repeated therapy may be needed.[11] Elimination diets and, in particular, elemental diets, have shown improvement in children and adolescents. Antihistamines, cromolyn and montelukast (at doses of about 100 mg/day), and mepolizumab have been used; their efficacy has not been established.[12] Long-term prognosis is unknown. The relatively recent recognition of EE as a clinical condition has impacted the clear definition of its natural history, but EE appears to be a chronic disease with a waxing and waning course, as suggested by a noteworthy relapse rate of 80% in an eight-year follow-up of children with EE, and similarly high rate of recurrent symptoms and chronic therapy in adults.[1]

EG is eosinophilic infiltration of one or more segments of the GI tract with signs and symptoms related to the layer (mucosa, muscle, and/or subserosa) and extent of bowel involved. In published reports, the stomach (26 to 81%) and small intestine (28 to 100%) are the predominant areas affected.[1] EG is a rare disease, affecting males and females equally. In mucosal disease, typical symptoms include abdominal pain, nausea, vomiting, and diarrhea, with endoscopic biopsy confirming eosinophilic infiltration. Symptoms suggesting gastric outlet and intestinal obstruction are common due to a gut made thick and rigid from the eosinophilic infiltration. In subserosal disease, individuals may present with eosinophilic ascites. Elevated peripheral eosinophil counts are frequently seen in mucosal and subserosal disease. EG is associated with atopy manifest as asthma and allergies in 40 to 50 % of cases.[13] Treatment is primarily oral steroids; cromolyn, montelukast and elimination diets have shown mixed results in published trials. The natural history of EG is not well known; some individuals have no recurrence, while a few will flare concurrently with or immediately after prednisone taper, and still others may experience periodic flares months to years after the initial episode.

II. Aeromedical Concerns.

Symptoms relevant to aviation include dysphagia, food impaction, nausea, vomiting, and chest and/or abdominal pain. The symptoms are of concern primarily due to the potential impact while performing aircrew duties and the effects on mission safety and completion.

Topical corticosteroid therapy, administered via MDI as described earlier, is acceptable for waiver. Montelukast therapy is waiverable, although of uncertain benefit. Approved antihistamines, loratadine (Claritin®) or fexofenadine (Allegra®) and cromolyn are acceptable for waiver. Waiver is not recommended while on oral steroids. If the individual is asymptomatic after oral steroids, waiver could be considered after the pituitary axis has returned to normal function (based on Cortrosyn® stimulation testing; see Waiver Guide – Systemic Glucocorticoid [Steroid] Treatment).

III. Waiver Consideration.

History of EE and EG is disqualifying for all flying classes. It is not waiverable in FCI/IA and unlikely to be waivered in untrained FC II and III. It is potentially waiverable in FC II and III if the individual has no aeromedically significant complications and remains asymptomatic on or off waiverable medications. Neither EE or EG is listed as disqualifying for ATC/GBC or SMOD personnel, but persistent and severe esophagitis or gastritis is not qualified for retention in the US Air Force.

Table 1: Waiver potential for EE and EG

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA Untrained II/III/IIU	Eosinophilic esophagitis Eosinophilic gastroenteritis	No AETC No AETC
II/III/IIU*	Eosinophilic esophagitis Eosinophilic gastroenteritis	Yes MAJCOM Yes MAJCOM
ATC/GBC	Eosinophilic esophagitis or eosinophilic gastroenteritis if severe	No MAJCOM
SMOD	Eosinophilic esophagitis or eosinophilic gastroenteritis if severe	No AFSPC or GSC

*AFMSA is the waiver authority for FC IIU personnel.

AIMWITS search in Nov 2011 revealed a total of 43 cases with a listed diagnosis of either eosinophilic esophagitis or eosinophilic gastroenteritis. There were a total of 2 disqualifications. Breakdown of the cases was as follows: 2 FC I/IA cases (both disqualified), 31 FC II cases, 8 FC III cases, and 2 ATC/GBC cases. Both DQ cases were FC I/IA and had severe disease.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for eosinophilic esophagitis or gastroenteritis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History with special attention to symptoms, frequency, duration, treatment, precipitating factors, action taken to mitigate recurrence.
C. Gastroenterology consult - evaluation and treatment recommendations.
D. Endoscopy report.
E. Pathology report of biopsies of esophagus, antrum and duodenum.
F. Allergy consult – addressing possible food allergies.

The AMS for waiver renewal for eosinophilic esophagitis or gastroenteritis should include the following:
A. Brief summary of symptoms, treatment, original endoscopy and pathology results and any intervening symptoms or signs (including pertinent negatives e.g. dysphagia, food impaction).
B. Gastroenterology consult.
C. Endoscopy report.
D. Pathology report of biopsies.

ICD-9-codes for eosinophilic esophagitis, complications, and eosinophilic gastroenteritis	
530.19	Other esophagitis
530.3	Stricture and stenosis of esophagus
530.89	Other, other specified disorders of esophagus
558.9	Other and unspecified noninfectious gastroenteritis and colitis

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WAIVER GUIDE
Initial Version: May 2010
By: Dr Dan Van Syoc
Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology, and Col Patrick Storms, AF RAM and gastroenterologist.

CONDITION:
Esophagitis (May 10)

I. Overview.

Esophagitis refers to inflammation of the esophageal mucosa. It can be caused by the reflux of gastric contents, infectious organisms, corrosive agents, irradiation, or direct contact with swallowed pills.[1] In our aviator population, the vast majority of cases will be the result of the progression of gastroesophageal reflux disease (GERD) to erosive esophagitis (EE). In looking at the burden of digestive diseases in the US, GERD ranks second in prevalence, but is first in annual direct costs.[2] Therefore, the potential impact of esophagitis in the general US population and among our aircrew is substantial. It is estimated that 40% of the U.S. population experiences symptoms of gastroesophageal reflux at least once a month, with 7% experiencing symptoms daily. An essential concept in the pathogenesis of GERD is that the extent of symptoms and of mucosal injury is proportional to the frequency of reflux events, the duration of mucosal acidification, and the caustic potency of refluxed fluid. The integrity of the esophageal mucosa in normal individuals reflects the balance between injurious forces (acid reflux, potency of refluxate) and defensive forces (esophageal acid clearance, mucosal integrity). For one or more reasons, this balance becomes impaired in patients who develop GERD.[3] The prevalence of severe EE increases with age, but the severity of the heartburn symptoms is an unreliable indicator of the severity of erosive disease, particularly in our elderly population.[4]

The mechanisms of GERD and its complications are not completely understood. Most clinicians feel that transient lower esophageal sphincter (LES) relaxation is the key motility disorder in mild to moderate disease. It has been suggested that impaired esophageal clearing of refluxed gastric contents during times of sleep has a significant causative role in reflux esophagitis.[5] In addition, there are indications that esophageal motor dysfunction in patients with reflux esophagitis is a primary phenomenon.[6] There are also some significant racial differences regarding reflux esophagitis and its complications. Barrett's esophagus (BE), a precursor to adenocarcinoma of the esophagus, is more common in non-Hispanic whites than in African Americans. Similarly, heartburn is the primary indication for endoscopy in the non-Hispanic white population, while upper GI bleeding is the primary indication for African Americans.[7]

BE is a complication of GERD and erosive esophagitis and is a premalignant condition. BE can be defined simply as columnar metaplasia of the esophagus and is seen in 8% to 20% of patients with chronic GERD. Many gastroenterologists feel that the major reason to evaluate a patient with longstanding GERD is to be able to recognize BE. The overall incidence of BE in the general population is difficult to estimate as approximately 25% of BE patients have no symptoms of reflux. One multi-center study demonstrated that the prevalence of BE was 6.8% in evaluation of patients with or without the symptoms of heartburn, and rose to 15% if they had erosive esophagitis on endoscopy. Epidemiologic data also indicate that men are at greatest risk and, although Barrett's esophagus can be found at any age, the prevalence increases with advancing age until a plateau is

reached in the 60s. There is no current data showing that surveillance decreases the rate of mortality.[8-10]

GERD and/or esophagitis is frequently a diagnosis of exclusion. Physical examination, laboratory testing, and radiographic imaging aid only in the exclusion of alternate diagnoses. Chief among diseases to be excluded is coronary artery disease, but gallbladder disease, peptic ulcer disease and pill esophagitis are other common causes of similar symptoms in our population. "In the simplest case, when symptoms are typical and the patient responds to therapy intended to address those symptoms, no diagnostic tests are requisite. Rather, diagnostic testing is invoked in 3 broad scenarios: (1) to avert misdiagnosis, (2) to identify complications of reflux disease, and (3) in the evaluation of empirical treatment failures." The concept of alarm features is commonly cited as a screening mechanism to decide whether diagnostic tests are necessary. "Proposed alarm features include vomiting, evidence of gastrointestinal blood loss, involuntary weight loss, dysphagia, anemia, chest pain, or epigastric mass."[11]

Currently, proton pump inhibitors (PPIs) are considered the most effective short-term treatment for the disease. PPIs are well tolerated, with headaches and diarrhea described as the most common side effects. Histamine-2 Receptor Antagonists (H2RAs) have also been long used effectively to treat initial symptoms of GERD and reflux esophagitis. They tend to be less successful than are the PPIs in more severe disease states with healing rates rarely exceeding 60% after up to 12 weeks of treatment. The dosage of the H2RA agents often has to be significantly maximized to approach healing rates of the PPIs, but most often the PPI class will provide better success. Until recently, three prokinetic drugs were available for treating GERD and reflux esophagitis: bethanechol, a cholinergic agonist; metoclopramide, a dopamine antagonist; and cisapride, a serotonin (5-HT4) receptor agonist that increases acetylcholine release in the myenteric plexus. These drugs improve reflux symptoms by increasing LES pressure, acid clearance, and/or gastric emptying. Current prokinetics provide modest benefit in controlling heartburn but have unreliable efficacy in healing esophagitis unless combined with acid inhibiting drugs. Prokinetic drugs are significantly limited by their side-effect profiles.[12-14] Sucralfate, an aluminum sucrose polysulfate, potentiates cytoprotection and mucosal resistance and is safe to use in initial and maintenance therapy, though its efficacy is limited. Some patients with significant GERD and erosive esophagitis may need to consider surgical solutions such as the Nissen laparoscopic fundoplication procedure.

Medication-induced esophagitis is an increasing problem in our country. The types of medications causing direct esophageal injury can be divided into antibiotics, anti-inflammatory agents and others. Tetracyclines are the most common antibiotic to induce esophagitis, particularly doxycycline. All of the currently used anti-inflammatory agents can damage the esophagus, with the highest number of reported cases with aspirin. The flight surgeon also needs to be aware of problems with nutritional supplements. A recent surge in the use of compounds such as NANO^{X9} has led to increased esophagitis symptoms in military members (anecdotal story). The mechanism of injury is believed to be due to prolonged contact of the caustic contents of the medication with the esophageal mucosa. Most cases of medication-induced esophageal injury heal without intervention within a few days. Thus, the most important aspect of therapy is to make the correct diagnosis and then to avoid reinjury with the agent.[15]

II. Aeromedical Concerns.

Increases in intra-abdominal pressure, changes in gravitational position, and abdominal muscle contraction all increase the pressure gradient between the abdomen and the thorax, worsening GERD and esophagitis symptoms. This is of major concern in the high-performance cockpit. Reflux symptoms are of aeromedical concern because they can distract the aircrew member, though they are normally not disabling. The symptoms can be potentially disabling if the aviator has intractable coughing and aspirates. The availability of OTC medications can mask symptoms of severe disease until the flyer presents significant medical complications like hemorrhage or stricture. Acute hemorrhage secondary to mucosal ulcers may occur in aircrew with chronic GERD and severe esophagitis, and can be disabling. Acute esophageal obstruction, caused by food impaction in the face of a peptic stricture, can also be disabling. In addition, medications used to control esophagitis may cause disqualifying side effects. The prokinetic agents metoclopramide and cisapride are not compatible with flying duties and should not be used as first line agents. Typical antacids are safe to use in an aeromedical environment. Some H_2-receptor antagonists and PPIs are well-tolerated and recent changes to the Approved Aircrew Medication list have removed the necessity of a waiver if certain medications are well tolerated and control symptoms. At this time, the current approved GERD and EE medications are esomeprazole (Nexium®), omeprazole (Prilosec®), rabeprazole (Aciphex®), lansoprazole (Prevacid®), ranitidine (Zantac®), pantoprazole (Protonix®), and sucralfate (Carafate®). Each can be used to treat GERD or EE after a three day grounding period to rule out idiosyncratic reaction and to assure symptoms are controlled (See Official Air Force Approved Aircrew Medication list). Finally, for those aviators with Barrett's esophagus, there is concern regarding the future risk of esophageal cancer. The incidence of Barrett's esophagus progressing to adenocarcinoma is estimated to be 0.5 per 100 patient-years (i.e., one in 200 patients developing carcinoma per year).[10] As adenocarcinoma of the esophagus is a devastating disease, BE patients need to be followed closely.

III. Waiver Consideration.

Chronic or recurrent esophagitis including reflux esophagitis is disqualifying for all flying classes within the US Air Force. Similarly, symptomatic esophageal motility disorders (including Gastroesophageal Reflux Disease) not controlled by medications listed in the Official Air Force Approved Aircrew Medications list are disqualifying. For FC IIU, disqualification is limited to current or history of peptic, duodenal or gastric ulcer or gastrointestinal bleeding. If there is active esophagitis in a FC IIU member, good judgment will need to be utilized to ascertain whether or not the symptoms are distracting enough to warrant waiver consideration.

Table 1: Waiver potential for Esophagitis

Flying Class (FC)	Disease Status	Waiver Potential Waiver Authority
I/IA	Chronic or recurrent esophagitis History of esophagitis, resolved	No AETC Maybe AETC
II*	Chronic or recurrent esophagitis History of esophagitis, resolved	Maybe MAJCOM Yes MAJCOM
IIU	Chronic or recurrent esophagitis History of esophagitis, resolved	Maybe AFMSA Yes AFMSA
III*	Chronic or recurrent esophagitis History of esophagitis, resolved	Maybe MAJCOM Yes MAJCOM
GBC/ATC	Chronic or recurrent esophagitis or history of esophagitis, resolved	Yes AETC for untrained MAJCOM for trained
SMOD	Chronic or recurrent esophagitis or history of esophagitis, resolved	Yes AFSPC

*Initial FC II and FC III certification cases should be viewed similar to FC I/IA cases.

AIMWTS review in December 2009 revealed a total of 729 cases with the diagnosis of esophagitis. There were 5 FC I/IA cases, 363 FC II cases, 0 FC IIU cases, and 361 FC III cases. Of the total, 40 resulted in a disqualification; 1 case was FC I/IA, 12 were FC II and 27 were FC III. Only 2 disqualified aviators were disqualified primarily for esophagitis; one FC III aviator for bad disease and a FC II aviator for significant esophageal pain.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver requests should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for chronic or recurrent esophagitis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Thorough discussion of the history and etiology of the condition; detail any prior history of GERD; and list all treatments utilized to include results and side effects.
C. Consultation report by a gastroenterologist or internist.
D. Procedure reports: discussion of all endoscopic testing results.
E. Pathology reports if clinically indicated.

The aeromedical summary for the waiver renewal for esophagitis should include the following:
A. Interim history and treatment protocol.
B. Consultation report by a gastroenterologist or internist.
C. Procedure reports: discussion of all endoscopic testing results, if applicable.

ICD 9 codes for esophagitis	
530.10	Esophagitis, unspecified
530.11	Reflux esophagitis
530.12	Acute esophagitis
530.19	Other esophagitis

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WAIVER GUIDE
Initial Version: Jun 09
By: Lt Col Duncan Hughes (RAM 09B) and Dr Dan Van Syoc

CONDITION:
Eustachian Tube Dysfunction and Otitis Media (Jun 09)

I. Overview:

Eustachian tube dysfunction (ETD), which is most easily recognized as difficulty clearing one's ears, is often the cause for grounding of airmen. While most occupations require only normal hearing, a normal otoscopic exam, and absence of an ear disease history, the requirements for flight duty are far more rigorous[1]. Sudden changes in atmospheric pressure, as are experienced by aviators, demand tubal equilibrating capacity to be in optimal working order. Failure to equilibrate to rapid changes in atmospheric pressure can lead to the sudden onset of "ear block" – (barotrauma resulting in severe ear pain due to the inability to equilibrate pressures in the middle ear[2]). This sudden onset of severe pain may be incapacitating and pose great risk to safety of flight.

Our knowledge and understanding of the functions and diseases of the eustachian tubes (ET) are due to the pioneering works of men such as Bartolomeus Eustachius (16th century anatomist), Antonio Valsalva (18th century anatomist), and Adam Politzer (19th century otologist). As an outgrowth of their endeavors, we now realize that the ET serves three physiologic functions: 1) pressure regulation, 2) protection of the middle ear from pathogens/foreign material in the nasopharynx, and 3) clearance of the middle ear space[3]. Failure of the tubal mechanism can disrupt any and/or all of these functions. This altered tubal function may then lead to a multitude of complications which vary from mild and transient (i.e. causing temporary DNIF) to severe and debilitating (i.e. permanently disqualifying). For example, the transient difficulty clearing ears caused by viral upper respiratory tract infections (URIs) and/or seasonal allergic rhinitis (SAR) may only cause mild and/or fleeting symptoms. However, ETD has also been linked to the development of chronic otitis media and secondary cholesteatoma (trapping of squamous debris in the middle ear and mastoid).

In its resting state, the ET remains closed and only opens when necessary to equalize pressure. In flight, ascent usually causes little trouble even in the absence of any active ear clearing maneuvers. This is due to the passive escape from the middle ear of expanding air as it exceeds the opening pressure of the ET. However, 10-17% of airmen have reported vertigo during ascent which is believed to be secondary to asymmetry between the right and left side (i.e. alternobaric vertigo-causing a differential input to the vestibular system)[1, 2]. This is more frequently seen on descent which requires the active passage of air into the middle ear space. This is normally accomplished by the tubal musculature associated with deglutition and/or jaw movements[1]. The most well known example of this is the *Toynbee's maneuver*: displacement of air by the movement of the eardrum when swallowing with the nose closed[1]. Should such maneuvers fail, air can be forced into the middle ear by increasing nasopharyngeal pressures via the *Valsalva maneuver*: displacement of air by the movement of the eardrum caused by forceful expiration against a closed nose[4]. Many authorities suggest as safer alternatives the Toynbee or *Frenzel maneuvers*: open the jaw, fill mouth with air, pinch the nose, purse the lips, and then close the jaw while displacing air posteriorly by pushing the tongue up and back[4]. In a minority of cases, anatomic, hormonal, and disease factors

cause the ET to be remain open continuously (i.e. a patulous ET). This often leads to auditory complaints including autophony (hearing one's own breathing).

There are myriad etiologies of ETD and not all are understood in their entirety. Many mechanisms are easily understood. For example, the initiation of swelling, inflammation and/or drainage within the ET caused by entities such as viral URI, chronic sinusitis, and/or allergic rhinitis is a rather straightforward cause. Further, obstructive mechanisms such as adenoid hypertrophy, deviated nasal septum, or nasal polyposis are also well known. Less well appreciated, however, are other causes of ETD such as the decreased tubal function associated with tobacco smoke (decreased ciliary function), reflux disease (nasopharyngeal exposure to gastric contents), and congenital abnormalities (location/angle of tube, cleft palate, reduced mastoid air cell system)[3].

Any history of fullness or clogging of the ears, otalgia, hearing loss, tinnitus or dizziness should prompt an evaluation for ETD. A common complaint is that no amount of yawning, swallowing, chewing or attempted Valsalva maneuver alleviates the symptoms. Several methods are available to assess the function of the ET in the office. Otoscopic observation of tympanic membrane (TM) mobility caused by the Toynbee, Frenzel, Valsalva maneuvers and/or pneumatic otoscopy is good evidence of a functional/patent ET. Likewise, a normal tympanogram attests to the normal transmission of energy through the middle ear space[3]. However, studies have not shown good correlation between a normal tympanogram and any predictive value for barotrauma[2]. The limiting factor for all of these assessment tools; however, is that none of them assess ET function during the dynamic changes in atmospheric pressure experienced by aviators. Such complex function should be tested during simulated flights in a pressure chamber[1]. Even this assessment, however, short of expensive and invasive pressure manometer placement, is dependent upon the subjective report of the aviator. Seeking the best combination of cost, non-invasiveness and accurate surrogacy for the dynamic flight environment has led the United States Air Force to select demonstration of a normal Valsalva maneuver and successful completion of a pressure chamber flight as criteria for pilot selection and training[1]. The main predictors of barotrauma continue to be a previous history of nasal or otologic disease and/or abnormal otoscopy[2].

Review of the medical literature reveals no clear consensus on the efficacy of treatment modalities for ETD. While there are studies showing promising results from treating inflammatory, congestive and allergic causes for ETD with the appropriate oral/topical decongestant, antihistamine or nasal steroid, there are also studies which do not duplicate such promising outcomes[6-8]. Likewise, success rates following surgical correction for ETD have varied. Insertion of pressure equalization tubes (PET) has long been the mainstay of surgical treatment for ETD. However, several investigators have found that while the pressure differential between the middle ear and the external auditory canal may be immediately resolved, the function of the ET itself does not change following PET insertion. Other procedures such as adenoid resection and laser eustachian tuboplasty have also shown a mix of success and failure in treating ETD[3]. Thus, regardless of whether medically or surgically treated, and regardless of specific etiology, the outcome of any treatment for ETD needs to be evaluated on a case by case basis to determine the presence of acceptable ET function. This is especially true in the aviator population.

ETD and otitis media (OM), another common disorder of the middle ear, are closely related. Historically, the pathophysiology of OM has always been linked with abnormalities of ET function. As previously reviewed, the ET performs the three classic functions of aeration, clearance, and protection of the middle ear. Traditional teaching has held that the ET function of aeration was

limited and that this was the underlying cause of most acute otitis media (AOM). More recent investigation, however, has suggested that AOM is the result of bacterial entry into the middle ear (i.e., failure of protection). In either case, that there is a relationship between ETD and the development of OM is clear. Whether or not ETD precedes AOM, the finding of ETD in patients with AOM is nearly universal[9]. While space here does not permit a separate treatise on OM and its many variants, the following five principles derived cooperatively by the Centers for Disease Control and the American Academy of Pediatrics should help to guide OM-related diagnosis and treatment decisions: 1) the diagnosis of OM should not be made unless fluid is present in the middle ear, 2) OM should be classified as AOM or otitis media with effusion (OME) on the basis of the presence or absence of signs and symptoms of acute illness, 3) in contrast to AOM, OME should not be treated with an antibiotic, 4) effusion is likely to persist after the treatment of AOM and does not require repeated treatment, and 5) antibiotic prophylaxis for AOM should be used only in accordance with strict criteria[10].

For questions regarding the complication of cholesteatoma, please refer to the waiver guide on that topic.

II. Aeromedical Concerns.

ETD may result in the failure to equilibrate middle ear pressures and lead to pain, impairment of hearing, and vertigo, with or without rupture of the tympanic membrane, resulting in compromised aircraft safety if a member of the crew is incapacitated in this way[1]. ETD may only be minimally symptomatic at ground level. However, such tubal dysfunction can block the flow of air in and out of the middle ear space. In the presence of ETD, dynamic perturbations of atmospheric pressure may result in acute barotrauma, resulting in sudden, incapacitating pain. Should such an event occur immediately prior to or during landing procedures, it could lead to sudden incapacitation and an aircraft mishap. Treatment should consist of returning to altitude to allow slower equilibration of the middle ear, the use of Afrin, and if the block persists on landing, the use of a Politzer bag to assist in ventilating the middle ear. There is no quick test to ensure the ET is patent prior to flight; but, being able to Valsalva and prior successful completion of altitude chamber training are a close approximation. Further, any middle ear disturbance (e.g. ETD or OM) raises concern for decreased and/or loss of hearing, disequilibrium, and the development of more extensive disease.

There are some concerns about the chronic use of PE tubes in aviators. Most patients requiring prolonged PE tubes will end up with a large central perforation which tends to remain as long as the ear is not being ventilated. Also, the PE tubes can fail. They get plugged, extrude, cause granulation tissue which then causes bleeding and infection, and can cause perforations of the TM. They can also act as a conduit for fluids getting in the middle ear especially soapy fluids with low surface tensions that then can cause a chemical irritation of the middle ear and subsequent otorrhea/infection. The other challenge is that it sometimes takes a microscope to see what is actually going on with a PE tube, so a deployed FS looking at with an otoscope may not be able to discern what is happening with the tube or TM.

III. Waiver Considerations.

Acute ETD/OM secondary to a transient illness (e.g. viral URI or SAR) requires no waiver but is grounding for flyers until resolution. However, chronic ETD/OM is disqualifying and requires a waiver for FC I/IA, II and III. Also any surgical procedure for correction of ETD/OM is

disqualifying for FC I/IA, II and III. It is summarily accurate to emphasize that resolution of ETD/OM and adequacy of ET function are to be assessed on a case by case basis and that no one treatment or procedure, per se, will lead to waiver approval. Regardless of cause or treatment modality, ET functionality must be demonstrable for waiver authority consideration to be granted. In general, the permanent use of PE tubes in flyers is not a good idea, but it is a fact that adults tend to tolerate chronic use of PE tubes better than children. What is important is the operational necessity of using the tubes and the clinical judgment of the flight surgeon and treating otolaryngologist.

Table 1: Waiver potential for chronic ETD/OM and/or surgery for same.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	ETD/OM, regardless of cause, controlled with nasal steroids and/or approved oral antihistamines. ETD/OM, regardless of cause, controlled via surgical correction.	Maybe* AETC Maybe*# AETC
II	ETD/OM, regardless of cause, controlled with nasal steroids and/or approved oral antihistamines. ETD/OM, regardless of cause, controlled via surgical correction.	Yes* MAJCOM Yes*#+ MAJCOM
IIU	ETD/OM, regardless of cause, controlled with nasal steroids and/or approved oral antihistamines or surgery.	Yes@ AFMSA
III	ETD/OM, regardless of cause, controlled with nasal steroids and/or approved oral antihistamines. ETD/OM, regardless of cause, controlled via surgical correction.	Yes* MAJCOM Yes*#+ MAJCOM

* Waiver in FC I/IA and untrained FC II/III requires at least 12 months of symptoms controlled on medication before waiver.
# Waiver may be considered if at least 3 months after surgery, symptoms entirely resolved, clearance granted by ENT physician. ENT clearance is mandatory as different surgical procedures (e.g. PET vs. cholesteatoma resection) have dramatically different recovery periods and associated complications. Further, any surgical complications (e.g. hearing loss) require evaluation and waiver of their own accord.
+ Altitude chamber ride up to 8-10,000ft with rapid decompression is required. If treated with surgery, altitude chamber ride no earlier than 6 weeks after surgery or when cleared by ENT physician (whichever is later).
@ Waiver for FC IIU will most likely be approved as long as there is no hearing impairment.

A review of AIMWTS through April 2009 showed 99 cases with the diagnosis of ETD; 3 were FC I/IA, 28 FC II, and 68 FC III. Of the 69 (69%) disqualified cases, 2 were FC I/IA, 13 were FC II

and 54 were FC III. In every case, except one (optic drusen), the disqualifying diagnosis was the ETD/inadequate or absent Valsalva. In almost every case where the ETD was treated with aeromedically waiverable medications and/or surgical correction (e.g. PET, adenoidectomy, cholesteatoma resection, nasal polypectomy, etc.), the waiver was granted in the presence of subsequently demonstrated pressure equalization (e.g. altitude chamber). In only one case was a granted waiver subsequently denied due to recurrent ETD. Of note, a difference of opinion is noted in review of this group of waivers: 15 of 20 times that waiver was sought for ETD post correction with PETs, waiver was granted; 5/20 times the waiver authority denied waiver for either "permanent need for PETs" or "risk of in-flight PET failure" despite demonstrated placement and function of the PETs. (Of historical note, in WWII, healthy German Stuka Dive bomber pilots had myringotomies done to facilitate rapid pressure changes on bombing runs). However if a pilot has a clinical problem, PE tubes solve the immediate issue of middle ear ventilation, but long term challenges are the following: 1) occlusion of the PE tube from wax or serous fluid, 2) premature extrusion, 3) contamination of the middle ear with water-especially soapy water with secondary otitis media or chemical inflammation, 4) risk of cholesteatoma, 5) persistent TM perforation, 6) potential for unequal middle ear equilibration leading to alternobaric vertigo, and 7) inability to care for these problems in an austere environment.

A review of AIMWTS through the beginning of April 2009 showed 9 cases with the diagnosis of OM (1 duplicate case from the ETD group). All 9 submissions were for FC III aviators. In every case, the OM waiver was granted whether the end result was resolution, treatment with aeromedically waiverable medications, and/or surgical correction (e.g. PETs). Two of these waivers were later denied because of a comorbid diagnosis (Crohn's disease and complications status post cholesteatoma resection requiring ossicle reconstruction).

IV. Information for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for <u>initial waiver</u> for ETD/OM should include the following:
A. History – symptoms (flying and on ground), duration, and treatment.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Physical – HEENT including Valsalva.
D. ENT consultation report to include any surgical reports if applicable.
E. Audiology with Impedance test consultation report.
F. Altitude chamber flight results.

The aeromedical summary for <u>waiver renewal</u> for ETD/OM and/or surgery should include the following:
A. History – interim summary of any symptoms (flying and on ground), treatments, or recurrences/exacerbations since last waiver.
B. Physical – HEENT including Valsalva.
C. ENT consult if symptoms recurrent.
D. Audiology consult if symptoms recurrent.
E. Status report of ET functional capacity in flight (i.e. any in-flight symptoms?).

ICD9 Codes for Eustachian Tube Dysfunction and Otitis Media	
381.0	Acute nonsuppurative otitis media
381.01	Acute serous otitis media
381.1	Chronic serous otitis media
381.02	Acute mucoid otitis media
381.2	Chronic mucoid otitis media
381.3	Other and unspecified chronic nonsuppurative otitis media
381.4	Nonsuppurative otitis media, not specified as acute or chronic
381.5	Eustachian salpingitis
381.6	Obstruction of the Eustachian tube
381.7	Patulous Eustachian tube
381.8	Other disorders of the Eustachian tube
381.9	Unspecified Eustachian tube disorder
382.0	Acute suppurative otitis media
382.01	Acute suppurative otitis media with spontaneous rupture of the ear drum
382.3	Unspecified chronic suppurative otitis media
382.4	Unspecified suppurative otitis media
382.9	Unspecified otitis media

Waiver guide reviewed by Col David Schall (RAM 83/Otolaryngologist and Neuro-Otologist.)

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WAIVER GUIDE
Updated: Dec 06
By: Lt Col Cunningham (RAM 08) and Dr Fox

CONDITION:
Gallstones (Cholelithiasis) (Dec 06)

I. Overview.

Gallstone disease is one of the most common diseases in the world. It is estimated that in the United States, approximately 30 million people have gallstones. The age-adjusted female-to-male ratio is 2.9 between ages 30 and 39 years but decreases to 1.2 between the ages of 50 and 59 years. Asymptomatic gallstones comprise about 85% of gallstones. USAF aircrew, being predominantly younger and male, have an estimated prevalence of 1%-2% asymptomatic gallstones. These asymptomatic gallstones convert to symptomatic cholelithiasis at a rate of about 2% per year for 5 years and then decreases over time. When symptoms do occur, the classic is biliary colic, a moderately severe crescendo type pain in right upper quadrant radiating to the back and right shoulder, which may be accompanied by nausea, and lasting one to four hours. Pain may be brought on by fatty foods. Suspected gallstones are usually diagnosed by transabdominal ultrasonography.

Symptomatic cholelithiasis is effectively treated with cholecystectomy, most commonly via laparoscopy. When fully recovered (approximately 3 weeks for the laparoscopic technique), patients who have demonstrated an absence of retained stones after cholecystectomy are qualified to return to flying status without waiver. Dissolution therapy with ursodeoxycholic acid (UDCA) is generally reserved for those patients with contraindications to laparoscopic cholecystectomy. UDCA can dissolve multiple small stones (<5 mm) in up to 60% of patients with a functioning gallbladder. Gallstones generally dissolve at a rate of 1 mm per month. After dissolution, gallstones recur at a rate of 10% per year for 5 years. This prolonged and less effective approach is not recommended for aviators. Extracorporeal shock wave lithotripsy may successfully disintegrate existent larger stones, but does not correct the lithogenic diathesis of the individual. Gallstones disappear in more than 50% of patients, but recurrences occur in 50% of successfully treated patients. Again this approach is not recommended for aviators.

Asymptomatic cholelithiasis found incidentally, usually on ultrasound or CT, is generally not treated in the civilian community except possibly for individuals at increased risk for gallbladder carcinoma or gallstone complications, in whom prophylactic cholecystectomy or incidental cholecystectomy at the time of another abdominal operation can be performed. In flyers, not treating incidentally found gallstones may be valid as long as there are no symptoms associated with cholelithiasis. Key point is “what prompted the test that discovered the cholelithiasis in the first place?”

II. Aeromedical Concerns.

In patients with gallstones, biliary colic can present abruptly as a sharp, incapacitating abdominal pain that is frequently accompanied with intense nausea and emesis.

III. Information Required for Waiver Submission.

A waiver is required before return to flying for any case of asymptomatic cholelithiasis. The aeromedical summary needs to include a report of how the stones were discovered, a detailed G.I. history noting any abdominal pains, and address concerns of underlying pathology and gallbladder function along with the likelihood of the stones evolving into symptomatic cholecystitis. Asymptomatic cholelithiasis is not waiverable for FCI/IA. Aviators with symptomatic cholelithiasis are not eligible to return to flying status until status post cholecystectomy.

If the aircrew member has had a cholecystectomy, is fully recovered, and has demonstrated the absence of retained stones, then the individual should be returned to flying status and no waiver is required.

IV. Waiver Considerations.

The table below is a summary of the waiver potential/requirement based upon flying class and cholelithiasis status.

Cholelithiasis Status	**Flying Class**	**Waiver Potential/Waiver Authority**
Asymptomatic	I/IA	Not waiverable/AETC
	II/III	Yes/MAJCOM
Symptomatic	I/IA	Not waiverable/AETC
	II/III	Not waiverable/MAJCOM
Status post cholecystectomy	I/IA	No waiver required, qualified
	II/III	No waiver required, qualified

Review of AIMWTS through October 2006 showed 16 cases of cholelithiasis; ten FC II, five FC III and one ground base controller. All received waivers except two and these had additional nonwaiverable conditions. Five were symptomatic and had a cholecystectomy performed. Eight were incidentally found and no symptoms were present, of which two underwent cholecystectomy. Three had abdominal symptoms that after workup were finally diagnosed as muscle strain for two and dyspepsia controlled with medication for the other; all symptoms resolved and the cholelithiasis was deemed incidental and asymptomatic.

This waiver guide was reviewed by USAF/SG Consultant for Gastroenterology, Lt Col Cheryl Cox.

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WAIVER GUIDE
Updated: Nov 09
Supersedes Waiver Guide of Nov 06
By: Dr. Dan Van Syoc

CONDITION:
Gastroesophageal Reflux Disease (Nov 09)

I. Overview.

Gastroesophageal reflux disease (GERD) includes the constellation of symptoms and sequelae which occur as a result of excessive exposure of the esophageal mucosa to injurious gastric contents. Gastroesophageal reflux (GER) is a multifactorial process, with transient lower esophageal sphincter (LES) relaxation felt to be the key motility disorder in mild to moderate disease. It is estimated that 40% of the U.S. population experiences symptoms of GER at least once a month, with 7% experiencing symptoms daily. The most common symptoms of GERD are pyrosis and regurgitation. Other symptoms may include dysphagia, odynophagia, water brash, chest pain and hemorrhage. Pulmonary symptoms may be the only clinical manifestations of GER and include chronic cough, wheezing, asthma, hemoptysis, hoarseness and recurrent aspiration pneumonia. The presence of GER is suggested by history, whereas the presence and complications of reflux esophagitis are most commonly assessed through endoscopy. Endoscopy may be normal in many patients with GER (up to 40%) or may reveal erosive esophagitis, peptic stricture, columnar cell-lined lower esophagus (Barrett's esophagus), or adenocarcinoma. The presence of alarm symptoms, such as dysphagia, weight loss, and bleeding, suggest more complicated disease and warrant endoscopic investigation. The differential diagnosis of GERD includes peptic ulcer disease, gastritis, symptomatic gallstones, and nonsteroidal anti-inflammatory (NSAID)-induced GERD, all of which should be at least briefly considered in the dyspeptic patient. Mildly symptomatic cases could benefit from lifestyle changes prior to pharmacologic interventions. Obesity is strongly correlated to GER, through a variety of mechanisms, and should be a focus of non-pharmacologic intervention. Additional conservative treatment measures include the avoidance of fatty foods, chocolate, and carminatives (spearmint, peppermint). Alcohol and smoking can decrease LES pressure and/or delay gastric emptying which can cause/worsen symptoms of GER. NSAIDs can be caustic to the esophageal mucosa; these agents also should be avoided. Patients should also be taught to avoid wearing tight clothing, eating large meals, and reclining soon after eating.

First line pharmacologic therapy involves the use of antacids; the most effective are those which contain a combination of magnesium and aluminum hydroxides. Most individuals with either heartburn or regurgitation, which do not respond to conservative measures including intermittent antacid use, will self-medicate with OTC H_2-receptor antagonist regimens (ranitidine or famotidine), or even proton pump inhibitors (PPIs) such as Prilosec OTC. The availability of potent OTC meds is a concern for flight surgeons, since patients with potentially severe GERD can self-medicate gain symptom relief, even though their clinical condition could be of aeromedical concern.

Disease severe enough to warrant physician attention can be treated with higher dose H_2-receptor antagonists or with a proton pump inhibitor (omeprazole, rabeprazole, lansoprazole, pantoprazole). Prokinetic agents, such as metoclopramide are not waiverable secondary to its side effect profile. In resistant and complicated cases of GERD, antireflux surgery may be considered. Nissen

fundoplication, the preferred antireflux procedure, reinforces the lower esophageal sphincter with a 360-degree gastric wrap around the lower esophagus. Nissen procedures can now be done through laparoscopy or thoracoscopy. Major complications of GERD include esophageal strictures, ulceration with or without hemorrhage, and the development of Barrett's esophagus. Any of these complications should prompt referral to a gastroenterologist for further evaluation and treatment.

II. Aeromedical Concerns.

Increases in intra-abdominal pressure, changes in gravitational position, and abdominal muscle contraction all increase the pressure gradient between the abdomen and the thorax, worsening the symptoms of GERD. This is of major concern in the high-performance cockpit. Reflux symptoms are of aeromedical concern because they can distract the aircrew member even though they are usually not disabling. The availability of OTC medications can mask symptoms of severe disease until the flyer presents significant medical complications like hemorrhage or strictures. Acute hemorrhage secondary to mucosal ulcers can occur in aircrew with chronic GERD and severe esophagitis and can be disabling. Acute esophageal obstruction, caused by food impaction in the face of a peptic stricture, can also be disabling. As already noted, medications used to control GERD may cause disqualifying side effects. Metoclopramide, a dopamine antagonist, crosses the blood-brain barrier. Up to 20% of patients experience psychotropic side effects which include somnolence, lassitude, restlessness, anxiety, insomnia, and rarely extrapyradimal reactions. Cisapride, another dopamine antagonist, is better tolerated. However, it is still associated with psychiatric and extrapyramidal symptoms as well as QT prolongation and serious ventricular arrhythmias; the latter has been a particular problem with this drug. Sucralfate, an aluminum sucrose polysulfate, potentiates cytoprotection and mucosal resistance. It is safe to use in initial and maintenance therapy, though its efficacy is limited. Antacids are also safe to use in an aeromedical environment.

III. Waiver Considerations.

A recent policy change eliminates the routine need for a waiver for GERD. The current policy states that a waiver is necessary for "symptomatic esophageal motility disorders (including Gastroesophageal Reflux Disease) not controlled by medications listed in Official Air Force Approved Aircrew Medications". The current approved GERD medications are esomeprazole (Nexium®), omeprazole (Prilosec®), rabeprazole (Aciphex®), lansoprazole (Prevacid®), ranitidine (Zantac®), or pantoprazole (Protonix®); each can be used to treat GERD after a three day grounding period to rule out idiosyncratic reaction and to assure symptoms are controlled. Esophagitis that is more than reflux disease will require closer scrutiny and tighter control of medications. Current policy dictates the need for a waiver for history of chronic or recurrent esophagitis to include reflux esophagitis.

Table 1 – Waiver Potential for GERD

Flying Class (FC)	GERD Status	Waiver Potential Waiver Authority
I/IA	GERD controlled by approved medications	Waiver not required AETC
	GERD controlled by Surgery*	Yes AETC
	GERD not controlled by approved medications or surgery	No AETC
II	GERD controlled by approved medications	Waiver not required MAJCOM
	GERD controlled by Surgery*	Yes MAJCOM
	GERD not controlled by approved medications or surgery#	Maybe MAJCOM
IIU	GERD controlled by approved medications	Waiver not required AFMSA
	GERD controlled by Surgery*	Yes AFMSA
	GERD not controlled by approved medications or surgery#	Maybe AFMSA
III	GERD controlled by approved medications	Waiver not required MAJCOM
	GERD controlled by Surgery*	Yes MAJCOM
	GERD not controlled by approved medications or surgery#	Maybe MAJCOM

*If surgery is successful and patient does not require maintenance medications, no waiver is necessary. A waiver will be required if medication usage is still required, even for medications on the approved list.

#Routinely unapproved medications may be considered on a case-by-case basis after discussion with waiver authority and the ACS. This is typically done only after all approved medications have had an adequate trial (and failed) and even then approval is not guaranteed.

AIMWTS review in Nov 2009 revealed over 2000 aircrew with a diagnosis of GERD. Over 90% of these cases received a waiver and almost every disqualification was due to a diagnosis other than GERD.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

For cases requiring a waiver, the following information is necessary:

A. History of symptoms and all treatments attempted with response.
B. Diagnostic test results and consultation findings.
C. Surgical report if indicated.
D. Documentation of resolution of symptoms and observation for adverse reaction.

ICD-9 codes for GERD	
530.81	Esophageal reflux

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WAIVER GUIDE
Updated: Feb 2010
Supersedes Waiver Guide of Dec 2006
By: Dr Dan Van Syoc

CONDITION:
Gout (Feb 10)

I. Overview.

Gout is a recurrent, often monoarticular, acute arthritis resulting from the deposition of urate crystals within joint spaces and in adjacent cartilage and tendons. Fundamental to the development of gout is a substantial increase in total body uric acid stores, as reflected in the metabolic disorder hyperuricemia. It is important to realized that all patients with gout have hyperuricemia (serum uric acid level exceeding 6.8 mg/dL), but that the vast majority of hyperuricemic individuals never experience a clinical event resulting from urate crystal deposition.[1] Gout is a very common disease accounting for an estimated 4 million outpatient visits annually in the United States.[2] It is estimated to affect at least 1 percent of men with a male:female ratio ranging from 7:1 to 9:1.[3] Gout is predominantly an idiopathic or multifactorial disease of adult men, with a peak incidence in the fifth decade and it rarely occurs in men before adolescence or in women before menopause.[4]

The term *gout* is used to represent a heterogeneous group of diseases found exclusively in humans that include the following characteristics: 1) elevated serum urate concentration (hyperuricemia), 2) recurrent attacks of acute arthritis in which monosodium urate (MSU) crystals are demonstrable in synovial fluid leukocytes, 3) aggregates of MSU crystals (tophi) deposited chiefly in and around joints, which sometimes lead to deformity and crippling, 4) renal disease involving glomerular, tubular, interstitial tissues and blood vessels, and 5) uric acid nephrolithiasis.[5] A minority of gout cases are due to heritable defects (about 10%), while the majority are due to increased cell turnover due to tumors, disease states and declining renal function, or the influence of other medications on renal function. Gout is classified as overproduction of uric acid (10%) or underexcretion of uric acid (90%). The most common initial presentation is an acute episode of pain in first metatarsophalangeal joint (also called podagra) which reaches its maximum intensity within 6-12 hours, often with overlying erythema. Such a presentation is highly suggestive of the diagnosis of gout, but the demonstration of MSU crystals in the synovial fluid permits a definitive diagnosis.[6]

Hyperuricemia is common in our US population and is often caused by a combination of high purine diet, alcohol use, diuretic therapy, and reduced renal clearance. Uric acid is a metabolic by-product of purine metabolism which explains the issue with purine-rich foods.[2] The symptoms of gout and gouty arthritis are due to the unique characteristics of MSU which can cause crystals to precipitate in body fluids if the concentration surpasses its solubility. These crystals are capable of directly triggering and sustaining an intense inflammatory response, the so-called “acute attack”, because of their ability to activate humoral and cellular inflammatory components.[7] Early attacks of gout, if untreated, usually resolve spontaneously in three to ten days, but tend to recur with increasing frequency. Intercritical gout is the interval between acute synovitis attacks. Chronic arthritis may develop, with deposition of crystal aggregates (tophi) in cartilage, synovial membranes, tendons, and soft tissues, and nephrolithiasis with obstructive uropathy which may occur from precipitation of crystals in the renal collecting system.

Since the 1960s, there has been a reported relation between serum uric acid levels and numerous cardiovascular conditions including hypertension, metabolic syndrome, coronary artery disease, cerebrovascular disease, vascular dementia, preeclampsia, and kidney disease. It is unclear how important these associations are and there is not yet adequate data to support the general treatment of asymptomatic hyperuricemia to reduce cardiovascular risk. The major point of emphasis is for the provider to be looking for such conditions in patients with known gouty disease or significantly elevated uric acid levels.[8] Gout is also associated with obesity and metabolic syndrome. Lifestyle modifications aimed at these highly morbid conditions can also reduce the likelihood of gout recurrence. Diet, exercise, and alcohol moderation can reduce body mass index (BMI), blood pressure, triglycerides, and waist-to-hip ratio and the associated likelihood of gout recurrence.

Nephrolithiasis occurs in 10 to 25 percent of patients with primary gout. The likelihood of stones in a given patient with gout increases with serum urate concentrations and with amounts of urinary uric acid excretion. It exceeds 50 percent with a serum urate level above 13 mg/dl or with urinary uric acid excretion rates in excess of 1100 mg every 24-hours.[5]

In the acute setting, standard therapy consists of prompt treatment of the pain and disability with nonsteroidal anti-inflammatory drugs (NSAIDs) (indomethacin has been the traditional choice by clinicians but is not currently waiverable) or colchicine. Narcotics can be considered for acute pain control. Intrarticular injection of glucocorticoids represents the most efficacious and expedient care if available. Parenteral steroids can also be considered. NSAIDs given in full anti-inflammatory doses are effective in approximately 90% of patients, and the resolution of signs and symptoms usually occurs in 5-8 days. Oral glucocorticoids should be reserved for polyarticular disease.[9] Oral colchicine can be effective for the treatment of acute gouty arthritis, particularly when administered early after the onset of symptoms. It is a plant derivative and inhibits leukocyte activation and migration, and is most effective if given during the first 24 to 48 hours of the attack. However, its use is limited by adverse effects. In one study, approximately two-thirds of colchicine-treated patients improved after 48 hours compared with one-third of the placebo group. However, all patients taking colchicine developed diarrhea and/or vomiting after a median time of 24 hours (mean colchicine dose 6.7 mg), which was before the relief of pain in the majority of patients. As a result of these adverse effects, the use of oral colchicine should be limited to patients intolerant of NSAIDs or for those who have used colchicine with success in the past.[10, 11]

After the acute attack has subsided a decision needs to be made regarding long-term management of the condition. This will normally consist of one of the urate-lowering agents. Indications for such therapy include two or more gout attacks per year, tophaceous gout, erosive arthritis on radiographs, and uric acid kidney disease (urate nephropathy, uric acid nephropathy, and uric acid nephrolithiasis). The goal for therapy is to lower the serum uric acid level to less than 6.0 mg/dL, as serum uric acid levels below this level have been associated with a reduced frequency of acute attacks.[10] Uricosuric drugs increase the urinary excretion of urate, thereby lowering the serum urate concentration. Approximately 75% of patients with primary gout have substantially decreased renal urate excretion. However, uricosuric medications including probenecid require an adequate glomerulo-filtration rate (>60 mg/min) to be effective. Furthermore, patients prescribed probenecid should be counseled to avoid salicylate use at doses greater than 81 mg per day. Xanthine oxidase inhibitors block the final step in urate synthesis. Allopurinol is effective in lowering serum urate concentrations in both urate over production and renal urate under excretion and is once-a-day dosing. Gouty individuals who excrete larger quantities of uric acid (>800mg/24-hours) in their urine, who have a history of renal calculi of <u>any</u> type, or have renal insufficiency should be treated

with allopurinol. Antihyperuricemic agents should not be initiated, adjusted, or stopped during the acute attack without the specific guidance of a rheumatologist as fluctuations in the serum urate concentration may exacerbate an acute attack. Colchicine (not on waiverable medication list) or NSAIDs can be used prophylactically against recurrent attacks, especially during the initiation of urate lowering treatment. However, although colchicine and NSAIDs may block the acute inflammatory response they do not alter the deposition of crystals in tissue. Therefore, colchicine and NSAIDs should not be used solely for prophylaxis but in conjunction with urate-lowering drugs.

II. Aeromedical Concerns.

Acute episodes of gout may cause significant physical incapacitation due to painful joints and cognitive impairment due to distraction of pain. In addition, the risk of nephrolithiasis increases modestly with the serum urate level and with the magnitude of daily urinary uric acid excretion. Chronically, gout may cause significant physical incapacitation due to erosive joint deformities, urate nephropathy, and/or obstructive uropathy (e.g. nephrolithiasis).

NSAIDs can cause gastritis acutely; chronic use can result in peptic ulcer disease and both chronic and acute renal insufficiency. Colchicine may cause diarrhea in the typical prophylactic dose and it usually causes moderate to severe intestinal cramping and vomiting if given intravenous or in high dose orally to abort acute gout. All antihyperuricemic drugs can precipitate an attack of acute gouty arthritis as serum uric acid levels are lowered. Up to 5% of patients are unable to tolerate allopurinol because of adverse events including headache and gastrointestinal irritation, and less commonly, but far more serious, is the occurrence of severe hypersensitivity reactions and bone marrow suppression.

The major questions to be answered prior to requesting a waiver include: Are the gouty attacks frequent and severe? Is the patient free of renal involvement? Does the patient have hypertension, diabetes, atherosclerosis, or other disease associated with gout? Is the serum uric acid kept at normal levels with medication and is the patient free of untoward side effects of the medication prescribed? All of these are important considerations for an airman with gout.[12]

III. Waiver Consideration.

Gout is disqualifying for Flying Classes I, II, IIU, and III per AFI 48-123.

Table 1: Waiver potential for gout

Flying Class (FC)	Gout Treatment Status	Waiver Potential Waiver Authority
I/IA	No meds, allopurinol, probenecid, NSAIDs* or colchicine	No AETC
II	No meds, allopurinol. probenecid, NSAIDs* Colchicine	Yes MAJCOM No MAJCOM
IIU	No meds, allopurinol. probenecid, NSAIDs* Colchicine	Yes AFMSA No AFMSA
III	No meds, allopurinol. probenecid, NSAIDs* Colchicine	Yes MAJCOM No MAJCOM

* NSAIDs currently on waiverable medication list are ibuprofen and naproxen.

Review of AIMWTS data in Nov 09 revealed a total of 311 cases. There was 1 FC I/IA case, 170 FC II cases, 1 FC IIU case and 138 FC III cases. Of the total, there were 24 disqualifications; 15 were FC II and 9 were FC III; although gout should not be waived in FC I/IA applicants, the one FC I case was waived. All but one case were disqualified for a diagnosis other than gout. One FC III aircrew was disqualified for severe gout symptoms.

IV. Information Required for Waiver Submission.

Information for the initial waiver for gout should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history to include description of acute gouty arthritis (duration, location, response to medical treatment), risk factors (aberrant diet, alcohol intake, elevated BMI) and associated conditions (HTN, kidney stones). Negatives for risk factors and associated conditions should be included.
C. Physical exam with special attention to joints and presence of tophi. Screening radiographs of the hands and feet as hands and feet hold wealth of information about joint health.
D. Labs: Results of joint aspiration; Serum BUN, creatinine, and uric acid. (Uric acid levels are frequently normal during attacks).
E. If prophylaxis begun, then current medication, dose, any side effects, and uric acid level (goal < 6.0 mg/dL). A 24-hour urine for uric acid is required to show that the individual is not a urate over producer if started on probenecid.

F. Consultation report from a rheumatologist or internist.

Information for waiver renewal should include the following:
A. Interim history to include any interval attacks to along with frequency, specific joint involvement, and treatment.
B. Physical exam with special attention to joints and presence of tophi. If abnormality of joints or tophi, then x-rays of involved area.
C. If on prophylactic treatment then annual uric acid level (goal <6.0 mg/dL) on medications and current medication, dose and side effects experienced.
D. Consultation report from a rheumatologist or internist.

ICD 9 codes for gout	
274	Gout
274.0	Gouty Arthropathy
274.1	Gouty Nephropathy
274.82	Tophaceous Gout
274.9	Gout, unspecified

Reviewed by AF/SG Consultant for Rheumatology, Col William Venanzi.

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WAIVER GUIDE
Updated: Dec 2010
Supersedes Waiver Guide of Mar 2007
By: Dr Dan Van Syoc
Reviewed by Dr. Steve McGuire, ACS Neurologist

CONDITION:
Guillain-Barré Syndrome (Acute Inflammatory Demyelinating Polyradiculoneuropathy) (Dec 11)

I. Overview.

Guillain-Barré syndrome (GBS) consists of a heterogeneous group of acute, progressive, immune-mediated, polyradiculoneuropathies. These variants include acute inflammatory demyelinating polyradiculoneuropathy (AIDP, in 85% to 90% of U.S. and European cases), the Miller Fisher syndrome (MFS, in 5% of U.S. and 25% of Japanese cases) characterized by ophthalmopelgia, ataxia and areflexia, acute motor axonal neuropathy (AMAN, in 5% to 10% of U.S. cases), acute motor and sensory neuropathy (AMSAN), and acute panautonomic neuropathy.[1, 2] In 70% of cases, GBS is typically preceded (days to weeks) by trigger events, most commonly viral or bacterial infectious illnesses often relating to campylobacteriosis, respiratory infections, or gastrointestinal infections.[1, 3, 4, 5, 6] AMAN and AMSAN occur more frequently in *Campylobacter jejuni* infected patients and *C. jejuni* infection is associated with slower recovery, axonal degeneration and severe residual disability. GBS can also be seen after immunizations, surgery, trauma, bone-marrow transplantation, and systemic diseases such as Hodgkin's disease, systemic lupus erythematosus, and sarcoidosis, and it is more common in males than females. Worldwide it occurs in 1 to 3 out of 100,000 people annually, affecting all age groups and races, but peaks in late adolescence and early adulthood, as well as in the elderly and pregnant or postpartum women.[1, 5]

GBS generally presents acutely with symmetric proximal muscle weakness, usually lower extremity (90% of the time), more so than facial or upper extremities. Tingling in the extremities, paresthesias, disappearance of deep tendon reflexes, and paralysis (typically ascending) also progress. Pain occurs in about half of GBS patients and can be extremely severe. Cranial nerve involvement can affect airway maintenance, eye movement, facial muscles, and swallowing. Autonomic dysfunction (dysautonomia) including urinary retention, alternating hypotension and hypertension, orthostatic hypotension, bradycardia, other arrhythmias, ileus, and loss of sweating, occurs in 70% of GSB patients, and if severe, can even be associated with sudden death. Other atypical features such as, papilledema, hearing loss, vocal cord paralysis, and mental status changes are associated with severe disease and autonomic dysfunction. Individuals should be hospitalized for observation and care, as 30% will require mechanical ventilation. Complications of thromboembolism, skin breakdown due to immobility, and psychological trauma are among some of the other clinical concerns. This progressive phase lasts from a few days to four weeks, with 73% of symptoms peaking at one week and 90% to 98% at four weeks.[1] It is followed by a plateau phase with persistent, unchanging symptoms. Disease improvement can start within days of the plateau and varies in symptom duration.

The diagnosis of GBS can be difficult initially due to the large variety of symptoms incurred. The substantial differential diagnosis includes disorders of the spinal cord, muscles, neuromuscular junction, brainstem, and other acute polyneuropathies. In addition, electrolyte imbalances, viruses,

bacteria or other organisms, chemicals, toxins and venoms, and even psychosomatic disorders and malingering must be ruled out. Initial diagnosis is made based on clinical features and testing, most reliably five to seven days after symptoms start. Testing in all suspected cases of GBS should include a lumbar puncture to look for elevated protein levels and clinical neurophysiologic studies (electromyography [EMG] and nerve conduction studies) to support the diagnosis and to assess neurophysiological impairment. Treatment entails supportive care and frequently includes respiratory assistance, cardiac monitoring, and pain control. Specific therapy with high-dose intravenous immune globulin (IVIG) or plasmapheresis have been successful in shortening the severity and duration of the illness up to 40% to 50%.[7] A history of completing plasmapheresis or IVIG treatments is not in itself a contraindication to later return to flying duties. However, flying during these therapies is disqualifying due to their adverse effect profile and the fact that the disease is still active.

Within six to twelve months 85% of GBS patients have fully recovered, with maximal recovery of residual deficits usually seen 18 months after symptom onset. However, persistent minor weakness, areflexia, and paresthesias remain, with approximately 7% to 15% of patients left with permanent neurological sequelae (e.g. foot drop, intrinsic hand muscle wasting, sensory ataxia, painful dysesthesia). On average, 5% to 10% of GBS patients have an extended disease course with several months of ventilator dependency and very delayed and incomplete recovery while 3% of patients become restricted to a wheelchair.[3, 7] With sound intensive care and respiratory support availability, the overall mortality rate for GBS is less than 5%. Approximately 20% of ventilator dependant patients die. Early diagnosis, close monitoring, and appropriate treatment of this disease are essential to prevent mortality. Rehabilitation will be needed in most patients with GBS. In addition severe fatigue persists in 80% of patients and is unrelated to age, duration or severity of the initial illness.[8] The cause and contributing factors are not fully known, but fatigue appears in part to be a sequela of forced inactivity and general muscle deconditioning. The relapse rate for GBS is rare and therefore if occurs brings into question the presence of chronic inflammatory demyelinating polyradiculoneuropathy (CIDP).

II. Aeromedical Concerns.

Acutely GBS can cause sudden, acute onset of weakness, paresthesias, pain, dysphagia, and a variety of other symptoms, sometimes developing within a few hours, which can affect flying ability. Ataxia is also a concern in the MFS variant of GBS. Sensory touch and proprioception may be affected, while respiratory distress, cardiac and autonomic dysfunctions, and easy fatigability pose a serious risk for incapacitation. The major aeromedical concern after recovery is the possible long term residual neurological deficits which could affect performance of aircrew duties.

Recurrence of GBS after immunization is rare.[8] Immunizations are not recommended during the acute and recovery phase of GBS. While there is no overall absolute contraindication to immunizations following an episode of GBS, if GBS occurred within 6 weeks after a particular immunization, consideration of avoiding that particular immunization in that individual should be weighed against the overall risk of the disease for which the patient is being immunized.

III. Waiver Consideration.

GBS is disqualifying for those on flying status and for FC IIU personnel. It is not specifically mentioned as disqualifying for ATC/GBS or SMOD duties, but under retention standards, the

following are not eligible for continued active duty, therefore need grounding action and would require a waiver for continuation in their career field: “Any other neurological condition, regardless of etiology, when after adequate treatment, there remain residuals, such as persistent severe headaches, weakness or paralysis of important muscle groups, deformity, incoordination, pain or sensory disturbance, disturbance of consciousness, speech, or mental defects, or personality changes of such a degree as to definitely interfere with the performance of duty.”

For flyers and RPA personnel with GBS, a waiver is very likely if there is full recovery. An ACS review/evaluation is required to determine eligibility for a return to flying status if residual deficits remain after recovery and are minor and not felt to interfere with aircrew duties.

Table 1: Waiver potential for GBS

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	GBS with full recovery	Yes AETC
	GBS with some residual deficits	No AETC
II/III ATC/GBC	GBS with full recovery	Yes MAJCOM
	GBS with some residual deficits**	Maybe* MAJCOM
IIU	GBS with full recovery	Yes AFMSA
	GBS with some residual deficits**	Maybe* AFMSA
SMOD	GBS with full recovery	Yes AFSPC or GSC
	GBS with some residual deficits**	Maybe* AFSPC or GSC

*Those with residual neurological deficits would need to be reviewed by the ACS prior to waiver consideration.
**Candidates for FC II, III, IIU, ATC/GBC, or SMOD may need to be assessed more critically, as are FC I/IA prior to waiver consideration.

AIMWITS search in November 2010 revealed a total of 7 cases of GBS. There was 1 FC I case, 4 FC II cases, 1 FC III case, and 1 SMOD case. The only disqualified case was the SMOD individual who was disqualified for GBS and concomitant myasthenia gravis.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for GBS should include the following:
A. Summary of presentation, course, and treatment of disease.
B. Results of lumbar puncture, EMG, and neurophysiologic studies.
C. Neurology consult that includes complete exam once disease has resolved.
D. Pulmonary function test upon resolution of disease.
E. Optometry/ophthalmology consult to include all test listed in AFI 48-123 (stereopsis, ocular motility and alignment testing), if vision involved.
F. Physical and occupational rehabilitation consults if obtained; at the least, documentation of return to full physical activity (including specific comments regarding any limitation of activities requiring prolonged physical exertion).

The aeromedical summary for waiver renewal, if indicated, for GBS should include the following:
A. Interval history since last waiver submission with particular emphasis on neurological exam and specific testing as annotated in the initial waiver section.
B. Neurology consult.
C. Evidence that the aviator is fully capable of resuming/continuing normal duties.

ICD 9 codes for Guillain-Barré syndrome	
341	Other demyelinating diseases of the central nervous system
357.0	Acute infective polyneuritis
357.4	Polyneuropathy in other diseases classified elsewhere
357.8	Other inflammatory and toxic neuropathies

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WAIVER GUIDE
Updated: Nov 2010
Supersedes Waiver Guide of Mar 2006
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Reviewed by Dr. Steve McGuire, ACS Neurologist

CONDITION:
Headache (Nov 10)

I. Overview.

Headaches are extremely common, with most adults being affected at some point during their lives (lifetime prevalence of more than 90%).[1] Most headaches are not serious, but they can affect the afflicted patient's home life, work environment, and social interactions.[2] Headaches affect most children by early adolescence; headaches rank third among illness-related causes of school absenteeism. When children with chronic headaches are followed for up to 10 years, their symptoms were shown to improve or remit in 60% to 80% of cases.[3] For children with migraine headaches, the family history of migraine significantly predicted the persistence of headache symptoms at the 10-year follow-up.[4]

The International Headache Society (IHS) classification of headache has become the basis for headache classification in the International Classification of Headache Disorders (ICHD-IIR1, 2003).[5, 6] Headaches are classified into three categories:

1. Primary headache disorders (90 % of all headaches), i.e., headaches with no other causative disorder (migraine without aura, migraine with aura [includes acephalgic migraine], tension-type, cluster and other trigeminal autonomic cephalgias, and other primary headaches),
2. Secondary headache disorders, i.e., those headaches caused by another disorder (medication overuse, hormonal, sinus, cervicogenic, and others), and
3. Cranial neuralgias, central and primary facial pain, and other headaches.

Any kind of headache may become disabling to the individual. Some people are prone to just one type of headache, while others may get a combination of headache types. It is not the type of headache that is the primary concern in aeromedical disposition of a given aviator; rather, what matters is the degree of incapacitation a headache of any type is likely to cause in that individual.[7] Of interest to our discussion of headaches in aviation is the fact that headache is the most common nervous system complication at altitude. This can be very important with aviators flying in aircraft that are not pressurized to 8,000 ft or less.[8] With an increasing number of female Air Force aviators, the flight surgeon needs to be aware that there is a significant association between headache and the reported use of estrogen-containing oral contraceptives, both for migraine and for non-migrainous headaches.[9]

For clinical management of the aviator with a headache, of course, a meticulous, detailed history is essential to arriving at a correct diagnosis, and therefore to directing appropriate treatment. Thus, some discussion of primary headache types likely to affect aviators is warranted.

Table 1: Differentiation of headaches

Characteristic	Migraine	Tension-Type	Cluster
Location of pain	Unilateral more than bilateral	Usually bilateral	Always unilateral
Duration of pain	4 to 72 hours	2 hours to days	30 to 120 minutes
Severity of pain	Mild to severe	Mild or moderate	Excruciating
Quality of pain	Usually throbbing or pulsing, but may be constant	Constant ache or pressure-like pain	Burning, stabbing, "sharp poker" at eye or temple
Nausea, sensitivity to light or sound, aura	Yes (to at least 1 of 3)	No	No
Redness or tearing of eyes; stuffy or runny nose	Maybe	No	Yes

Tension-Type Headaches

Tension-type headaches (TTH) are the most common of all headaches. Lifetime prevalence of TTH is 69% among men and 88% among women. Three percent of the population has a daily headache.[10, 11] Although TTH can be annoying these headaches are usually not incapacitating. A small percentage of individuals, however, suffer from incapacitating TTH, which clearly would be of aeromedical concern. Tension headaches will usually resolve with time and lifestyle changes. Management is typically with over-the-counter (OTC) analgesics such as acetaminophen, aspirin and other non-steroidal anti-inflammatory agents (NSAIDs). For more severe headaches, treatment may include muscle relaxers or benzodiazepines. Those in the general population who seek medical attention are usually only those whose headaches are more severe and unresponsive to OTCs. Chronic tension headaches may be treated with a prophylactic agent such as an antidepressant. Another treatment modality may be biofeedback. An aviator seeking medical attention for TTH is truly an outlier, and the alert flight surgeon should be prepared to look at all medical and psychosocial aspects of such a case.[7] A Danish study reveals a poor outcome for TTH patients with chronic headaches, coexisting migraine, not being married, and sleeping problems.[12]

Cluster Headaches

As compared to tension headaches, cluster headaches are markedly less common within the general population, affecting less than one percent of the population. Men are at least 4 times more likely than women to be afflicted. Cluster headaches are typically characterized by a sudden onset, without prodrome, of incapacitating pain that is severely sharp and stabbing, or deep and excruciating, usually periorbital or at the temple, and always unilateral. Episodic cluster headaches occur in clusters of one to four headaches per day, each lasting 30 to 120 minutes, for a period of several weeks to months, with headache-free intervals varying from six months to several years. Chronic cluster headaches lack sustained headache-free intervals. Ipsilateral conjunctival injection, lacrimation, eyelid edema, nasal congestion, Horner's syndrome, and restlessness or agitation, may occur during an attack.[13] Cluster headaches occur most frequently in the spring and fall months.

Management of cluster headaches typically requires both abortive and prophylactic medication during the headache cluster period. 100% oxygen at headache onset, ergotamines and triptans have

been used effectively as abortive treatments. Intranasal lidocaine has also been used but is reported to have only transient effect. Calcium channel blockers, prednisone, lithium and valproic acid are frequently used for prophylaxis.

Due to their universally severe nature, cluster headaches historically have not been considered waiverable.[7]

Migraines

The earliest written reference to migraine is in an epic poem written in Sumeria around 3000 BC. In 1778, Fothergill introduced the term fortification spectra to describe the visual aura of migraine. In 1950 Harold Wolff developed the experimental approach to the study of headache and elaborated the vascular theory of migraine, which has come under attack as the pendulum again swings to the neurogenic theory.[14] Although migraines can be seen at any age, they are most common in the young and middle aged adult, beginning most frequently in adolescence, and with the highest prevalence between 25 and 55 years of age.[13, 15] Migraine affects approximately 6% of men and 18% of women. Many migraine sufferers have a family history of migraine.[1] Migraine is not a homogeneous disorder, as attacks may vary in intensity, duration, frequency of occurrence, and in associated features. This variability may occur from one migraine sufferer to another or from one headache to the next.

Migraines are classified according to their complex of symptoms. The two most common types are migraine without aura ("common migraine" in the old terminology) and migraine with aura ("classical migraine"). The aura is the presence of neurological symptoms from a few minutes up to an hour before the migraine attack. The most common form of aura is visual, such as flashing lights, blurriness, or even temporary vision loss. The second most common manifestation is paresthesias, which often occur in association with visual symptoms. Less common forms of aura include global confusion, speech difficulty, or extremity weakness.[16] If the aura occurs without a headache during the aura or within 60 minutes after, it is referred to as a "migraine with aura without headache." This is commonly referred to as an "acephalgic migraine," although the ICHD-IIR1 does not use that term.

A migraine headache is often described as a throbbing or pulsating headache that is usually unilateral (although generalized headache occurs in up to 30-40% of patients), severe pulsating quality (although there may be a range starting from dull, deep and steady pain), an onset that tends to be gradual over minutes to hours, and a duration which may last from hours to days. Onset is common upon awakening in the morning and in the late afternoon, but may occur at any time during the day or night. Associated features include nausea (87%), vomiting (56%), photophobia (82%), phonophobia, visual disturbances (36%), lightheadedness (72%), vertigo (33%), and alterations in consciousness (18%). The pain can be described as incapacitating.

Migraine sufferers may also describe headache patterns consistent with more than one headache type (e.g. tension-type headaches and migraine headaches). To diagnose migraine, it is necessary to exclude secondary headache causes and then determine whether the patient has another coexisting primary headache. Note that some experts view migraine and tension-type headaches as distinct diseases while others view them merely as ends of a continuum of severity. In the end, the diagnosis in both clinical practice and epidemiological research is almost entirely dependent on the patient's description of prior attacks (i.e. symptom profile). In occupations where a diagnosis of

migraine could threaten a career (such as military aviation), there may well be attempts to avoid even reporting of such headache conditions.

Unlike cluster headaches, migraines frequently are set off by "triggers." Precipitating factors can include stress (often during post-stress "let down"), fatigue, physical exertion, glare, hunger, certain foods and/or medications, atmospheric changes (e.g., weather, altitude, and ambient temperature), fluorescent lighting and chronobiologic challenges (e.g., alterations in sleep/wake cycles, jet lag, changing seasons, etc.). Migraine may also be precipitated by menstruation (presumably due to hormonal changes).[9] Past beliefs about dietary triggers for migraines (such as chocolate, cheese and certain fruits) have proved invalid in controlled trials.[13]

Standard migraine therapy can be divided into prophylactic, abortive, and therapeutic therapies. Prophylactic pharmacotherapy includes the use of beta-blockers, NSAIDs, calcium channel blockers, SSRIs (selective serotonin reuptake inhibitors) and other antidepressant medications, as well as certain anti-seizure drugs (Depakote® and Topamax®), and ergotamine preparations. The first-line of prevention, however, is the avoidance of known or suspected triggers, especially foods which may precipitate migraines in individual patients. Sleep deprivation and stress are also known triggers. Alternative therapies such as relaxation or meditation techniques, cervical manipulation, and acupuncture have also been advocated. Abortive pharmacotherapy includes the use of sumatriptan or dihydroergotamine (DHE). Abortive treatments for an established migraine headache can be divided into treatments for mild-moderate headaches and treatments for severe headaches includes sumatriptan, rizatriptan, zolmitriptan, almotriptan, DHE, antiemetics (e.g., Compazine® or Phenergan®), narcotics and sedatives.[16] None of the abortive or prophylactic pharmacologic therapies are waiverable for flying.

Therapy for headache, no matter the classification, is dependent on a correct and complete diagnosis. The clinician needs to be cognizant of secondary disorders, medication misuse, as well as concurrent events in the life of the sufferer. It is well recognized that migraine sufferers have less tolerance for significant life changes, sleep disturbances, and stresses in daily than do those without migraines. These life changes can easily trigger a migraine headache.[17]

II. Aeromedical Concerns.

The aeromedical decision should be based on the severity and incapacitating nature of the headache, rather than the headache type. The effects of a headache may disrupt concentration at best and be totally incapacitating at worst. Associated features such as visual disturbance, vomiting, or vertigo could themselves lead to incapacitation during flight. Concern would be greatest for those flying single seat aircraft or in aircraft where complete crew participation and coordination is essential for mission completion. However, significant concern exists for any aircrew member in any type of aircraft. Additional concern exists because of the potential duration of the headaches and the consequent fact that the flyer would need to be grounded until complete resolution occurs (potentially days). Lastly, concern exists for the patient's personal well-being because inadequately-managed migraine can result in complications such as persistent aura, ischemic stroke, or migraine-induced seizures, and is a major risk factor for development of affective disorders.

The treatment of headache disorders is complex and most of the commonly used medications are not waiverable. Occasional use of over-the-counter (OTC) analgesics such as acetaminophen, ibuprofen and caffeine is acceptable for headaches that are not otherwise disqualifying.

III. Waiver Consideration.

According to AFI 48-123, all headaches, except for the occasional tension headaches, are disqualifying for flying duties in the US Air Force, including FC IIU, ATC/GBC, and SMOD duties. There is no longer any minimum observation period before waiver application. A headache will be considered disqualifying if any of the following characteristics are present:
A. Impairment in social, vocational or academic activities caused by the headache and/or its associated symptoms.
B. Medication other than OTCs is required for abortive control of the headache.
C. A prescription for prophylactic medication is required for the headache.
D. There is associated neurologic dysfunction or deficit including aura, with or without (i.e., acephalgic migraine) associated headache.

The waiver authority may consider a waiver if there are:
A. *Three or fewer* disqualifying headaches per year, and
B. There are *no* associated neurologic dysfunction, deficit or aura, and
C. There exists *negligible or mild* functional impairment (i.e., did not cause significant social or occupational impairment), nausea, photophobia, or phonophobia, and
D. *No* prescription prophylactic or abortive medication is required.
E. All other cases require ACS review.

Table 2: Waiver potential for Headache

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	History of headaches resolved or headaches controlled on OTCs	Yes AETC
	History of migraine or cluster headaches	No AETC
II/III/IIU*#	History of headaches resolved or headaches controlled on OTCs	Yes MAJCOM
	History of migraine headaches	Maybe MAJCOM
	History of cluster headaches	No MAJCOM
ATC/GBC*	History of headaches resolved or headaches controlled on OTCs	Yes MAJCOM
	History of migraine headaches	Maybe MAJCOM
	History of cluster headaches	No MAJCOM
SMOD	History of headaches resolved or headaches controlled on OTCs	Yes AFSPC
	History of migraine headaches	Maybe AFSPC
	History of cluster headaches	No AFSPC

* For initial flying class II, IIU, III, and ATC/GBC cases, waiver certification authority is AETC.
# Waiver authority for FC IIU (trained) is AFMSA

AIMWTS review in Jun 2010 resulted in a total of 667 cases with a diagnosis of headache. 331 of the cases resulted in a disposition of disqualification. Breakdown of the cases was: FC I/IA – 39 cases (13 disqualified); FC II – 166 cases (68 disqualified); FC IIU – 4 cases (1 disqualified); FC III – 272 cases (152 disqualified); ATC/GBC – 103 cases (70 disqualified); and SMOD – 83 cases (27 disqualified).

IV. Information Required for Waiver Submission.

The aeromedical waiver package should be submitted only after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for headache should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the headaches; age at onset; presence or absence of aura and prodrome; frequency, intensity and duration of attacks; number of headaches per month; time and mode of onset; quality, site, and radiation of pain; associated symptoms and abnormalities; family history of headaches; precipitating and relieving factors; effect of activity on pain; relationship with food/alcohol; response to any previous therapies; any recent change in vision; any recent trauma; recent changes in weight, exercise, sleep, or diet; state of general health; change in work or lifestyle; change in birth control methods (women): effects of menstrual cycle and exogenous hormones (women); and possible association with environmental factors.
C. Current physical exam – based on history, but focused on a good neurological exam
D. Imaging studies and EEG reports if done – they are not routinely necessary unless there are concerns about secondary causes of headache or danger signs with the history and exam.
E. Consultation report from treating physician.

The aeromedical summary for waiver renewal for headache should include the following:
A. Interval history.
B. All applicable physical exam, labs, and imaging tests as in the initial aeromedical summary.
C. Consultation from treating physician

ICD 9 codes Headache	
784.0	Headache
346.0	Classical migraine
346.1	Common migraine
346.2	Variants of migraine
346.8	Other forms of migraine
346.9	Migraine, unspecified

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WAIVER GUIDE
Updated: Jun 2011
Supersedes Waiver Guide of Mar 2008
By: Dr Dan Van Syoc
Reviewed by LtCol Mark Boston, AF/SG consultant in otolaryngology and LtCol Robert Shull, AF/SG consultant in audiology

CONDITION:
Hearing Loss/Asymmetric Hearing Loss/Use Of Hearing Aid(s) (Jun 11)

I. Overview.

USAF aircraft are frequently noisy, so hearing protection is necessary to prevent long-term hearing loss.[1] USAF flight surgeons routinely encounter questions about hearing loss related to either changes in annual audiograms among individuals in the Hearing Conservation Program (HCP) and/or changes in the hearing profile category of aircrew. Aircrew must meet hearing standards as outlined in AFI 48-123, but are NOT enrolled in the HCP. This waiver guide addresses questions related to changes in hearing profile category and asymmetry. Specific questions concerning identification and administrative management of Significant Threshold Shift (STS) are best referred to AFOSH standard 48-20.[2]

A. Epidemiology and Classification: Hearing loss (HL) is common in the general population with estimates of 4% of people under age 45 and as many as 29% of people over age 64 suffering from "handicapping loss of hearing," defined as "severe enough to interfere with effective conversation in an adult – approximately 25 to 30 decibels (dB)."[3-4] An accelerating incidence of high-frequency hearing loss in younger individuals points to early, chronic noise exposure, possibly from personal entertainment devices.[5] Most audiologists use the following guideline when describing the severity of hearing loss.

- Normal hearing (0 to 25 dB HL)
- Mild hearing loss (26 to 40 dB HL)
- Moderate hearing loss (41 to 70 dB HL)
- Severe hearing loss (71 to 90 dB HL)
- Profound hearing loss (greater than 91 dB HL)

Through World War II, hearing loss among aviators was so common that acquired hearing loss was referred to as "aviator's ears" or "aviator's deafness"; implying that hearing loss among aviators was expected or routine.[6] A 1985 study of 777 aviators in the Israeli Air Force found that "13.5% of the examined population suffered from hearing loss," that was at least mild to moderate as described above.[7]

HL is commonly classified by type:[8]

- Sensorineural (involving the inner ear, cochlea, or auditory nerve – examples include noise exposure, presbycusis [HL associated with ageing], Meniere's disease, acoustic neuroma, infection [viral cochleitis in adults], inner ear barotrauma, ototoxic drugs [permanent - aminoglycosidic antibiotics and platinum derivative anti-tumor agents; reversible - "loop" diuretics and salicylates]).

- Conductive (decreased sound reaching the inner ear due to sound not conducted efficiently through the ear canals, eardrum or bones of the middle ear – examples include impacted cerumen, otitis media, tympanic membrane perforation, cholesteatoma, pathology of the ossicles in the middle ear, or middle ear barotraumas).
- Mixed HL – a combination of sensorineural and conductive hearing loss.

Sensorineural hearing loss (SNHL) is the most common type of HL in the general population and is usually related to long-term exposure to noise. However, a short blast of loud noise (generally greater than 120 – 155 dB) can also cause "severe to profound sensorineural hearing loss, pain, or hyperacusis (pain associated with loud noise)."[8] In either case, the HL is related to direct mechanical damage of the hair cells lining the cochlea resulting in permanent loss of a number of these cells specialized to sense sound at a given frequency. "All auditory information is transduced by only 15,000 hair cells, of which the so-called inner hair cells, numbering 3500, are critically important, since they form synapses with approximately 90 percent of the 30,000 primary auditory neurons. Thus, damage to a relatively few cells in the auditory periphery can lead to substantial hearing loss."[3]

Therefore, HL related to noise exposure (short or long term) can be permanent and irreversible. Think about the effect of losing a number of adjacent rods and cones in the retina and the resulting visual field defect. Losing adjacent hair cells in the cochlea is similar in that it results in loss of hearing in specific frequencies that can grow larger as more nearby hair cells are lost with continued noise exposure. Just as glasses cannot reverse a visual field defect, modern hearing aids are not capable of restoring the function of lost hair cells. Therefore, in a patient with sustained sensorineural hearing loss, the care plan is usually more in the direction of palliation than toward a cure.[9]

Clinically, an individual's hearing limitation is described in terms of decibels (dB) of HL. The threshold of hearing at a given frequency by a "normal" person is 0 dB HL, and numbers higher than zero on an audiogram indicate how much louder a sound at a given frequency must be in order for that individual to perceive it fifty percent of the time. Normal conversation levels are 45 to 60 dB, while a jet engine at 100 ft is 140 to 150 dB.[3]

HL as the only symptom of a systemic illness is unlikely except in the case of latent syphilis or immune-mediated SNHL.[3] However, numerous other systemic illnesses (e.g. diabetes, blood cell dyscrasias, hyper or hypothyroidism) can result in hearing loss.

B. Office evaluation of hearing loss: Whether the aviator presents with acute hearing loss (deployed or garrison) or an audiogram that demonstrates worsening HL, in order to direct further evaluation/treatment, classifying the hearing loss (conductive, SNHL, mixed) is started with the history and physical exam. Some pertinent questions are:[10]

- What was the onset and progression of the hearing loss?
- Is there pain or drainage out of the ear associated with the hearing loss?
- Is there a history of significant trauma, including noise and barotrauma?
    - What exposures to sudden loud noise or repetitive noise (work/hobby)
- Is there a history of previous ear surgery?
- Is there associated tinnitus, vertigo, or disequilibrium?

- Is there a family history of hearing loss? There are a number of congenital and hereditary causes of hearing loss; presbycusis also can run in families.

Many of these questions are covered on the AF IMT 1753, *Hearing Conservation Examination.*

Physical examination portion of an office hearing evaluation includes:

- Whispered voice test – whisper a short sequence of letters and numbers while standing behind the patient and occluding the other ear (rub the tragus in a circular motion to mask hearing)
- Tuning fork assessment
    - Cannot hear 512 Hz tuning fork – approximate loss of 20-30 dB
    - Can hear 512 Hz tuning fork but not 256 Hz tuning fork – approximate loss of 10-15 dB
- Weber and Rinne tests
- Visual exam of the ears – exclude otitis externa, cerumen impaction, otitis media, squamous cell carcinoma, etc.
- Pneumoscopy – the operational version of this is the Valsalva with observed movement of the TM.

These tests are not intended to replace a thorough audiology evaluation (see below) but do provide some objective findings to document the status of the individual's hearing at the time of the visit. (A recent meta-analysis listed the sensitivity of the whispered voice test as 90-100 % while the specificity was 70-87 % as a screening tool.[11]) They also provide more effective communication with specialists at a (potentially) distant site (e.g., when trying to make decisions concerning air evacuation for further evaluation).

C. Formal audiologic assessment: The following tests are part of a complete audiologic evaluation. The audiologic evaluation should follow the testing parameters as outlined in AFOSH 48-20.

Pure tone air and bone conduction thresholds – This is the audiogram. Hearing is tested with both air and bone conduction. Air conduction measures thresholds of sensitivity to sounds that travel to the inner ear through the external auditory canal and middle ear. These values are compared to the thresholds of sensitivity to sounds that travel to the inner ear directly through the bone of the skull. Any difference between the two thresholds is consistent with conductive hearing loss.

Speech reception thresholds (SRT) – This is the softest level at which a person can correctly repeat 50 percent of presented spondee words (words should be presented by professional recorded test). Spondee words are two-syllable words where each syllable is stressed, such as airplane, armchair, or pancake. SRT results are recorded in dB HL and should correlate with the audiogram: equal to the pure tone air conduction average (average dB score at 500, 1000, and 2000 Hz) to within 10 dB as long as the scores from the three frequencies are similar.

Speech discrimination testing, to include high intensity discrimination – (aka word recognition score) percentage of phonetically balanced words correctly repeated at a given dB level, the most comfortable level (MCL) for speech. Generally classified as normal (>90%); slight difficulty; comparable to listening over a telephone (75-90%); moderate difficulty (60-75%); poor

discrimination, difficulty in following conversation (50-60%); and very poor discrimination, difficulty in following running speech (<50%).[12] It is important to understand that hearing aids do not improve word recognition scores. This is a significant test for an aviator with bilateral hearing loss as it directly relates to comprehension of what is being said (on a radio, for example). All speech testing should use professionally recorded materials, not live voice (e.g., NU-6 by difficulty, W-22, Harvard-50).

Immittance audiometry – generally consists of three separate tests:

- **Tympanograms –** objective measure of TM compliance.
- **Ipsilateral and contralateral acoustic reflexes** (tested at or below 110 dB HL) – a measure of the softest level at which the stapedius and tensor tympani muscles contract; helping differentiate between conductive and sensorineural hearing loss (ipsilateral: the sound stimulus is presented to the ear being measured, and contralateral: the sound stimulus is presented to the ear opposite the ear being measured).
- **Acoustic reflex decay** (500 and 1000 Hz, tested at or below 110 dB HL) – measures the response of the stapedius to a loud stimulus lasting 10 seconds which may help indicate whether the source of the hearing loss is in the cochlea or in the acoustic nerve.

Otoacoustic emissions (transient evoked or distortion product) – this is a test of cochlear function and requires no input from the patient. Simply stated, a normal cochlea produces sound that can be measured by ultra-sensitive microphones placed in the outer ear (requires normal middle and outer ear function). This test can help specify whether sensorineural hearing loss is related to the sensation of sound (cochlear function) or neural transmission of the sound (acoustic nerve).

- Transient evoked ototacoustic emissions are measured in response to a brief sound stimulus.
- Distortion product ototacoustic emissions are measured in response to two simultaneous tones of different frequencies.

If the audiology testing listed above excludes conductive and retrocochlear disease, the audiologist may defer ENT evaluation. If the results are equivocal, additional testing and ENT evaluation is recommended. Some additional tests to consider include:

- **Auditory brainstem response** – a screening tool for suspected retrocochlear pathology, an abnormal response indicates the need for an MRI of the cerebellopontine angle.
- **MRI (**cerebellopontine angle) **–** particularly with gadolinium enhancement.

D. Treatment: Good treatment (often surgical) exists for many forms of conductive hearing loss, but there is really no surgical procedure that can reverse or lessen the severity of a sensorineural hearing loss.[9] It is important for flight surgeons to realize that hearing aid technology is advancing at a rapid rate. It is equally important to realize that indications for successful hearing aid use relate more to a patient's communication needs and challenges that to the specifics of the hearing loss.[13] In addition, there are continued challenges to using hearing aids in the cockpit setting. The normal sense of hearing allows us to filter out unwanted noise during conversation, which is why speech is understandable to us even in a noisy room, but a hearing aid cannot do this. Instead, all sound in the environment of the listener is amplified and distorted, causing great difficulty in understanding the speaker.[14] Newer hearing aid technology is available, however hearing aids can never replace a normally functioning auditory system.

II. Aeromedical Concerns.

Clearly it is essential that aviators have hearing adequate to recognize and understand verbal communications and warning tones. This includes adequate binaural hearing in aircraft with warning tones presented specifically to the left or right sides. Significant tinnitus may also interfere with communications as well as sleep. Hearing loss can be an early symptom of other medical problems, for example, an acoustic neuroma (see Acoustic Neuroma waiver guide) which could directly impact vestibular function and flight safety. Lastly, aviators with noise induced hearing loss will likely experience some degree of worsening hearing loss secondary to continued noise exposure.

Normally hearing aids are not worn in hazardous noise (flight environment). Hearing aids may in fact increase the chances of worsening hearing loss in these environments. Hearing aids are not hearing protection, and if exposed to hazardous noise hearing protection must be worn as well. However, if necessary, the only type of hearing aid that may work is custom-made feedback phase cancellation hearing aids that fit in the ear and hearing protection is provided by David Clark type muff (not helmet). Hearing aids behind or over the ear cannot be worn due to comfort issues with the hearing protection, breaking the hearing protection seal, feedback issues, as well as increasing the possibility of further hearing loss. If double protection is required, hearing aids are not allowed. Cochlear implants or implantable amplification devices are not allowed in any hazardous noise environment and thus not allowed in aviators. Battery life varies with the shortest being about 4 days; changing a battery can be disruptive to aircrew duties, thus batteries should be changed prior to flying if hearing aids are worn while performing aircrew duties.

Individuals with otosclerosis or other causes of conductive hearing loss may actually hear better in noise/flight. This is due to a phenomenon called the Paracusis of Willis; the otosclerosis filters out the background noise and allows the individual to hear communications better. In this unique situation hearing aids may be used on the ground but not recommended/needed in flight.

The Attenuating Custom Communication Earpiece System (ACCES) earphone is the shape of the pilots' external auditory canal and blocks out much of the ambient noise; 35 to 50 dB attenuation occurs with the combination of ACCES and a David Clark headset. ACCES may improve communication capability in individuals that otherwise may have failed the hearing proficiency validation tests.

III. Waiver Consideration.

The following table outlines the definition for H-1, H-2, H-3 and H-4 hearing profiles. The hearing profile is based on an unaided audiogram (no hearing aids) and removal from hazardous noise for at least 14 hours.

Table 1: Hearing profile standards and asymmetry definition.

	500 Hz	**1000 Hz**	**2000 Hz**	**3000 Hz**	**4000 Hz**	**6000 Hz**
H-1 Profile If no single value exceeds (dB):	25	25	25	35	45	45
H-2 Profile If no single value exceeds (dB):	35	35	35	45	55	--
H-3 Profile	Any hearing loss exceeding at least one value for H2 profile					
H-4 Profile	Hearing loss precluding safe and effective performance of duty, despite the use of hearing aids, as determined by hearing proficiency validation.*					
***Hearing Proficiency Validation**	Inflight hearing test (AFPAM 48-133, para 7.8) – OR – Written validation of ability to safely perform all assigned aircrew duties in flying environment signed by flying SQ/CC or Operations Officer, ***supplemented by*** the flight surgeon's written MFR stating that Speech Discrimination Levels (from the audiology report) are adequate to perform flying duties (>60%).					
Asymmetry	≥20 dB difference comparing left and right ear, at any two consecutive frequencies, or ≥15 dB at 3000 Hz*.					

*Asymmetry at 3000 Hz is considered by recent studies to be an important predictor of retrocochlear pathology.

For flying class physicals for I/IA, II, IIU, III, and ATC/GBC applicants (initial), a hearing profile that exceeds H-1 is disqualifying. For SMOD, applicants must be at least H2. Trained aviators (FC II and III, as well as IIU and ATC/GBC) with H-2 profiles should have a full audiology evaluation sufficient to exclude conductive or retrocochlear pathology, but do not require waivers. Trained aviators (all classes) with H-3 profiles or asymmetric HL are disqualified. Waivers are valid for no greater than three years (indefinites will not be granted) or until a shift of 10 dB or greater on the average of 2,000, 3,000 and 4,000 Hz in either ear from the previous waiver's audiogram, whichever occurs first. If the cause of the hearing loss is acoustic neuroma, cholesteatoma, eustachian tube dysfunction, otosclerosis, or a peripheral vertiginous disorder, refer to the Waiver Guides for those conditions as well before preparation of the aeromedical summary.

Table 2: Degree of hearing loss and waiver potential.

Flying Class	**Hearing Loss**	**Waiver Potential** **Waiver Authority** β
I/IA	H-1 with asymmetry	Yes AETC
	H-2 with or without asymmetry	Maybe+ AETC
	H-3/H-4 with or without asymmetry	No AETC
	Hearing aids	No AETC
II/IIU/III	H-2	Initial/untrained – Maybe* Trained – N/A† MAJCOM
	H-3	Initial/untrained – No Trained - Maybe# MAJCOM
	H-4	No MAJCOM
	Asymmetry	Initial/untrained – Maybe& Trained – Maybe MAJCOM
	Hearing aids	Initial/untrained – No Trained - Maybe$ MAJCOM
ATC/GBC SMOD**	H-2	Initial/untrained – Maybe* Trained – N/A† MAJCOM
	H-3	Initial/untrained – No Trained - Maybe# MAJCOM
	H-4	No MAJCOM
	Asymmetry	Initial/untrained – Maybe& Trained – Maybe MAJCOM
	Hearing aids	Initial/untrained – No Trained - Maybe$

+ Waiver for FC I/IA may be considered if H-2 due to one frequency in one ear.
* Waiver for initial/untrained FC II and III may be considered if H-2 due to one frequency in one ear. H2 is qualifying for SMOD applicants.
† For trained FC II and III no waiver required (need not be DNIFed) but must have full audiology work-up.
# If individual inactive flyer, then hearing proficiency validation is delayed; FC IIC or modified FC III waiver granted by MAJCOM (must have hearing proficiency validation [inflight test or letter from SQ/CC or DO] before flying).
& Waiver for initial/untrained FC II and III with H-1 likely; waiver for initial/untrained FC II and III with H-2 may be considered if H-2 due to one frequency in one ear; no waiver for initial/untrained FC II and III with H-3.
$ If H-3 and hearing aids not worn while flying, must pass hearing proficiency validation without hearing aids.
Note: NO indefinite waivers will be granted for asymmetric hearing loss or H-3; maximum length of waiver is 3 years.
** Waiver authority for SMOD personnel is either AFSPC or GSC depending on unit of assignment.
β AFMSA is the waiver authority for all FC IIU personnel.

Review of AIMWTS through May 2011 showed 20 cases of hearing aid usage; 2 FC I/IA cases (1 disqualification), 3 FC II cases (1 disqualification), 6 FC III cases (0 disqualifications), 0 FC IIU cases, 8 ATC/GBC cases (1 disqualification), and 1 SMOD cases (0 disqualification).

Review of AIMWTS through May 2011 demonstrated 2,338 waivers for some degree of hearing loss. There were 128 FC I/IA cases (58 disqualifications), 1,142 FC II cases (50 disqualifications), 912 FC III cases (119 disqualifications), 9 FC IIU cases (2 disqualifications), 109 ATC/GBC cases (10 disqualifications), and 38 SMOD cases (16 disqualifications). Of the 2,338 cases, 255 were disqualified (10.9%). Of the 255 disqualified cases, all but 63 were disqualified primarily for hearing-related issues.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Initial waivers and waiver renewals should include the following elements in the aeromedical summary (AMS):
A. History related to hearing loss (including noise exposure history). If hearing aids used include if worn while flying and address the ability to wear hearing protection.
B. Baseline and latest audiograms.
C. Documentation of complete (and current – within 12 months of waiver submission) audiology evaluation.
D. ENT evaluation, if audiologist does not state conductive or retrocochlear disease is ruled out.
E. Validation of hearing proficiency for H-3 waivers (initial waivers and waiver renewals with a shift of 10 dB or greater on the average for 2,000, 3,000 and 4,000 Hz from the previous waiver's audiogram).
1. In-flight hearing test or

2. Written validation of ability to safely perform all assigned aircrew duties in flying environment signed by flying SQ/CC or Operations Officer, ***supplemented by*** the flight surgeon's written MFR stating that Speech Discrimination Levels (from the audiology report) are adequate to perform flying duties (≥60%).

ICD 9 Codec for Hearing Loss	
389.0	Conductive hearing loss
389.1	Sensorineural hearing loss
389.16	Sensorineural hearing loss, asymmetrical
389.2	Mixed conductive and sensorineural hearing loss
V53.2	Hearing aid

V. References.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of May 2007
By: Dr Dan Van Syoc
Reviewed by Lt Col Edith Canby-Hagino, the AF/SG Consultant for Urology, and LtCol Laveta McDowell, the AF/SG Consultant for Nephrology.

CONDITION:
Hematuria (Mar 11)

I. Overview.

Gross hematuria is relatively common - one out of every 1000 visits to the emergency room is prompted by a patient's discovery of gross hematuria. Asymptomatic microscopic hematuria is even more common, with a prevalence of 1.2% to 5.2% in young adult males, and as high as 16% in community population-based studies.[1, 2] Discovering the underlying process, if any, causing the hematuria is the key to a proper aeromedical disposition. The risk factors for significant underlying disease include: cigarette smoking, occupational exposure (benzene, aromatic amines), history of gross hematuria, age greater than 40 years, history of urologic disorder or disease, urinary tract infection, analgesic abuse, irritative voiding symptoms, pelvic radiation, and cyclophosphamide use.[3] Screening for hematuria in patients with no symptoms suggestive of urinary tract disease is not recommended by any medical body.[7]

Hematuria may be transient and common causes of such cases are vigorous physical exercise, sexual intercourse, trauma, digital rectal examination, or menstrual contamination. If a transient etiology is suspected, the clinician should order a follow-up urinalysis 48 hours after the positive test and a negative result will probably confirm the diagnosis of transient hematuria.[4, 5]

A positive dipstick for blood in urine indicates hematuria, hemoglobinuria or myoglobinuria. Hematuria can be distinguished from hemoglobinuria and myoglobinuria by microscopic examination of the centrifuged urine; the presence of a large number of erythrocytes establishes the diagnosis of hematuria. If erythrocytes are absent, examination of the serum will distinguish hemoglobinuria and myoglobinuria. In hemoglobinuria, the supernatant will be pink and in myoglobinuria, the serum remains clear. Dipsticks for heme detect 1 to 2 RBCs per high powered field (HPF) which is equivalent to the sensitivity of urine sediment examination, but will result in more false positive tests. The American Urologic Association has stated that the most accepted upper limit of normal for urinary RBCs, based on an exam of the urinary sediment, is 2 to3 per HPF.[6, 7, 8]

Hematuria of nephrologic origin is frequently associated with casts in the urine and almost always associated with significant proteinuria. Protein in the urine greater than 200mg/24 hours is of nephrologic origin; significant hematuria from a urologic origin will not elevate protein that high. Erythrocytes arising from glomerular disease are typically dysmorphic and show a wide range of morphologic alteration. Conversely, erythrocytes arising from tubulointerstitial renal disease and of urologic origin have a uniformly round shape.[9]

Hematuria may be essentially a normal variant, or it may be a sign of underlying disease, which may possibly even be life-threatening. For the purposes of evaluation and diagnosis, hematuria is divided into two general categories: glomerular and non-glomerular.

Glomerular hematuria (loss of blood into urinary tract from glomeruli) is frequently associated with proteinuria, protein or RBC casts, and dysmorphic RBCs on phase-contrast microscopy. The differential diagnosis of hematuria with proteinuria or casts is extensive, and includes nephron damage and many forms of glomerulonephritis. The most common glomerular sources have been found to be IgA nephropathy (Berger's disease) and thin glomerular basement membrane disease.[4]

Non-glomerular hematuria is blood that enters the urinary tract distal to glomeruli, so that RBCs have normal morphology on phase-contrast microscopy. Proteinuria and casts are not normally associated with non-glomerular hematuria. The most common non-glomerular sources are stones, infection and malignancy. In six major studies of microscopic hematuria, between 1% and 12.5% had a neoplastic etiology and between 3.5% and 16.5% had calculi as the etiology. In one study of 161 aviators with asymptomatic microscopic hematuria, no evident pathology developed over a mean follow-up period of 7.6 years.[9, 10]

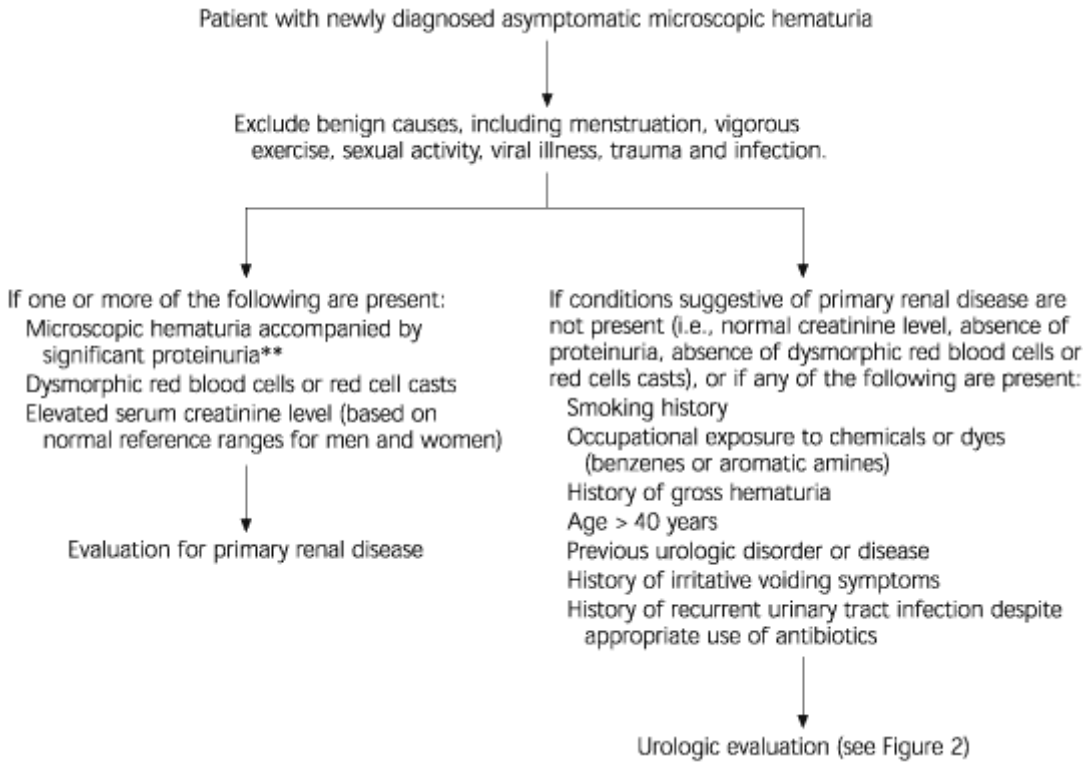
The differential diagnosis of asymptomatic hematuria without proteinuria or casts (e.g. non-glomerular hematuria) includes neoplasm, calculi, infection, trauma (including exercise), analgesic use/abuse and sickle cell nephropathies. Bleeding into the urinary tract from a source between the urethra and the renal pelvis results in no protein, cells or casts. Hematuria at the beginning or end of the stream usually indicates a urethral or prostatic source.

Once infectious and glomerular etiologies of hematuria have been ruled out, other etiologies will need to be considered. The consensus among urologists is that patients presenting with hematuria less than 40 years of age and no risk factors do not require further urologic evaluation. For the remainder of cases, a complete urologic evaluation to include imaging and cystoscopy is indicated. Cystoscopy is utilized to directly visualize the lining of the bladder to detect evidence of bladder cancer. The goal of imaging is to detect neoplasms, urinary tract calculi, renal cystic disease, and obstructive lesions that could be responsible for the hematuria.[10] Most clinicians consider multidetector CT urography to be the preferred initial imaging modality in most patients presenting with unexplained hematuria. Other modalities used include intravenous pyelography (IVP), ultrasonography, MR urography, retrograde pyelography and plain films.[7]

The American Urological Association (AUA) best practice guidelines recommend the following evaluation for microscopic hematuria (Figures 1 and 2 below):

FIGURE 1. Initial evaluation of newly diagnosed asymptomatic microscopic hematuria[9]

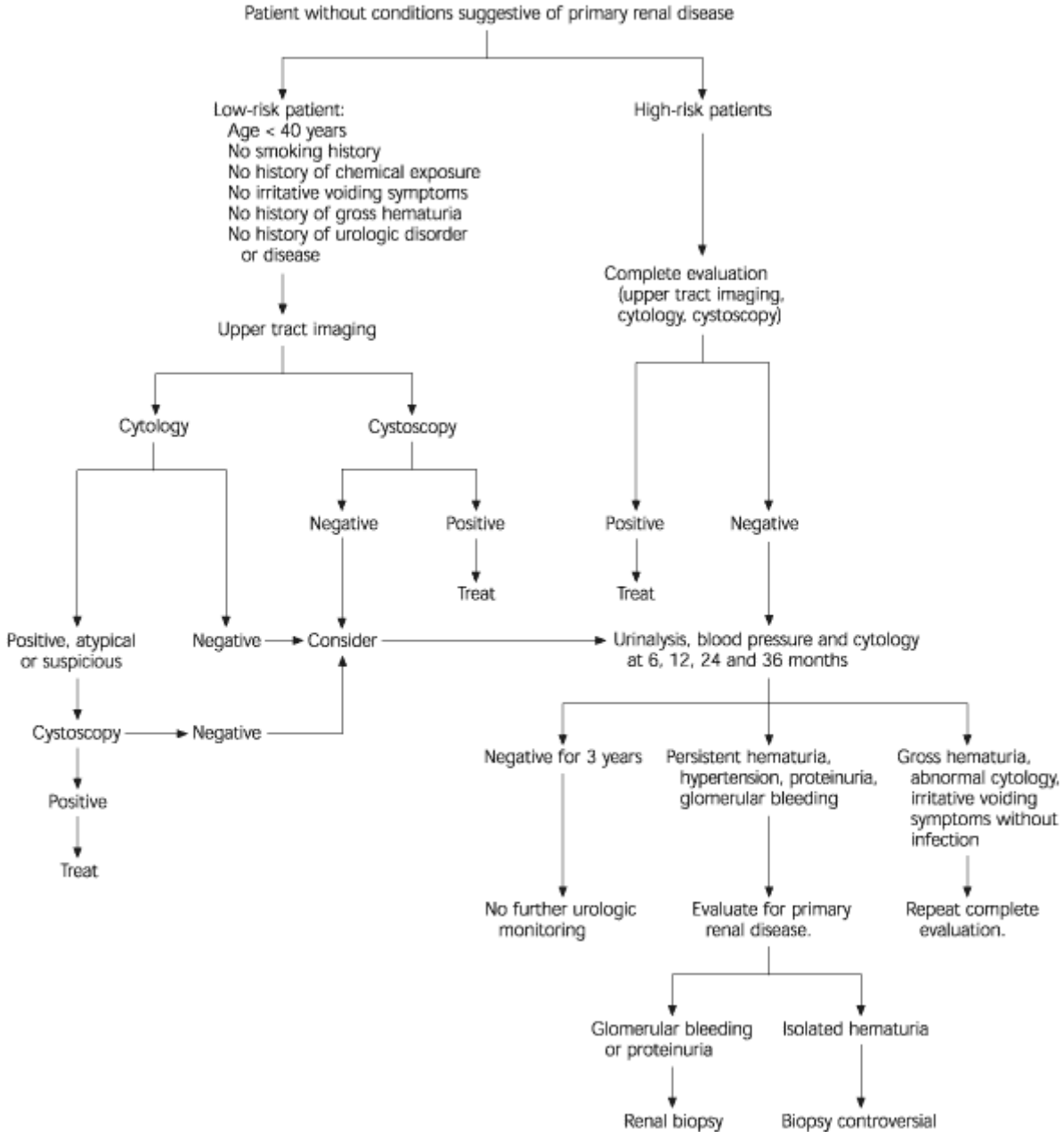
Initial Evaluation of Asymptomatic Microscopic Hematuria*



*The recommended definition of microscopic hematuria is three or more red blood cells per high-power field on microscopic evaluation of two of three properly collected specimens.
**Proteinuria of 1+ or greater on dipstick urinalysis should prompt a 24-hour urine collection to quantify the degree of proteinuria. A total protein excretion of >1,000 mg per 24 hours (1 g per day) should prompt a thorough evaluation or nephrology referral. Such an evaluation should also be considered for lower levels of proteinuria (>500 mg per 24 hours [0.5 g per day]), particularly if the protein excretion is increasing or persistent, or if there are other factors suggestive of renal parenchymal disease.

FIGURE 2. Urologic evaluation of asymptomatic microscopic hematuria[9]

Urologic Evaluation of Asymptomatic Microscopic Hematuria



II. Aeromedical Concerns.

Persistent or recurrent hematuria is disqualifying, whether an underlying etiology is identified or not. Because hematuria can be a sign of significant underlying disease, it must be evaluated fully. Calculi can cause extreme pain, lead to urinary tract infection and obstruction and/or result in sudden incapacitation while in flight. Urinary neoplasms are often slow growing but must be diagnosed and treated early to optimize survival and function. Glomerular disease must be

evaluated and renal function assessed to determine proper treatment and to address worldwide deployability (e.g. renal reserve, ability to tolerate dehydration, etc.).

III. Waiver Consideration.

Hematuria which is "persistent or recurrent" is disqualifying for flying classes I/IA, II, and III. For FC IIU, "current hematuria" is classified as disqualifying. It is not disqualifying for retention purposes, for ATC/GBC duties, or for SMOD duties. While hematuria itself is not disqualifying for GBC or SMOD duties, the underlying cause (such as calculi) may be disqualifying or require waiver.

Table 1: Waiver potential for hematuria

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	"Benign" or idiopathic	Yes AETC
	Calculi†	Maybe AETC
	Others causes*	No AETC
II/III	"Benign" or idiopathic	Yes MAJCOM
	Calculi†	Maybe MAJCOM
	Others causes*&	Maybe MAJCOM
IIU	"Benign" or idiopathic	Yes AFMSA
	Calculi†	Maybe AFMSA
	Others causes*&	Maybe AFMSA
ATC/GBC	N/A	N/A-not disqualifying
SMOD	N/A	N/A-not disqualifying

†See Renal Stones waiver guide for details
*IgA nephropathy, glomerulonephritis, cancer
& Initial Flying Classes II, IIU, and III applicants will need to be evaluated similarly as for FC I/IA

AIMWITS search in Dec 2010 revealed a total of 430 individuals with a waiver diagnosis of hematuria; of this total, 41 cases resulted in a disqualify disposition. There were 42 FC I/IA cases (10 disqualifications), 180 FC II cases (6 disqualifications), 1 FC IIU case (0 disqualifications), 193

FC III cases (24 disqualifications), 8 ATC/GBC cases (0 disqualifications), and 6 SMOD cases (1 disqualification). Of the 41 cases resulting in a disqualification, only 11 were primarily due to a renal-related cause. The remaining cases were disqualified for a variety of other medical causes.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

For flying class II, IIU, and III, the initial waiver for the finding of microscopic hematuria only (if proteinuria also seen in urinalysis then initiate steps J through L listed below concurrently) is to include:
A. Thorough history to identify possible sources for hematuria, upper versus lower tract, and identification of risk factors for malignancy.
B. Examination of external urethra and prostate (male) or pelvis (female).
C. Urine culture.
D. Serum BUN and creatinine.
F. Repeat urinalysis 48 hours after cessation of menstruation, analgesic medications, vigorous exercise, or sexual activity. Repeat urinalysis 6 weeks after treatment of a urinary tract infection.

In individuals where the above information supports a "benign" cause (menstruation, analgesic medications, vigorous exercise, sexual activity, and/or the resolution of a urinary tract infection) and the repeat urinalysis is normal, no further workup is required. If the cause was determined to be due to exercise, sexual activity or analgesic medications that need to be continued, then waiver would be required since resumption of these activities would lead to a recurrence of hematuria.

If A – F above does not point to a "benign" cause of the hematuria (menstruation, analgesic medications, vigorous exercise, sexual activity, and/or the resolution of a urinary tract infection), the aeromedical summary is required to contain the following additional elements:
G. Radiographic evaluation of upper tract CT, IVP and/or ultrasound (helical CT with and without contrast is now upper tract imaging procedure of choice, if available).
H. Urology consult (to include cystoscopy and/or cytology) should follow upper tract imaging, particularly if risk factors for malignancy are identified.
I. If no urological etiology is found, consultation with a nephrologist for possible renal biopsy should be obtained.

If proteinuria, dysmorphic red blood cells, red cell casts, or elevated serum creatinine level is present, the following additional work-up is required:
J. Complete blood count (CBC).
K. 24-hour urine for creatinine and protein, if urinalysis positive for protein.
L. Nephrology consultation to include consideration of a renal biopsy.

For FC I/IA, even "benign" causes will need a urological work-up (A-H).

For waiver renewal of microscopic hematuria in "high risk" individuals where a cause was not found (idiopathic), with initial negative urologic work-up, the following is required for waiver renewal:

A. Urinalysis, blood pressure, urine cytology at 6 months, 12 months, 24 months and 36 months.
B. If all negative, then subsequent waiver every three years should include interval history with special attention to urological symptoms, urinalysis, blood pressure and cytology.
C. If persistent hematuria, hypertension, proteinuria, or glomerular bleeding then refer to nephrology for evaluation of renal disease.
D. If gross hematuria, abnormal cytology, irritative voiding symptoms without infection then repeat complete evaluation and refer to urology.

For waiver renewal of microscopic hematuria in "low-risk" individuals (<40 y/o, nonsmoker, etc.) where a cause was not found (idiopathic), with initial negative urologic work-up, the following is required for waiver renewal:
A. Interval history with special attention to urological symptoms.
B. Urinalysis, blood pressure and urine cytology.

For waiver renewal of microscopic hematuria from "benign" causes which require waiver (exercise, medications not stopped, or sexual activity), the following is required for waiver renewal:
A. Interval history with special attention to urological symptoms.
B. Urinalysis

If a cause for the hematuria is determined such as calculi, IgA nephropathy, glomerulonephritis or cancer, then waivers will be also be needed for those diagnoses. Current waiver guides exist for renal stones, IgA nephropathy, and bladder cancer which need to be adhered to if that diagnosis is applicable.

ICD 9 code for hematuria	
599.7	Hematuria

V. References.

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WAIVER GUIDE
Updated: Mar 2010
Supersedes Waiver Guide of Dec 2006
By: Dr Dan Van Syoc
Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology, LtCol Erika J. Struble, AF/SG consultant in Hematology/Oncology, and Col Patrick Storms, AF RAM and gastroenterologist.

CONDITION:
Hemochromatosis (Mar 10)

I. Overview.

Hemochromatosis is an iron overload syndrome. Trousseau was the first to describe a case of hemochromatosis in the French pathology literature in 1865. Almost 25 years later, in 1889, von Recklinghausen, thinking that the disease was a blood disorder that caused increased skin pigmentation, coined the term hemochromatosis. In 1935, Sheldon published a description of all 311 cases of the disease that had been reported in the world's literature to that point, including several from his own records. He realized that hemochromatosis was an inborn error of iron metabolism and that all the pathologic manifestations of the disease were caused by increased iron deposition in the affected organs. In 1976, Simon and coworkers demonstrated that the gene for hereditary hemochromatosis (HH) was linked to the HLA region on the short arm of chromosome 6.[1] This hemochromatosis gene (C282Y mutation) is now referred to as HFE and was discovered in 1996. Other gene mutations have been described that lead to hemochromatosis, but these are much rarer than HFE.[2, 3] Studies by numerous investigators have shown that 85% to 90% of patients with typical features of HH are homozygous for the HFE mutation.[4]

Hemochromatosis is now known to be a genetic disease of autosomal recessive inheritance with a prevalence of approximately 1:400 in the US Caucasian population and is the most common genetic disease in populations of European ancestry.[5, 6] Population screening has demonstrated that the frequency of heterozygotes is about 10 percent in the US Caucasian population and that the frequency is 0.5 percent (5 per 1000) for the homozygous state.[7] It is now recognized that a substantial proportion of C282Y homozygotes do not develop clinically significant iron overload, so it is speculated that modifier genes are involved in the development of clinical disease.[8]

Adult men normally have 35 to 45 mg/kg of total body iron. Premenopausal women have lower iron stores as a result of recurrent monthly blood loss with menstruation. More than two thirds of the body's iron content is incorporated into hemoglobin, and lesser amounts are found in muscle myoglobin (10-15%), enzymes and cytochromes (10%), with less than 1% circulating in plasma bound to transferrin. Under homeostatic conditions, the 1 to 2 mg of iron lost daily through sweat and sloughed cells of the skin and intestine is balanced by dietary iron absorption. As humans have no physiologic mechanism for the excretion of excess iron, the body stores are regulated by intestinal iron absorption in the duodenum. Improper regulation of this absorption can lead to iron overload, which is what occurs with hemochromatosis.[9, 10]

Iron absorption is a highly regulated process with the amount of iron absorbed being closely linked to body iron needs. The two major factors that influence iron absorption are body iron stores and the rate of erythropoiesis.[11] Increasing transferrin saturation is the earliest detectable biochemical

abnormality and is attributed to increased intestinal iron absorption. Marked elevation of serum ferritin level has been associated with evidence of iron deposition. The complications of HH are the result of tissue deposition.[6]

As most hemochromatosis patients absorb only a few milligrams of excess iron daily, the clinical manifestations of disease often occur only after age 40 when body stores of iron have reached 15 to 40 grams (normal body iron stores are approximately 4 grams). In the past, hemochromatosis was diagnosed at an advance stage and the presenting symptoms were often the classic triad of cutaneous hyperpigmentation, diabetes, and cirrhosis. In the present day, most patients newly diagnosed with the disease are asymptomatic and those who are symptomatic early in the course of the disease now present with symptoms of arthralgias, fatigue and impotence[3]. In patients with these types of presenting symptoms, HH should be suspected when the transferrin saturation (during fasting) is above 45% in men or above 35% in premenopausal women on at least two consecutive occasions, even if the serum ferritin is normal. In this setting, genetic testing should be strongly considered, looking for the HFE genotype. Similar genetic testing should be considered in first degree relatives of those known to have the disorder.[12]

In the past, hemochromatosis could have devastating effects on those afflicted with the disorder. Excess iron leads to problems with the liver, heart, pancreas, gonads, thyroid gland, joints, and skin. Untreated disease could lead to liver cirrhosis which accounts for about 85% to 90% of all HH-related deaths. It can also result in a mixed dilated-restrictive or dilated cardiomyopathy and conduction disturbances. Cardiac dysrhythmias and cardiomyopathies are the most common cause of sudden death in iron overload states. Iron excess can lead to diabetes by either iron accumulation in the pancreatic beta cells or by impairing insulin sensitivity. Hypogonadism is the most common nondiabetic endocrinopathy and can present as impotence, amenorrhea, decreased libido, or osteoporosis. Thyroid dysfunction in HH occurs at a rate approximately 80 times over the rate in unaffected men. Classic HH arthropathy occurs in up to 50% of patients and resembles noninflammatory osteoarthritis. Skin pigment changes often present as a “bronzing”, but can be brown or slate-gray as well.[10] Besides cirrhosis as a cause of death, HH patients are at a much higher risk of liver carcinoma (200 times higher than the general population in patients with hemochromatosis and cirrhosis).[3, 13] Hemochromatosis patients who drink in excess of 60 grams of alcohol daily are approximately nine times more likely to develop cirrhosis than are those who drink less than this amount. Therefore, it is strongly recommended that HH patients decrease or eliminate alcohol consumption.[14] With earlier recognition of symptoms and improved screening, advanced liver disease is much rarer than in the past.

Phlebotomy has long been the mainstay of treatment of HH. Each 500 mL of whole blood removed contains 200 to 250 mg of iron. In providing replacement for the hemoglobin lost during the phlebotomy, the body mobilizes an equal amount of iron from tissue stores, which reduces the degree of iron overload. For a typical patient diagnosed early with HH, one phlebotomy per week for 50 weeks should fully deplete the excess accumulated iron stores. An endpoint for weekly phlebotomies is normalized iron stores, defined as a serum ferritin <50 ng/mL and transferrin saturation <50%. A maintenance phlebotomy schedule should then be continued following the primary iron depletion to prevent reaccumulation. Most clinicians agree that the goal is to keep the ferritin concentration at 50 ng/mL or less. For maintenance, most patients require a 500 mL phlebotomy every two to four months.[15] It is now widely recognized that the prognosis of

hemochromatosis depends on the amount and duration of excess iron. Early diagnosis and prompt therapy largely prevent the adverse consequences of the disease and essentially normalize life expectancy.[16]

As with all diseases with a known genetic cause, there are questions regarding mass screening in order to diagnose early and treat prior to the patient becoming symptomatic. At this time, large-scale screening is not recommended as there are unanswered questions regarding cost-effectiveness.[3, 17] On the other hand, all first-degree relatives should be offered testing once an HH proband is diagnosed. If an adult relative of a C282Y homozygote is identified, and is either a C282Y homozygote or a compound heterozygote (C282Y/H63D) and if blood iron studies are abnormal then a presumptive diagnosis can be made and therapeutic phlebotomy can be initiated. Early treatment can prevent complications.

Dietary supplements containing iron should be avoided. It may be reasonable to recommend avoidance of vitamin C supplements due to their possible enhancement of free iron and the generation of reactive oxygen species. Patients with HH should be advised to avoid consumption of uncooked seafood because bacteria found in them can thrive on increased plasma iron concentrations.[15]

II. Aeromedical Concerns.

Hemochromatosis has the potential to affect numerous organ systems of the body through the deposit of iron in the tissue. Some of the major aeromedical concerns include: 1) cardiac arrhythmias or cardiomyopathy, 2) cirrhosis of the liver and hepatocellular carcinoma, and 3) diabetes mellitus. Arthropathy could become severe enough to interfere with controlling the aircraft. Symptoms of hypogonadism and hypothyroidism would be of gradual onset and not likely to be suddenly incapacitating and treatment compatible with flying is available.

III. Waiver Consideration.

Hemochromatosis is disqualifying for all flying classes. It is not waiverable for initial flying training. It is potentially waiverable in FC II and III if the aviator has no aeromedically significant complications from the hemochromatosis and is on maintenance phlebotomy. Maintenance phlebotomy to maintain control of iron stores will require a 72-hour DNIF after each venesection. Hemochromatosis is unfit for continued service so does require an MEB.

Table 1: Waiver potential for Hemochromatosis

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	No AETC	No
II	Yes# AFMSA	At the discretion of MAJCOM
IIU	Yes# AFMSA	At the discretion of AFMSA
III	Yes*# AFMSA	At the discretion of MAJCOM

*Initial FC III requests for untrained individuals should be treated like FC I/IA and waiver should not be granted for a history of hemochromatosis.
#No indefinite waivers

Review of AIMWTS data in Dec 2009 revealed a total of 18 submitted cases for the diagnosis of hemochromatosis. There were 0 FC I/IA cases, 9 FC II cases, 9 FC III cases and 0 FC IIU cases. There were 2 cases resulting in a disqualification and both were FC III. One was initial FC III and was disqualified for a history of PRK with an excessive preoperative refractive error and the other was disqualified for a history of a myocardial infarction.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver request should be submitted only after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Information required for an initial waiver of hemochromatosis should include:
A. Complete history of symptoms including pertinent negatives, complete physical and treatment plan.
B. Genetic testing results (if done).
C. Labs: Serum iron, serum ferritin, serum transferrin, and transferrin saturation; CBC; liver function tests to include ALT, AST, bilirubin, and alkaline phosphatase; fasting electrolytes and glucose levels; and thyroid function tests.
D. ECG, echocardiogram and Holter (reports, representative tracings and echo tape should be sent to the ACS ECG Library for FC II).
E. GI consult regarding need for liver biopsy if liver function tests abnormal or ferritin levels greater than 1000 ng/mL.
F. Copy of all consults, imaging, and procedure reports.
G. MEB results if one is required.

The following information will be required for waiver renewal (if any abnormalities surface in the interim, they will need to be addressed appropriately):
A. Interim history to include change in symptoms, medication usage, and side effects.
B. All labs since last AMS. Individuals on maintenance phlebotomy should be followed with yearly serum transferrin saturation and ferritin. Further studies are dependent on symptoms.
C. All additional tests completed since last AMS.
D. All consults since last AMS.

ICD 9 code for hemochromatosis	
275.0	Disorders of iron metabolism

V. References.

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WAIVER GUIDE
Updated: May 2009
By: LtCol Naili Chen (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Hepatic Cirrhosis (May 09)

I. Overview.

According to the National Center of Health Statistics, chronic liver disease and liver cirrhosis account for 9.5 deaths per 100,000 people in the United States making it the 12th most common cause of death[1]. *Cirrhosis* in Greek means orange or tawny, and was definitively described by Laennec over a century and a half ago. Hepatic cirrhosis is defined as a chronic disease of the liver in which diffuse destruction and regeneration of the hepatic parenchymal cells have occurred, and in which a diffuse increase in connective tissue has resulted in disorganization of the lobular and vascular architecture[2]. Alcohol use is the most common cause of cirrhosis in the developed world, whereas chronic viral hepatitis is more often the cause of cirrhosis in the developing world[3]. Other causes include non-alcoholic fatty liver disease (NAFLD), primary biliary cirrhosis (PBC), autoimmune hepatitis, drug-induced liver injury, hemochromatosis, celiac disease, alpha-1-antitrypsin deficiency, Wilson's disease, sarcoidosis, protozoan infection, small bowel bypass, a variety of lesser miscellaneous causes, and cryptogenic cirrhosis. The distribution of causes of cirrhosis in a military population is not well-described, nor is the distribution of causes in a population of military aviators.

Two conditions warrant particular consideration in a population of generally young healthy aviators: NAFLD and autoimmune hepatitis. NAFLD is increasingly common, and reflects a spectrum that ranges from simple fatty liver without inflammation, to non-alcoholic steatohepatitis (NASH) that can result in cirrhosis and liver failure. The apparent correlation between weight gain, metabolic syndrome and NAFLD increases concern about this condition in the face of our obesity "epidemic"[4]. Autoimmune hepatitis is a progressive chronic hepatitis that can impact both adults and children. It can share features with other immune-based inflammatory liver conditions, including primary biliary cirrhosis and sclerosing cholangitis. Potential triggers include drugs and viral infections, and it is felt that "aberrant autoreactivity" plays a role[5]. Both NAFLD and autoimmune hepatitis can strike an otherwise healthy military aviator, and are thus important to understand in detail.

Liver dysfunction in the face of cirrhosis is manifest as both synthetic dysfunction and vascular pressure concerns. Signs and symptoms are myriad, depending on the severity and underlying cause of the cirrhosis. Constitutional symptoms often include "failure to thrive", with wasting, anorexia, weakness and fatigue[2]. Jaundice may be noted in the face of end-stage synthetic dysfunction or biliary obstruction, and physical exam findings aside from jaundice may include palmar erythema, thenar wasting, Caput Medusae, and ascites. A patient with advanced cirrhosis and hepatic encephalopathy may demonstrate decreased mental status to the point of coma, and reveal asterixis on physical exam. And of course a dramatic presentation with aggressive gastrointestinal hemorrhage from variceal rupture may drive a physician's initial encounter with a cirrhotic patient.

Laboratory assessment of the cirrhotic patient often reflects the severity of their hepatic dysfunction. Elevated transaminases suggest ongoing hepatocyte destruction. Anemia can reflect either active or recent bleeding, or can be a result of the "anemia of chronic disease". Thrombocytopenia is common in the advanced cirrhotic, due to both sequestration and decreased production. Hyperbilirubinemia can be the result of drastically reduced hepatic reserve, or can be a marker of biliary obstruction at the intra or extra-hepatic level. Radiologic assessment may include sonographic evidence of a small echogenic liver, enlarged spleen, and, in the case of biliary obstruction, dilated biliary radicals. A radioisotope liver scan will often reveal decreased uptake in the hepatic bed with shunting of the radionuclide into an enlarged, bright spleen. CT scan is of considerable value in assessing the patient for one of the very serious complications of cirrhosis: hepatocellular carcinoma. Of course, liver biopsy is the definitive method to assess for the presence of cirrhosis and to gain valuable information about the potential underlying cause of the cirrhosis. Unfortunately, the risks of liver biopsy in the cirrhotic patient with ascites and coagulopathy can be considerable. Recently, the "Fibroscan", a non-invasive method of determining liver stiffness, has gained attention as a tool to assess for cirrhosis without the need to resort to liver biopsy[6]. While cirrhosis is a histopathologic diagnosis, usually it is not necessary as the diagnosis can be made on clinical grounds in the majority of cases.

Treatment

Treatment of hepatic cirrhosis is less about reversing established hepatic fibrosis than it is about reducing or eliminating ongoing hepatocyte destruction, preserving residual functional capacity, and treating the complications of established cirrhosis[7]. Therapy to reduce hepatocyte destruction depends on the primary disease process. For patients with alcoholic cirrhosis, abstinence remains the cornerstone of therapy. Those with NAFLD should pursue vigorous controlled weight loss. In patients with viral hepatitis, antiviral therapy has shown some promising results with demonstrated results in viral suppression and reduction of inflammation and fibrosis. For patients with primary biliary cirrhosis and primary sclerosing cholangitis, ursodeoxycholic acid (UDCA) has demonstrated an ability to slow down disease progression and reduce the severity of cholestatic symptoms. In hemochromatosis, regular therapeutic phlebotomy remains the treatment mainstay, whereas patients with Wilson's disease should be treated with chelation therapy[8, 9].

II. Aeromedical Concerns.

Aeromedical concerns include: torrential gastrointestinal hemorrhage, hepatic encephalopathy, generalized malaise and lethargy, metabolic bone disease, ascites, renal dysfunction and pulmonary decompensation. Each of the underlying medical conditions may have additional aeromedical concerns, such as itching related to PBC. As many of the cirrhotics in our aviation population will have problems with alcohol, there are also concerns related to alcohol use/abuse and the behavior associated with this condition.

In the face of portal hypertension, gastric or esophageal varices could result in spontaneous massive upper GI hemorrhage, and while a literature search failed to reveal studies evaluating the risk of the anti-G straining maneuver in patients with portal hypertension, it would seem unwise for patients with varices to engage in this vigorous activity. Aggressive gastrointestinal hemorrhage could certainly lead to sudden incapacitation and unconsciousness.

Hepatic encephalopathy would be hazardous for aircrew duties due to compromised cognition, impaired higher executive decision making and decreased dexterity. Ascites could interfere with

proper fit and function of the anti-G suit, and the anorexia and inanition that are often found in cirrhotic patients undermine proper conditioning necessary for top physical performance while flying. Finally, hepatopulmonary syndrome and portopulmonary hypertension could potentially lead to hypoxemia.

III. Waiver Consideration.

The diagnosis of hepatic cirrhosis is disqualifying for all flying classes in the US Air Force.

Table 1 – Waiver Potential for Cirrhosis

Flying Class (FC)	**Waiver Potential Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	No
II	Initial - No Maybe*+! MAJCOM	No Yes
III	Initial FC III - No Maybe*+! MAJCOM	No Yes

* Waiver possible with documentation of treatment and resolution of symptoms or documentation of adequate control measures.
+ MEB required first if individual experiences recurrent jaundice or ascites or demonstrable esophageal varices or history of bleeding from them.
! No indefinite waiver.

Review of AIMWTS data in March 2009 revealed three cases with a diagnosis of cirrhosis, all for FC III. Two of the three cases were disqualified; one of those was waiting for a liver transplant at the time of the writing of the AMS and had cirrhosis secondary to Hepatitis C. The other disqualified aviator had cirrhosis secondary to alcohol use. The waived aviator had cirrhosis secondary to hemochromatosis and had stable disease.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.
The aeromedical summary for hepatic cirrhosis should include the following:
A. Complete history with clear delineation of the underlying disease process that led to the development of cirrhosis, and notation of the presence or absence of major complications of hepatic cirrhosis to include ascites, any episodes of spontaneous bacterial peritonitis, varices with or without bleeding, hepatic encephalopathy, and any other medical complications attributed to the diagnosis of cirrhosis. Document alcohol use: years, amount, and if still drinking.
B. List and fully discuss <u>all</u> clinical diagnoses requiring a waiver.

C. Exam: Vital signs, weight (as many as possible to assess fluid gains from ascites if present), thorough abdominal and neuromuscular exams.
D. Labs: CBC with platelet count, metabolic panel with liver function tests, lipid panel, PT/PTT, iron panel, ceruloplasmin with serum copper level and urine copper levels, serum protein electrophoresis, 24 hrs urine protein, alpha 1-antitrypsin level, antinuclear antibody, complete viral hepatitis panel, anti-mitochondrial antibody, and anti-smooth muscle antibody.
E. Imaging studies: CT-scan of the liver, ultrasound of the abdomen, radionuclide liver/spleen scan or as clinically recommended by consultant.
F. Reports of any endoscopic examinations.
G. Pathology reports from any biopsies.
H. Consultation reports from a gastroenterologist or hepatologist.
I. If alcohol dependent, report from ADAPT and documentation that aviator will remain abstinent. And refer to Alcohol Abuse and Dependence waiver guide for assistance.
J. Medical treatments: all drugs used to include dosages and any side effects.
K. Medical evaluation board results (if required).

ICD 9 codes for hepatic cirrhosis	
751	Chronic liver disease and cirrhosis
751.0	Alcoholic fatty liver
751.2	Alcoholic cirrhosis of liver, including Laennec's cirrhosis
751.5	Cirrhosis of liver without mention of alcohol (portal cirrhosis, cryptogenic, postnecrotic, post hepatic, NOS
751.6	Biliary cirrhosis
751.8	Other chronic nonalcoholic liver disease (NAFLD)

Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology and by Col Patrick Storms, AF RAM and gastroenterologist.

V. References.

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WAIVER GUIDE
Updated: Aug 09
Supersedes Waiver Guide of Dec 03
By: Col William A. Thomas, Jr. (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Hepatitis, Viral (Aug 09)

I. Overview.

Hepatitis (liver inflammation) can result from many types of infectious agents (including bacterial and viral organisms), alcohol, drugs, chemicals, and metabolic or autoimmune processes. The most common infectious agent of the liver that the flight surgeon will encounter will be viral—hepatitis A, B, C, D, E and G have been described. Symptoms during the acute phase of a viral hepatitis may include anorexia, nausea, vomiting, fatigue, malaise, arthralgias, myalgias, headache, and "flu-like illness". Symptom expression is variable; however, as an example, 75-85% of those with acute hepatitis C virus (HCV) infection may be asymptomatic[1]. Accurate diagnosis is important for future waiver actions, and patients should have clinically appropriate medical care and evaluation through the acute phase of any type of hepatitis. The focus of the remainder of this waiver guide will be on Hepatitis B and Hepatitis C.

Generally, patients will fully recover from an acute infection with minimal clinical sequelae, but a few patients may progress directly to hepatic failure. Recovery from the acute phase of a viral hepatitis can be assumed when symptoms have resolved, liver enzymes have returned to normal and viral markers have a pattern of resolved or chronic infection—usually within six months of the initial infection. With hepatitis B virus (HBV), surface antigenemia has usually resolved after three months, so chronic infection is likely if viral surface antigen is still detectable after six months. Approximately 1% of immunocompetent adults will become chronically infected following an acute case of HBV[1]. In cases of chronic hepatitis C (HCV) infection, the acute phase may not have been identified. A persistent, detectable viral load indicates chronic infection and 74-86% of HCV infections will become chronic. Up to 38% of patients with chronic hepatitis C also have extrahepatic manifestations such as those noted above, as well as lichen planus, idiopathic thrombocytopenic purpura, thyroid abnormalities and diabetes[2].

Chronic infections with either of these viruses may be static or slowly progressive--but can also be severe, and may result in cirrhosis, end-stage hepatic failure and hepatocellular carcinoma[3]. In chronic HBV infection antigen-antibody immune complexes may persist and can cause arthralgias, arthritis, glomerulonephritis and polyarteritis[1]. In HCV, chronic hepatitis may not progress, but if it does, it tends to be slow and insidious. Cirrhosis may develop in up to 20% of HCV patients. Progression tends to be slower (over 30 years) for females who were younger at age of first infection, and is accelerated in all patients in the presence of alcohol use or infection with other hepatopathic agents. After cirrhosis is present, hepatocellular carcinoma may occur at a rate of 1-4% per year[3]. Due to the high risk of chronicity, HCV-infected aviators should be under the clinical care of a gastroenterologist. A liver biopsy is often a useful tool to help direct appropriate therapy but should not be considered necessary in every case of Hepatitis C[2].

Pharmaceutical therapy is available for chronic B and C virus hepatitis but these drugs have significant side effects. Specific treatment regimens are beyond the scope of this document, but the patient should be DNIF and cannot be considered for a waiver while on any of these medications.

Table 1 – Treatment regimens for Hepatitis B and Hepatitis C

	Treatment Agent	Potential side effects[1, 4]
Hepatitis B	Interferon-α-2a	Headache, fever, fatigue, thrombocytopenia, anorexia, insomnia, demotivation, depression, paranoia, diabetes mellitus, optic neuritis, seizures, cardiotoxicity
	Lamivudine	Headaches, nausea, vomiting, dizziness, insomnia, lactic acidosis, exacerbation of viral hepatitis, pancreatitis, cough, rashes, arthralgias
	Adefovir	
	Entecavir	
	Telbivudine	
	Tenofovir	
Hepatitis C	Interferon-α-2a	Headache, fever, fatigue, thrombocytopenia, anorexia, insomnia, demotivation, depression, paranoia, diabetes mellitus, optic neuritis, seizures, cardiotoxicity
	Ribavirin	Hemolysis, nausea, anemia, pruritus, gout

For both infections, the risks and benefits of treatment with antivirals must be weighed against the current clinical state and likelihood of disease progression. Treatment is typically reserved until there is evidence of chronic liver disease (as demonstrated by unequivocal serological and laboratory results, or biopsy results showing moderate necrosis and inflammation, or definite fibrosis) rather than empirically treating virological carrier status[2, 4].

II. Aeromedical Concerns.

Aviators with acute hepatitis are unfit to fly due to the likelihood of unacceptable symptoms, as are those with chronic hepatitis who are either undergoing drug treatment or who have progressed to end-stage liver disease. However, aviators who have fully recovered from acute hepatitis, as demonstrated by being asymptomatic with liver function tests (LFTs) in the normal range and negative viral markers, may be returned to flying status without requiring a waiver.

Aviators with chronic hepatitis may have many years of acceptable function before the onset, if at all, of aeromedically significant complications. Therefore, individuals may be considered for a waiver if they are off disqualifying medications, demonstrate normal hepatic functional capacity and have no significant symptoms. Aviators thought to be carriers should be evaluated like those with chronic hepatitis.

III. Waiver Considerations.

Chronic hepatitis is disqualifying for all flying classes in the US Air Force. Waiver consideration will hinge upon the severity of hepatic inflammation, functional hepatic capacity and absence of significant neuropsychiatric symptoms.

AFMSA/SG3PF recently granted a waiver for the use of Entecavir for Chronic active hepatitis in an exchange pilot. Waiver was recommended and requested by the AF/SG of his country. AFMSA honored this waiver IAW long standing STANAG policy. Both the condition and treatment remain disqualifying in the USAF.

Table 2 – Waiver Potential for Hepatitis B or C for FC I/IA, FC II and FC III

Flying Class (FC)	**Waiver Potential Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	Only if requested by AETC
II	Maybe*+# MAJCOM	Yes
III	Maybe*+# MAJCOM	Yes

* Waiver possible with resolution acute phase and no sequelae from chronic state.
+ MEB required first for evidence of persistent liver impairment.
# No indefinite waiver.

Review of AIMWTS medical waiver submissions for Hepatitis through mid March of 2009 showed 23 waivers approved for hepatitis B (8 for F CII and 15 for FC III), and 20 approved for hepatitis C (10 for FC II, 7 for FC III and 2 for GBC). One case of hepatitis (not otherwise specified) was also approved. Initial waivers for training were all disapproved (3 for HBV and 5 for HCV). There was only 1 FC I case submitted and it resulted in a DQ.

IV. Information Required for Waiver Submission.

Individuals granted a waiver should have an annual evaluation locally to document normal hepatic function. The minimum information required for waiver renewal would be a current history including updates/changes since last waiver, a review of possible neuropsychiatric symptoms and a blood panel including LFTs, serum albumin, prothrombin and platelets.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Information required for an initial waiver for hepatitis should include:
A. History, including diagnosis, serology, all available chronological LFT results, treatments, if any, and current performance at work (particularly with regard to possible fatigue or neuropsychiatric symptoms).
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. Results of physical examination, focusing on signs of acute and chronic liver disease.
D. Gastroenterology/hepatology evaluation.
E. Current LFTs, serum albumin, prothrombin and CBC with platelet count.
F. MEB report (if required under A2.9.6.).
G. A liver biopsy need not be routinely performed prior to waiver request, although the waiver authority may ask for this in specific cases. However, if a biopsy has been undertaken clinically, then a copy of the pathology report must be enclosed.

The following information will be required for waiver renewal for hepatitis:
A. Interim history to include documentation recent serology and LFTs, and work performance.
B. Current treatment.
C. Results of physical examination, focusing on signs of acute and chronic liver disease.
D. Gastroenterology evaluation (internal medicine evaluation will suffice if patient has been stable for over twelve months).

At this time, each of the medications listed in Table 1 for hepatitis immunotherapy/ chemotherapy is disqualifying. Waivers may be considered on a case-by-case basis for patients with hepatitis before or after treatment, and will depend on the status of the underlying disease.

ICD 9 Codes for Viral Hepatitis	
070	Viral Hepatitis NOS
070.1	Viral hepatitis A without mention of hepatic coma
070.3	Viral hepatitis B without mention of hepatic coma
070.5	Other specified viral hepatitis without mention of hepatic coma
070.52	Hepatitis delta without mention of hepatitis B w/ hepatic coma
070.6	Unspecified viral hepatitis with hepatic coma
070.70	Viral Hepatitis C without mention of hepatic coma
070.9	Unspecified viral hepatitis without hepatic coma

Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology and by Col Patrick Storms, AF RAM and gastroenterologist.

V. References.

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WAIVER GUIDE
Updated: Jun 2012
Supersedes Waiver Guide of Nov 2008
By: Dr. Dan Van Syoc
Reviewed by LtCol Randall McCafferty, AF/SG Consultant for Neurosurgery and LtCol Warren Kadrmas, AF/SG Consultant for Orthopedic Surgery

CONDITION:
Herniated Nucleus Pulposus (HNP) and Spinal Fusion (Jun 12)

I. Overview.

Herniated Nucleus Pulposus:

Herniated nucleus pulposus (HNP) is the herniation of the nucleus pulposus (NP), a mucoprotein gel located in the posterocentral portion of the disc, through the annulus fibrosis (AF), the concentric bands of fibrous tissue surrounding the NP. It usually occurs in a posterior or posterolateral fashion, compressing the spinal cord and/or nerve roots, causing pain and neurologic symptoms.[1] It can be caused by violent trauma, recurrent microtrauma, or from degenerative changes of the disc. Risk factors include increased age, heavy lifting, and diving from a board. It has been postulated that the hydraulic pressure on the disc rather than the excessive motion produces the traumatic disc herniation. Mechanical studies have shown that injury from a single event is rare and that most injuries are a wear and tear phenomenon. There is a genetic predisposition for disc degeneration with estimates of heritability ranging from 34 to 61%.[2]

The majority of HNPs occur in the lumbar region, followed by the cervical region, and the thoracic region. The age-incidence curve peaks in the second through fourth decades of life and the incidence is higher in males than females. It is most common between C5-6, C6-7, and L5-S1.[1, 3] Symptoms from HNP vary from asymptomatic to paraplegia depending on the degree of compression of nerve roots, vascular structures, and the spinal cord. Neuropathic symptoms such as radicular pain, numbness, paresthesias, weakness, and myelopathic symptoms such as weakness and muscle wasting can be the presenting symptoms. However, progression of myelopathic disease may lead to quadriparesis, paraplegia, and emergent conditions such as cauda equina syndrome and conus syndrome.

Cervical disc disease is of concern in our aircrew, particularly those in high performance aircraft. The mean age in the general population of cervical disc disease is 47 years and the most commonly affected nerve root is C7. Onset of symptoms is most frequently acute and paresthesias or numbness occur in 80% of affected patients. Associated neurological symptoms are a major concern in this population.[4]

Diagnosis of HNP is based on characteristic symptomatology, confirmed by radiologic studies. The predominant studies used to document HNP are MRI and CT myelogram. However, studies have failed to delineate a direct relationship between the degree of herniation and the amount of symptoms. In one study, MRI scans revealed herniated discs in approximately 25 percent of asymptomatic persons less than 50 years of age and in 33 percent of those more than 50 years of age.

Standard treatment for HNP consists of conservative therapy and/or surgery. Conservative therapy (i.e., bedrest, pain medications, physical therapy, and steroid injection) has resulted in symptomatic improvement in 20-95% of HNPs. Surgical resection of HNP, with or without fusion, and microdiscectomy are effective for pain relief in 90% of cases with some complications. Chymopapain nucleolysis of HNP has a lower success rate and its use has fallen out of favor. A more accepted form of treatment is transforaminal epidural steroid injection (TFESI). This modality has demonstrated good results in patients with acute to subacute unilateral radicular pain caused by HNP or spinal stenosis.[5] An ideal surgical solution to low back pain and HNP has yet to be found.[6] Newer methods such as minimally invasive microdiscectomy and prosthetic disc nucleus replacement have much promise.

Spinal Fusion

Spinal fusion can be traced back to 1911 when initially used to treat Pott's disease. Since then it has been used to treat scoliosis, kyphosis, fractures, dislocations, spondylolisthesis, and intervertebral disc disease. The decision to fuse can still be controversial, as in cases of disc disease or spondylosis, but is easily justified for severe instability, spondylolisthesis, or trauma with ligamentous rupture. Generally, conditions such as wedge, burst, and extension fractures are considered stable, and shear or rotational fracture-dislocations and dislocations are considered unstable injuries, however, this classification may vary with the extent of damage. Features predictive of the best surgical outcome include a definable neurological deficit, imaging pathology that correlates with the deficit, and positive physical signs of nerve root impingement. When all three exist 90 to 95% improvement is usual.

Current evidence indicates that fusion and remodeling may be prolonged but bony incorporation will likely adequately occur by 6 months sufficient enough to proceed with waiver. Factors that tend to prolong healing time in spinal arthrodesis include wound infections, loosening hardware, previous surgery in the same area, aged patients, clinically unstable spine, and large bone grafts. There is a concern that multiple level fusions cause increased stress concentration at the adjacent non-fused vertebral joints during flexion, extension, and rotational movements. It is thought that adequate healing will compensate for and accommodate a single level fusion.

Artificial Disc Replacement

Artificial disc replacement has a theoretical advantage over fusion in that that the prosthetic disc could help preserve normal range of motion and mechanics of the spine, thus reducing the long-term degenerative changes in adjacent vertebral segments that have been observed in individuals after fusion. There are two studies comparing disc replacement with the more traditional fusion. One of the studies demonstrated no significant differences in pain or functional status, and the second indicated a superior score for disc replacement based on a composite measure of disability, functional status, radiographic success, neurological improvement and the rate of reoperation.[7] One large multicenter study showed the CHARITÉ™ artificial disc to be clinically equivalent to lumbar fusion for treatment of lumbar disc disease (L4 to S1).[8] Another study showed conclusive evidence of the safety and efficacy of the ProDisc®-L total disc replacement for lumbar disc disease.[9] In addition, a large multicenter study of the PRESTIGE ST Cervical Disc System actually showed improved neurological success, improved clinical outcomes, and a reduced rate of secondary surgeries compared to the more traditional discectomy and fusion.[10] The above studies were designed only to test for equivalency with fusion and both were successful. Still other authors feel

that the jury is still out for lumbar artificial disc replacement and that there is limited evidence for use of arthroplasty over fusion.[11] At this time disc replacement is approved by the US FDA for patients who are in good health, less than or equal to age 60, and who have disease limited to one disc.

Spine surgeons are anxious to look at alternatives to more conventional treatment modalities. The preservation of motion is hypothesized to lower the risk of adjacent segment disease and, thereby, improve long-term outcomes. However, the current devices are expensive and their use is associated with the potential for significant complications (often above and beyond those seen with lumbar fusion). At the present time, there is a lack of evidence to suggest that the use of disc arthroplasty results in better short- or long-term functional outcomes than fusion in properly selected patients. At this time, Air Force spine specialists feel that lumbar artificial disc replacement has fallen out of favor due to costs and other factors, but that such treatment for cervical disease holds more promise. For lumbar total disc replacement there is also the concern involving revision and the increased potential for great vessel injury.

II. Aeromedical Concerns.

Our current high-performance aircraft can take a toll on the necks of our pilots.[12] Inability to perform flying duties may be a result of baseline symptoms such as pain and/or weakness. Sudden incapacitation and permanent disability are significant concerns, particularly in a high-G environment or during ejection.[3] The forces applied to the intervertebral disc under high-G stress may lead to accelerated progression of disease. Following surgical treatment of HNP, concerns are raised regarding vertebral joint stability and subsequent catastrophic failure of the vertebral column. There are documented cases of herniated discs, vertebral fractures, and neck injuries with high G maneuvers and ejections.

After spinal fusion, there is concern over the possibility of repeat injury to a fused spine as a result of ejection and rapid onset Gz-forces. The normal acceleration magnitude during ejection from the ACES II seat, used in all USAF high performance aircraft, is 12-14 +Gz, but may vary with flight parameters and weight of occupant. Parachute opening shock can range from 10 to 20 +Gz, especially if outside the ejection envelope. Vertebral fracture occurs frequently with forces of greater than 20 Gz. Sixty-six percent of subjects sustain vertebral fracture at G levels greater than 26 +Gz but with poor positioning forces as low as 10 +Gz have caused fractures. In all ejection seats, an inertial reel system is designed to pull the shoulders back into proper alignment, but nothing is in place to protect the cervical spine. There is no standard human spine tolerance limit to mechanical loads, but tolerances vary with the position of the vertebral body, angle of load and spine vectors, strain rate, and age. To date, there are no studies elucidating the G capability of the postoperative arthrodesis. Non-waiverability for high-performance and ejection seat aircraft of multiple level cervical fusions is based on the concern that fusions cause increased stress concentration at the adjacent non-fused vertebral joints during flexion, extension, and rotation of the joints. Significant cervical level motion is common in these airframes, i.e. checking six, air-combat training, or basic fighter maneuvers. Furthermore, cervical joint motions are often extreme during ejection, especially when ejecting outside the envelope. In the case of 2 or more levels of fusion, considerable increased stress concentrations may occur at adjacent levels causing fractures with potentially catastrophic results. Multiple levels of cervical fusion may also indicate progressive cervical spinal degeneration, which may worsen with further G-exposure.

Multiple level lumbar or thoracic fusions may be considered for waiver in ejection seat aircraft because i) the thoracolumbar joints are not generally as mobile as the cervical joints resulting in less severe focal stress concentrations at adjacent non-fused levels. During high-performance flight, most of the loading is theoretically along the vertical axis and ii) the consequence of a lumbar fracture or other injury is far less likely to result in permanent neurological impairment than cervical injury.

In a minority of cases, bone fusion is not complete despite the patient being asymptomatic and having a normal neurological exam, thus requiring more time for healing or possibly additional surgery. It is essential to establish successful complete fusion (dynamic X-rays) prior to returning to fly, particularly in high-performance aircraft given the mechanical stresses occurring during G-exposure and ejection.

As a general rule, most cases of HNP, regardless of the amount of disabling pain and neurologic deficit, the chance for returning to aviation duties is overall good.[13] Some high performance flyers may have restrictions placed upon them, but they will more than likely be returned to flying duties.

As data with artificial disc replacement is not yet conclusive, it would be best to take a conservative approach, particularly with lumbar disease. What is currently needed is a superiority study (disc replacement vs. fusion) for both cervical and lumbar regions and studies demonstrating that adjacent segment disease is prevented with disc replacement.

III. Waiver Considerations.

HNP is disqualifying for al flying classes (including FC IIU) and will require a waiver. It is not listed as disqualifying for ATC/GBC and SMOD duties, but is disqualifying for retention if symptoms and associated objective findings are of such a degree as to require repeated hospitalization or frequent absences from duty, so these personnel will need to apply for a waiver if returned to duty via the MEB process. Regarding the tables below, ATC/GBC and SMOD personnel should generally follow FC III recommendations.

Aviation personnel must fulfill all of the following applicable qualifying criteria for initial waiver request:

- Need to be asymptomatic
- Need to have adequate waiting period after treatment - see Note bottom of page 5
- Note difference in waiting times for aviators on Jump status.

Table 1. Requirement Criteria for Initial HNP Waiver Request (Conservative [non-surgical] Treatment, Discectomy with/without Laminectomy [no spinal fusion] and Microdiscectomy)

Level of Disc Herniation	Flying Class	Waiver Potential Waiver Authority	Waiting Period Post Treatment	Required Studies
Cervical/thoracic/lumbar	FC I/IA	No	N/A	N/A
Cervical	FC II	Yes AFMSA	3 months	Cervical MRI*
Cervical	FC IIB	Yes AFMSA	3 months	None required
Thoracic/lumbar	FC II	Yes MAJCOM	3 months	None required
Cervical/thoracic/lumbar	FC III**	Yes MAJCOM	3 months	None required
Cervical/thoracic/lumbar	Flyers on Jump status	Yes MAJCOM	6 months	None required#

* MRI must demonstrate the following: The cervical disc herniation does not contact or displace the spinal cord. The cervical disc herniation does not produce any signal change in the spinal cord or cord deformity. Cerebrospinal fluid remains visible anterior and posterior to the spinal cord. (MRI should be obtained on a 1.5 tesla (or greater) field strength magnet and include T2 weighted images).

** Members requesting FC III waivers for HNP whose duties require flight in ejection seat aircraft follow FC II waiver requirements. Waiver authority remains MAJCOM.

If the involved area is the cervical spine, the jumper will need a cervical MRI as part of their evaluation.

Table 2. Requirement Criteria for Initial Waiver Request (Spinal Fusion - with or without hardware)

Level of Disc Herniation	Flying Class	Waiver Potential Waiver Authority	Waiting Period Post Treatment	Required Studies
Cervical/thoracic/lumbar	FC I/IA	No Waiver	N/A	N/A
Cervical#	FC II (single level fusion only, multiple level fusion not waiverable)	Yes AFMSA	6 months	Tests may be required by ACS**
Thoracic	FC II (single or multiple level fusion)	Yes AFMSA	6 months	Tests may be required by ACS**
Lumbar	FC II (single or multiple level fusion)	Yes MAJCOM	6 months	None
Cervical/lumbar#	FC IIB/III (single or multiple level fusion)	Yes AFMSA	4 months	None
Thoracic	FC IIB (single or multiple level fusion)	Yes AFMSA (ACS evaluation required)	4 months	None Tests may be required by ACS**
Cervical/lumbar#	FC III*	Yes MAJCOM	4 months	None

* Members requesting FC III waivers for spinal fusion whose duties require flight in ejection seat aircraft follow FC II waiver requirements. Waiver authority remains MAJCOM.
** This applies if the ACS agrees to see or review the case for the waiver authority.
# All initial FC II/III waivers require copies or reports of MRI of C-Spine.

Note: A six month wait status post cervical, thoracic or lumbar fusion prior to waiver consideration for high performance aircraft is based on current evidence which indicates complete fusion of bone mass may require six months post-operatively. Multiple level cervical fusions is not waiverable for high-performance and ejection seat aircraft based on the concern that multiple level fusions cause a much greater increase in stress concentration leading to fractures at the adjacent non-fused vertebral joints during flexion, extension and rotation of the joints versus a single joint fusion. Multiple level thoracic and lumbar fusions may be considered for waiver for high-performance flying because the thoracic and lumbar joints are not generally as mobile as the cervical joints resulting in less severe focal stress concentrations at adjacent non-fused levels. Thoracic HNP is much less common than cervical and lumbar HNP and thoracic HNP requiring surgical intervention is even rarer. Because

of the location within the body, microdiscectomy is not possible and the surgical approach for laminectomy and fusion is more difficult. There is an increased risk of surgical complications including stenosis and myelopathy as well as the possibility of some underlying spinal pathology, which led to the thoracic HNP in the first place. Because of this, all aviators requesting a waiver for surgical fusion of the thoracic spine with or without hardware are required to be evaluated by the ACS.

Table 3. Requirement Criteria for Initial HNP Waiver Request for Artificial Disc Replacement (Prosthesis) [prosthesis must be fully FDA approved for that particular site and not investigational].+

Level of Disc Herniation	Flying Class	Waiver Potential Waiver Authority	Waiting Period Post Treatment	Required Studies
Cervical/thoracic/lumbar	I/IA	No AETC	N/A	N/A
Cervical#	FC IIB	Yes AFMSA	4 months	None
Thoracic (Not technically feasible)	FC II/III		N/A	N/A
Lumbar#	FC II	Yes AFMSA	4 months	None
Cervical*#/lumbar#	FC III	Yes MAJCOM	4 months	None

Single implant only, multiple not waiverable at any level.
* FC III waiver restricted to nonejection seat aircraft.
+ Disc replacement requires MEB

Table 4. Waiver requirement criteria for Initial HNP Waiver Request (Treatment other than Conservative, Discectomy, Microdiscectomy, Spinal Fusion or Prosthetic Disc Replacement)*

Level of Disc Herniation	Flying Class	Waiver Potential Waiver Authority	Waiting Period Post Treatment	Required Studies
Cervical/thoracic/lumbar	FC I/IA	No Waiver	N/A	N/A
Cervical/thoracic/lumbar	FC II/IIA/B/C	Maybe* AFMSA ACS evaluation	As requested by ACS	As requested by ACS
Cervical/thoracic/lumbar	FC III	Maybe* MAJCOM ACS evaluation	As requested by ACS	As requested by ACS
Cervical/thoracic/lumbar	Flyers on Jump status	Maybe* MAJCOM ACS evaluation	As requested by ACS	As requested by ACS

* Waiver requests for HNP treated with surgical procedures other than spinal fusion, prosthetic disc replacement, discectomy (with/without laminectomy) or microdiscectomy will be considered on a case-by-case basis and will require ACS consultation. Recommend discussing with ACS prior to surgery.

Any jumper with treatment more advanced that a microdiscectomy needs to be treated on a case-by-case basis as these aviators are potentially at high risk of re-injury.

Review of AIMWTS in Apr 2012 revealed a total of 2324 cases. Breakdown of the data was as follows: there were 31 FC I/IA cases (16 disqualifications), 1240 FC II cases (83 disqualifications), 15 FC IIU cases (2 disqualifications), 973 FC III cases (189 disqualifications), 47 ATC/GBC cases (19 disqualifications), and 19 SMOD cases (16 disqualifications). None of the cases received an artificial disc.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> for HNP and spinal surgery should include the following:

A. Detailed history of back/neck pain and previous treatments; surgical history; any physical therapy consultative reports.
B. Physical – musculoskeletal and neurological exam. A normal examination by a flight surgeon, and in addition, for surgical procedures (spinal fusion, discectomy with or without laminectomy, microdiscectomy, prosthetic nucleus implant), have a normal neurologic exam and be cleared for all activities by a neurologist, neurosurgeon or orthopedic surgeon.
C. Operative report from surgeon regarding patient's current postoperative status and prognosis (should be some statement regarding flying duties and/or clearing for unrestricted activities).
D. Studies – copies or reports of all imaging studies performed (MRI of C-Spine for initial FC II/III waivers).

The AMS for <u>waiver renewal</u> for HNP and spinal surgery should include the following:
A. Interval history of initial signs and symptoms, treatment and residual signs and symptoms, if any, current symptoms, medication, treatment, and activity level.
B. Physical – musculoskeletal and neurological exam by local flight surgeon.
C. Results of any studies obtained in the interval period.

* Waivers requesting a change from a FC IIB to an unrestricted FC II waiver should follow the initial waiver request criteria in Tables 1 or 2.

ICD9 Codes for HNP and Spinal Fusion	
722	Intervertebral Disc Disorders
81.0	Spinal Fusion
81.3	Refusion of Spine
84.60	Insertion of Spinal Disc Prosthesis, NOS

V. References.

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WAIVER GUIDE
Updated: Apr 2012
Supersedes Waiver Guide of Aug 2008
By: Dr. Dan Van Syoc
Reviewed by Col Erika Struble, AF/SG consultant for Hematology/Oncology

CONDITION:
Hodgkin Lymphoma (Apr 12)

I. Overview.

Hodgkin lymphoma (HL) [formerly Hodgkin's disease] is a neoplasm of lymphoid tissue that is defined histopathologically by the presence of the malignant Reed-Sternberg cell with an appropriate cellular background. HL is classified into five subtypes by the World Health Organization; the four classic HL subtypes, nodular sclerosis (40-70%), mixed cellularity (30-50%), lymphocyte-rich (<5%), and lymphocyte-depleted (<5%), and the fifth subtype, nodular lymphocyte-predominant (10%).[1, 2, 3] HL classic subtypes are distinguished on the basis of the appearance and relative proportions of Reed-Sternberg cells, lymphocytes, and fibrosis. Nodular lymphocyte-predominant subtype is distinguished by giant cells which express typical B cell lineage. The anatomic extent of disease and, to a lesser degree, the histologic subtype, are the primary factors determining the presenting features, prognosis, and optimal therapy of HL.

The term Hodgkin's disease goes back to 1865 in England. It had been unnamed since the original description of the disease by Dr. Hodgkin in 1832. It was not until the turn of the 20th century that pathologists discovered the giant cells necessary for the diagnosis which became known as Reed-Sternberg cells. It was not until 1967 that the Reed-Sternberg cell was officially recognized as malignant.[4]

The incidence of HL in the US has been stable over the past several decades. About 8,200 cases were diagnosed in 2007 in the United States. Common presenting features include painless lymphadenopathy (usually above the diaphragm), cough, fever, night sweats, and weight loss.[5] The incidence is higher in men than women, higher in whites than blacks, and shows an increased risk with high socioeconomic status. Unlike most malignancies, HL has a bimodal age-incidence curve. Rates rise through early life, peaking in the third decade and declining until age 45, after which the incidence increases steadily. The nodular sclerosis subtype predominates in young adults, while the mixed cellularity subtype is more common in the pediatric population and at older ages.

Several large studies have demonstrated that a prior history of serologically confirmed infectious mononucleosis (in particular elevated titers of Epstein-Barr virus) confers about a three-fold increased risk for HL in young adults.[6] An increased risk for HL among siblings and close relatives supports a genetic basis for increased susceptibility.[4]

The extent of HL is classified using the four-stage modified Ann Arbor classification. Stage I is involvement of a single lymph node region (I) or extralymphatic site (I_E). Stage II is involvement of two or more lymph node regions (II) or extralymphatic sites (II_E) on the same side of the diaphragm. Stage III is involvement of lymph node regions on both sides of the diaphragm (III) or extralymphatic sites (III_E) [Waldeyer's ring of lymphoid tissue in the orophayrnx and the spleen both count as nodal sites]. Stage IV is diffuse or disseminated involvement of one or more

extralymphatic organs or tissues. Extranodal/lymphatic sites primarily include bone marrow, liver, lungs and bones. The absence or presence of fever, night sweats, and/or unexplained loss of 10% of more of body weight in the 6 months preceding diagnosis are denoted by the suffix letters A or B, respectively. The classic B symptoms are seen in ~25% and denote widespread or locally extensive disease. Fatigue and pruritus can also be seen in HL.

Prognosis varies depending primarily on stage of disease and histologic subtype. Classic HL histologic subtypes, lymphocyte predominance and nodular sclerosis usually carry a better prognosis than mixed cellularity, which in turn has a better prognosis than lymphocyte depletion. Age greater than 45 years, B systemic symptoms, mediastinal mass to largest transthoracic diameter ratio >0.33 and extensive tumor burden (≥10cm largest diameter of any single mass) are other factors that have been repeatedly documented as poor prognostic factors.[7] Generally, individuals in clinical stages I or II without risk factors are considered early-stage favorable (limited) group. Early-stage unfavorable (intermediate) group is clinical stages I or II with risk factors (e.g., B symptoms, bulky mediastinal disease); this group has response rates closer to the advanced and are treated similarly. Individuals with stage III or IV are assigned to the advanced-stage risk group. Nodular lymphocyte-predominate HL has the best prognosis, usually (80%) present as asymptomatic, limited stage disease. For HL stage I-II the failure rate for recurrent disease (treated with chemotherapy and radiation therapy) is ~13% at 5 years and 16% at 10 years; however, overall survival at 5 years is 87% and 80% at 10 years. For limited-stage disease (stages IA or IIA), the rate of relapse is around 10-15%.[8, 9] Relapse after successful treatment in advanced-stage occurs in 35% to 40% and most relapses occur within 4 years, with about 10% of all relapses occur beyond 5 years.[1]

Treatment for HL may involve radiotherapy, chemotherapy, or both. Radiation therapy (RT) is usually delivered in the mantle region (cervical, supraclavicular, infraclavicular, axillary, mediastinal, and hilar nodes), the paraaortic/splenic region, and the pelvic region. Common chemotherapy regimens consist of ABVD (doxorubicin [Adriamycin®], bleomycin, vinblastine, and dacarbazine), BEACOPP (bleomycin, etoposide, doxorubicin, cyclophosphamide, vincristine, procarbazine, and prednisone) or Stanford V (doxorubicin, vinblastine, mustard, etoposide, vincristine, bleomycin and prednisone); the last two regimes are used in advanced-stage HL or relapse. MOPP (nitrogen mustard, vincristine, procarbazine, and prednisone) is no longer the standard of care due to side effects and decreased efficiency. Stem cell transplantation and immunotherapy has been used in refractory HL with limited success. Generally, individuals with limited-stage disease and nonbulky disease are treated with two cycles of ABVD followed by RT or four cycles of ABVD without RT.[10] Individuals with advanced-stage disease (III-IV) or with B symptoms in any stage receive ABVD until two cycles beyond achieving complete remission. Individuals with bulky disease and in any stage receive ABVD plus RT. More recent studies have indicated that two cycles of ABVD followed by involved-field, moderate-dose radiation can cure most patients.[11]

Although the likelihood of being "cured" of HL is high, overall expectation of survival is not normal.[1] Long-term follow-up studies show cumulative treatment-related mortality rate exceeds that of HL itself in 15 years.[10] The challenge is holding the potential for long-term toxicity to a minimum while successfully treating the disease initially. MOPP is associated with infertility, premature menopause and/or leukemia/myelodysplasia. ABVD has less long-term toxicities and has proven therapeutic efficacy. Anthracyclines (e.g., doxorubicin) are associated with cardiomyopathy, bleomycin with pulmonary fibrosis, and alkylating agents with bone marrow

failure. RT-induced second malignancies include non-HL, breast, lung or gastrointestinal cancers. RT treatment to the neck area is associated with hypothyroidism and to the chest with cardiac disease. The practice of RT has improved; smaller fields, PET/CT imaging enhanced RT planning and intensity-modulated radiotherapy (IMRT) allows for better targeting and reduced radiation of uninvolved tissues.[10] Fatigue is commonly reported in HL survivors.[2, 12]

II. Aeromedical Concerns.

As with most malignancies, aeromedical health concerns of HL are based on the disease and the treatment. With HL, the risk for sudden incapacitation is minimal as disease involvement of the CNS or heart is rare. Although the most common presentation of HL is a superficial nontender mass, initial manifestations rarely may include hemoptysis (intrathoracic involvement) or neurologic symptoms from spinal cord compression. However, the greatest concern arises from the potentially rapid (weeks to months) degradation in mental and physical status when the HL and/or treatment protocol is aggressive. Damage to the cardiopulmonary, neurologic, endocrine, and reticuloendothelial systems may occur as a result of disease progression and/or radiotherapy/chemotherapy. In general, flyers can be returned to flight status once all therapy has been discontinued, adverse effects from therapy have resolved, and any hematologic deficits have normalized.[13]

In the past, the use of bleomycin in aviators would have been permanently disqualifying. This was based on the risk of pulmonary fibrosis with exposure to oxygen. The value of bleomycin in the treatment of malignancies is in part a function of its specific toxicity, since it does not induce bone marrow aplasia, and thus does not add to the toxicity that limits most oncologic drugs. Instead, the principal target organ of bleomycin-induced injury is the lung, with acute pulmonary damage occurring in 6-18% of treated patients. The pathophysiology of delayed toxicity of bleomycin is complex. In the medical literature of the last thirty years, a number of patients have been described who, having previously received bleomycin therapy; have developed pulmonary toxicity when undergoing subsequent surgery. Typically, these have been young individuals receiving modest levels of oxygen (33-42%) during long operations (4-8 hours). The true incidence of such delayed toxicity is unknown, since the subsequent literature has largely consisted of isolated case reports or small series.[14] A more cogent argument can be made that the period of risk is primarily in the first year after therapy, since most cases occurred within that time frame. However, it is equally possible that this observation represents a bias related to the timing of operative intervention.

Applicable data had been non-existent, a state of affairs that has been somewhat altered by unpublished data recently supplied by the Duke Hyperbaric Unit.[14] Although it had been the practice in hyperbaric medicine to avoid hyperoxia in bleomycin-treated individuals, the undoubted benefit from hyperbaric oxygen (HBO) in wound healing and osteonecrosis posed against the uncertain risk of delayed bleomycin toxicity led several years ago to a change in policy. Since then, the Duke unit has treated 11 individuals previously exposed to bleomycin with HBO. There was a wide range of time between the last dose of bleomycin and the institution of HBO, ranging from 1 month to 22 years. The range of cumulative bleomycin doses was not noted. Anywhere from 8 to 44 treatments with 100% oxygen at 2 ATA (PiO2 ~ 1475 mmHg) were administered for two hours per treatment, once or twice daily. One individual experienced significant chest discomfort and a decline in diffusion capacity of 50%; both resolved following a break in treatment, and she successfully completed HBO treatment with a reduction in frequency of her sessions. While the Duke experience does not represent occupational exposure per se, and the number of individuals

treated is small, the amount of oxygen exposure from HBO therapy is far in excess of what would be expected in aviation, and suggests that the risk of delayed toxicity outside the operating room may be minimal.

Based on this data, policy was changed for aviators treated with bleomycin. Those aviators returning to non-high performance aircraft would be evaluated as usual, addressing risks of tumor recurrence and potential toxicity from chemotherapy. Assuming they had not developed bleomycin pneumonitis during therapy, then no restrictions from altitude chamber or other sporadic oxygen exposure is warranted. Because it is possible, and biologically plausible, that the common perception of an increased period of risk within the first year is correct, a grounding period of one year from the end of treatment is required before waiver consideration in high performance aircrew. In most cases, this will coincide with the grounding period already recommended as a result of the disease/chemotherapeutic regimen.

There have been case reports of life-threatening pneumonitis developing in patients with a history of bleomycin-induced lung injury, who were later given supplemental oxygen for surgical procedures. Therefore, aviators who have a history of bleomycin-induced lung injury should not be allowed to return to airframes that require routine use of 100% oxygen. Also, they should be exempted from the portions of the altitude chamber qualification that require 100% oxygen use. Use of 100% oxygen during emergencies such as fire or rapid decompression is acceptable and should not be discouraged.

III. Waiver Considerations.

History of Hodgkin lymphoma is disqualifying for all flying classes. In addition, all malignancies require an MEB which necessitates a waiver for all ATC/GBC and SMOD personnel with HL who are returned to duty through the MEB process.

Table 1: Waiver potential for various stages of Hodgkin lymphoma and flying class.

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**	**ACS review/evaluation**
I/IA	All stages	No AETC	No
II	All stages	Yes*#+ AFMSA	Maybe†
III	All stages	Yes*#+ MAJCOM	Maybe†
ATC/GBC SMOD	All stages	Yes+ MAJCOM**	No

* For untrained FC II and FC III, waiver may be considered five years after completion of treatment if asymptomatic and in full remission.
** Waiver authority for SMOD personnel is AFSPC or GSC.
# For trained FC II and III individuals only, waiver may be considered six months after completion of treatment if asymptomatic and in full remission; the exception is for fighter aircrew who need to wait 12 months prior to waiver consideration if they received bleomycin, otherwise 6 months.
+ No indefinite waivers will be granted.

† For high performance (routine use of aviator mask while flying) individuals treated with bleomycin, will no longer require an ACS evaluation unless problems arise and the evaluation is requested by the waiver authority.

Review of AIMWTS in Apr 2012 revealed a total of 23 members with a waiver request for the diagnosis of HL. There were two cases resulting in a disposition of disqualified. Breakdown of the cases was as follows: 1 FC I case (0 disqualifications), 9 FC II cases (0 disqualifications), 1 FC IIU case (0 disqualifications), 8 FC III cases (2 disqualifications), 2 ATC/GBC cases (0 disqualifications), and 2 SMOD cases (0 disqualifications). One of the DQs was for recurrent disease and the other was due to side effects from treatment.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for Hodgkin lymphoma should include the following:
A. History – initial symptoms and signs, staging, treatment (amount and location of radiation and/or amount and type of chemotherapy), current symptoms/signs and activity level.
B. Physical – lymphoid regions, spleen and liver.
C. Hematology/oncology consult.
D. CT scan results after treatment.
E. Labs – complete blood count (CBC), erythrocyte sedimentation rate (ESR), LDH, liver function tests, albumin, blood urea nitrogen (BUN), and creatinine.
F. ECG.
G. Pulmonary function testing, with spirometry pre and post bronchodilator, lung volumes and DLCO. If there is any DLCO abnormality, exercise oximetry and/or metabolic exercise testing, and follow up DLCO in 3-6 months would be advisable to determine functional status and clinical course.
H. Pathology report.
I. Tumor board results (military or civilian).
H. Medical evaluation board results.

The AMS for waiver renewal for Hodgkin lymphoma should include the following:
A. History – brief summary of stage with risk factors, treatment, review of symptoms for signs of recurrence or complications from treatment (include negatives), activity level
B. Physical – thyroid, lung, cardiovascular, lymphoid regions, spleen and liver.
C. Hematology/oncology consult.
D. TSH if RT to mantle region.
E. Labs – CBC, platelets, ESR, and chemistry profile.

ICD 9 Code for Hodgkin's lymphoma	
201.9	Hodgkin's disease (lymphoma), unspecified

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WAIVER GUIDE
Updated: Dec 09
Supersedes Waiver Guide of Apr 07
By Dr. Jeb Pickard and Dr. Dan Van Syoc

CONDITION:
Human Immunodeficiency Virus (HIV) Infection (Dec 09)

I. Overview.

Human immunodeficiency virus (HIV) is a retrovirus that likely evolved from simian immunodeficiency virus in chimpanzees, perhaps as early as 1968. The syndrome of acquired immunodeficiency syndrome (AIDS) was first described in 1981 as a severe form of immune deficiency in homosexual men. At that time, the disease appears to have been confined for the most part to Africa, the Caribbean, and North America, but over the next two decades the disease reached epidemic proportions throughout the world. The disease is predominantly transmitted via sexual contact, intravenous access (illicit drug use and transfusions), and transplacental in the perinatal period; currently, about 80% of transmission worldwide is believed to occur via heterosexual intercourse. With the introduction of highly active antiretroviral therapy (HAART), the natural history of the disease has changed, with long-term survival proving to be relatively common. HAART is not curative, however, and the drugs display considerable toxicity.

Infection with HIV is commonly asymptomatic in its early stages, with the presence of early symptoms correlating with more rapid progression to AIDS.[1] The infection at this point is diagnosable by measuring viral RNA copies. Seroconversion, with the development of specific antibodies detectable on standard ELISA testing, occurs within weeks to months, with over 95% converting within six months.[2] A small percentage (7% in one study) of individuals are able to spontaneously control their viremia.[3] For the first six months after transmission, the disease is usually latent, with no findings except occasional lymphadenopathy. Lymphoid tissue is the primary reservoir of infection. Helper T lymphocytes (cluster determinant 4, or CD4) are predominantly affected, with remarkable turnover of both virus and CD4 cells in the early stages of disease. In the great majority of patients, CD4 levels eventually decline from their pre-morbid value of ~1,000/mm^3, with the CD4 count correlating well with risk of infection. After the first year, CD4 counts drop an average of 50/mm^3 annually. Staging is largely by CD4 counts, and is depicted in Table II. AIDS is defined by a CD4 count of 200/mm^3 or by an AIDS-defining complication; about 10% of patients develop the latter while their CD4 count is still above 200/mm^3.[4] HAART is clearly indicated when the patient's CD4 count falls below 200/mm^3. Due to observational data that justify initiation of HAART when counts fall below 350/mm^3, Department of Health and Human Services treatment guidelines from 2008 suggested the latter value as a therapeutic threshold.[5] The Infectious Disease service at Wilford Hall Medical Center has recently adopted a threshold CD4 count of 350/mm^3 to begin HAART.

CD4 count correlates less well with other complications, including neurologic involvement. Encephalitis from AIDS was initially thought to be due to opportunistic organisms such as cytomegalovirus.[6] It soon became clear, however, that HIV itself was responsible.[7] Invasion of the central nervous system commonly occurs early in the course of disease, as soon as 16 days after transmission.[8] The virus probably gains access to the central nervous system (CNS) through infected macrophages, a route known as the Trojan Horse mechanism.[9] Once in the brain, the virus

targets the glia, the supporting cells that represent 90% of brain cells. There is little evidence that neurons themselves are infected, though the involvement of surrounding cells eventually leads to neuronal death. From post-mortem studies, the virus appears to have a predilection for subcortical white matter and the basal ganglia. About half to two-thirds of patients with HIV develop clinical neurologic disorders.[10] Though the introduction of HAART has been associated with a decrease in the incidence of frank dementia, the prevalence of HIV encephalopathy has actually risen over the same period.[11] This suggests that, while antiretroviral therapy reduces some of the severe neural manifestations, such therapy has had little effect on the virus's involvement of the CNS.

New onset seizures occur in 2-8% of HIV patients; about half of these are due to infectious complications or comorbid conditions, while the remaining half appear to be directly due to HIV itself.[12] Psychiatric manifestations are common, likely due to a combination of demoralization, social isolation, and chronic stress, as well as direct CNS involvement. Major depression affects 15-40% of patients with HIV, a rate that is far in excess of the general population.[13] Although some of the populations most affected by HIV may be at increased risk of depression, meta-analysis of ten published studies comparing HIV-positive individuals to at-risk HIV-negative controls found a two-fold increase in prevalence of major depression with the former group.[14] Unlike depression, AIDS mania is a complication of late-stage disease, and has diminished in frequency with the introduction of HAART.

Although the conditions described in the previous paragraph have the potential for severe morbidity, the most common neurologic complications are neurocognitive disorders. The earliest reports of CNS disease described cases of frank dementia. HIV-associated dementia (HAD) is a subcortical process, characterized in its early stages by impaired attention-concentration, abnormal memory, mental and motor slowing, and incoordination. As is typical for a subcortical dementia, language is generally spared. By definition, HAD entails moderate-to-severe cognitive impairment, and marked difficulty in carrying out activities of daily living (ADL). A milder form of the same disorder was also identified and labeled as minor cognitive-motor disorder (MCMD); characteristics were similar to HAD, but with mild-to-moderate cognitive impairment, and mild interference with ADL (e.g., difficulty managing finances, problems with medication schedules). The criteria for these two disorders were described by an American Academy of Neurology Task Force in 1991.[15] However, a number of reports began appearing over the ensuing decade which described subclinical neurocognitive abnormalities in association with HIV infection; these abnormalities involved similar cognitive functions, and were apparent on testing but were not grossly evident to the patient or to companions.[16-18] Some studies, in contrast, were unable to document similar abnormalities.[19,20] A review of available research found that identification of such abnormalities was largely determined by the nature of the cognitive test battery, with abbreviated exams usually failing to demonstrate the deficiencies.[21]

In 2007, the National Institute of Mental Health and the National Institute of Neurologic Diseases and Stroke convened a working group to evaluate the validity of these findings, and to refine the definitional criteria.[22] The group adopted the collective term HIV-associated neurocognitive disorders (HAND), and recognized three subcategories, consisting of HAD, mild neurocognitive disorder (MND, similar to MCMD), and asymptomatic neurocognitive impairment (ANI). Neurocognitive impairment of any of these three categories was noted to be prevalent throughout all HIV stages, with 27% of CDC stage A, 44% of stage B, and 52% of stage C affected (see Table 1). Epidemiologic data from the post-HAART era showed that, as the disease progressed through the stages, the prevalence of ANI slowly decreased, the prevalence of MND markedly rose, and HAD

prevalence remained under 5%. One issue noted from multiple studies was the instability of HAND, with about 20% of individuals showing fluctuating mental status from one examination to another. (Such fluctuation is not unique to HIV; it is particularly characteristic, for instance, of the dementia that may complicate multiple sclerosis).

Table 1 – AIDS Surveillance Case Definitions[5]

CD4 cell categories	A – Asymptomatic, PGL# or acute HIV infection	B – Symptomatic (not A or C)*	C – AIDS indicator condition
>500/mm^3 (≥ 29 percent)	A1	B1	C1
200-499/mm^3 (14-28 percent)	A2	B2	C2
<200/mm^3 (<14 percent)	A3	B3	C3

1993 AIDS surveillance case definition for adolescents and adults. All patients in categories A3, B3, C1-C3 are reported as AIDS based upon prior AIDS-indicator conditions and/or a CD4 cell count <200/mm^3. AIDS-indicator conditions include three new entities added to the 1987 case definition: recurrent bacterial pneumonia, invasive cervical cancer, and pulmonary tuberculosis.
Persistent Generalized Lymphadenopathy
*Symptomatic conditions not included in category C that (a) are attributable to HIV infection or indicate a defect in cell-mediated immunity or (b) are conditions considered to have a clinical course or to require management that is complicated by HIV infection. Examples of B conditions include but are not limited to bacillary angiomatoses; thrush; vulvovaginal candidiasis that is persistent, frequent or poorly responsive to therapy; cervical dysplasia (moderate or severe); cervical carcinoma in situ; constitutional symptoms such as fever (38.50C) or diarrhea for more than one month; oral hairy leukoplakia; and herpes zoster involving two episodes or more than one dermatome.

II. Aeromedical Concerns.

Aviation is a demanding discipline, requiring a high degree of cognitive capability in an occupation with significant inherent risk. Clearly any mental disorder that impairs ADL is incompatible with aviation. In addition, measurable neurocognitive abnormalities, even if not severe enough to impair routine activities, are considered to be potentially significant for aviation. Furthermore, certain conditions encountered in flying, particularly reduced ambient oxygen pressure, would be expected to unmask an underlying cognitive deficiency. It is notable that in one of the early reviews of HIV encephalopathy, the authors noted that, of those patients whose dementia appeared suddenly, approximately half did so under the stress of hypoxia.[23] Thus cognitive function would be at greatest risk under actual aviation conditions. Other potential aeromedical concerns include the aviator's emotional reaction to the diagnosis of HIV, side effects of treatment regimens, and the need for close observation of the patient.[24] There is also a risk of depression and suicide (relative rate 20 as compared to USAF controls) during the adjustment reaction phase.

Qualification for worldwide military duty must be considered for any HIV-seropositive individuals. In fact, issues of worldwide deployment to areas of limited medical resources, use of attenuated live

virus vaccines, and the use of the military as its own walking blood bank were all reasons cited for mandatory HIV testing of military personnel beginning in 1985.

III. Waiver Consideration.

HIV infection is disqualifying for FC I/IA/II/IIU/III personnel per AFI 48-123. Primarily because of the risk neurocognitive impairment even in the early stages of disease, aeromedical waiver is not recommended for this condition.

Table 2 – Waiver Potential for HIV Infections

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	HIV positivity	No AETC	No
II	HIV positivity	No MAJCOM	If requested by waiver authority
IIU	HIV positivity	No AFMSA	If requested by waiver authority
III	HIV positivity	No MAJCOM	If requested by waiver authority

AIMWTS review in Sep 2009 revealed a total of eleven cases, all with a disqualification disposition. Three of the cases were FC II and eight were FC III aviators. Information from AF/SG states the USAF has actually given one waiver (FCIII) for HIV in 2002 which is not reflected in AIMWTS. This waiver expired in 2003 and was retired in 2006.

IV. Information Required for Waiver Submission.

It should be considered, prior to submission of an aeromedical summary, that current policy does not give waiver consideration to airmen who are HIV positive.

Active duty Air Force members and Air Reserve Component (ARC) members on extended duty are referred to Brooke Army Medical Center (BAMC) for initial medical evaluation and medical evaluation board (MEB) to determine fitness for duty. ARC members not on extended active duty must obtain a medical evaluation that meets the requirements of Attachment 9 in AFI 48-135 from their civilian healthcare provider (in the case of the Air National Guard (ANG), only if the state identifies a nonmobility, nondeployable position in which the member can be retained). The immediate commander of ARC members not on extended active duty will determine if the member can be utilized in the Selected Reserve.

Information required for a waiver for HIV should include:
A. As this condition is not waiverable, there is no requirement for information to be submitted. If not already accomplished, an MEB is mandatory for continued military service.

ICD 9 code for HIV	
042	Human Immunodeficiency Virus Disease

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WAIVER GUIDE
Updated: Mar 2010
Supersedes Waiver Guide of Nov 2006
By: Col Karen Klingenberger (RAM X) and Dr Van Syoc
Reviewed by LtCol Tom Sauerwein, AF/SG Consultant in Endocrinology.

CONDITION:
Hyperlipidemia, Therapy of (Mar 10)

I. Overview.

Epidemiologic studies over several decades have found a graded relationship between the total cholesterol concentration and coronary risk.[1, 2, 3] More specifically, elevated LDL is recognized as a major risk factor for atherosclerosis. The relationship is continuous, but not linear, as risk rises more steeply with increasing LDL-C concentrations. This "log-linear" relationship has been demonstrated between LDL and relative risk for atherosclerosis such that with every 30 mg/dL reduction in LDL there is a 30% reduction in relative risk for coronary artery disease (CAD).[4]

A review of the National Health and Nutritional Examination Surveys (NHANES) conducted by the National Center for Health Statistics/Centers for Disease control and Prevention (NCHS/CDC) has shown consistent declines in the mean serum total cholesterol of adults with no change in HDL and VLDL, suggesting the decline was due to a decline in LDL cholesterol only and was consistent with documented decreases in dietary intake of saturated fat and cholesterol. Clinical trials noted in this review suggest a slightly different end point of a 1% decrease in LDL cholesterol translating into a 1% decrease in relative risk for coronary heart disease.[5] Although there are improvements, NHANES data also demonstrates that 50% of Americans have serum total cholesterol levels exceeding 200 mg/dL. The mean level of LDL and HDL for American adults was 127 and 50.7 mg/dL, respectively. Due to the prevalence of increased cholesterol levels, it is highly likely every flight surgeon will manage aircrew with abnormal serum lipids.

The complex lipid pathophysiology provides insight on the current pharmacological interventions to treat the variety of hyperlipidemias. Serum lipids are transported in the circulation via several lipoprotein complexes. Dietary cholesterol and triglycerides (TGs) are packaged into chylomicrons by the intestinal mucosa. Lipoprotein lipase hydrolyzes TGs to free fatty acids (FFAs) from chylomicrons and VLDL. Like chylomicrons, the TGs are hydrolyzed to FFAs in the circulation and the remnants are termed intermediate density lipoprotein (IDL). IDL can either return to the liver or be further hydrolyzed to LDL. In the liver, the rate limiting step in cholesterol synthesis is the conversion of 3-hydroxy-methylglutaryl coenzyme A (HMG-CoA) to mevalonate in the liver. HMG-CoA reductase inhibitors, or statins, reduce the synthesis of cholesterol via this pathway. Reductions in LDL from 20 to 60% are possible and VLDL is also lowered. Statins produce only moderate increases in HDL, rosuvastatin having the greatest effect (of the aeromedically approved statins, simvastatin has the greatest effect). Clinical trials have shown approximately a 36% reduction in coronary events.[6, 7] The statins are also well known to reduce coronary events independent of their effect on lipids.

Serum lipid levels should be determined after a 14-hour fast with only water recommended. This allows accurate determination of serum triglycerides and the calculated LDL. The upper limit of normal for serum total cholesterol is usually defined as 200 mg/dL and for serum triglycerides as

150 mg/dL. The lower limit of normal for HDL is 40 mg/dL for men and 50 mg/dl for women. Elevated serum LDL is usually defined as ≥160 mg/dL with specific levels for intervention based upon additional risk factors for disease.

Treatment:

1) In 2001 the National Cholesterol Education Program (NCEP) published the Adult Treatment Panel III Guidelines (ATP III). The authors amended ATP III in 2004 to reflect the results of five clinical trials on statin therapy and disease end points. Table 1 is adapted from this report. Risk factors for CAD include cigarette smoking, hypertension (BP ≥140/90 or on antihypertensive medication), low HDL (<40 mg/dL), family history of CAD in a first-degree relative (male <55 years old, female <65 years old), and age (men ≥45 years old, women ≥55 years old). A computer program for calculating the 10-year risk of CAD based on the Framingham Heart Study is available on the Internet from the National Heart, Lung, and Blood Institute (http://www.nhlbi.nih.gov/guidelines/cholesterol/).[8] ATP III also set the goal for patients with hypertriglyceridemia to lower non-HDL cholesterol to levels 30 mg/dL higher than the LDL goal (non-HDL = TChol – HDL = LDL + IDL + VLDL).

Table 1: ATP III Modified Goals for Therapeutic Lifestyle Change (TLC) and Drug Therapy

Risk Category*	**LDL-C Goal**	**Initiate TLC**	**Consider Drug Therapy**
High: CHD or equivalent (10-year risk >20%)	<100 mg/dL (optional goal <70 mg/dL)	≥100 mg/dL	≥100 mg/dL (<100 mg/dL consider)
Moderately High: 2+ risk factors (10-year risk 10 – 20%)	<130 mg/dL	≥130 mg/dL	≥130 mg/dL (100-129 mg/dL consider)
Moderate: 2+ risk factors (10-year risk <10%)	<130 mg/dL	≥130 mg/dL	≥160 mg/dL (130-159 mg/dL consider)
Low: 0-1 risk factor	<160 mg/dL	≥160 mg/dL	≥190 mg/dL (160-189 mg/dL consider)

CHD (coronary heart disease); HDL-C (high-density lipoprotein cholesterol); LDL-C (low-density lipoprotein cholesterol); TC (total cholesterol)
*All risks are Framingham risk scores

Therapeutic lifestyle changes (TLC) rest primarily with diet and exercise modifications. Although dietary restrictions of fat can result in significant short-term declines in serum lipids, long-term adherence to such diets has produced more modest reductions in total cholesterol and LDL on the order of 10%.[9, 10] Aerobic exercise can result in approximately 37% of energy coming from FFAs but this requires sustained activity up to 40 minutes, classically reported by athletes as getting "your second wind".[11] Frequently, interventions other than TLC are necessary to meet ATP III modified goals for LDL. Pharmacological therapy can target the metabolic processes of lipids at several points. Several approaches are currently approved for use by aircrew. Side effects of statins are generally few with the most common being mild gastrointestinal disturbances, headache, and rash. Intolerance to a statin does not preclude treatment with another drug in the class as side effects from one statin may not be seen with a different statin.

Elevated liver function tests (LFTs), 1 to 2% incidence, and dose-related myopathy can also occur. Myopathy is a general term referring to any disease of muscles. Myalgia is defined as muscle ache or weakness without creatinine kinase elevation. Myositis refers to muscle symptoms with increased creatinine kinase levels. Rhabdomyolysis (muscle symptoms with marked creatinine kinase elevation usually ten times normal) is the most serious adverse effect and has an incidence of less than 0.001% with use of these medications.[12] Air Force policy allows use of the statins: lovastatin (Mevacor®), pravastatin (Pravachol®), atorvastatin (Lipitor®) and simvastatin (Zocor®) to treat hyperlipidemia. In addition, fenofibrate (Tricor®) was added to the approved medication list in late 2008 and is to be used only with approved statins.[13] The current list of approved aircrew medications is located on the Air Force Medical Service Knowledge Exchange (https://kx.afms.mil/). Statins are the most effective class of drugs and the first choice for lowering lipid levels. Aircrew should be briefed to report any symptoms indicating myopathy: muscle discomfort, weakness or brown urine. Serum lipids and liver function tests (LFTs) should be checked prior to starting therapy, at 12 weeks, when indicated clinically and annually. Creatinine kinase should also be obtained at baseline and again when indicated clinically.

Hepatotoxicity from statins is rare (rates below 2%), but when it does occur, it manifests as an elevation of AST or ALT. Elevations of AST or ALT are asymptomatic; jaundice or hyperbilirubinemia are rarely associated with statins. Hepatotoxicity is dose-related, with higher statin doses associated with a higher rate of liver enzyme abnormalities. Elevations of aminotransferase levels usually occur within the first 12 weeks of therapy, and AST and ALT levels return to normal with discontinuation of therapy. If aminotransferase levels are found to be elevated > 2 times the upper limit of normal, the statin should be discontinued. Trial with a different statin should be considered once AST/ALT levels return to baseline.[12]

2) Ezetimibe (Zetia®) is a relatively new agent that inhibits cholesterol absorption by the intestine. Reduction of LDL on the order of 18% has been demonstrated. This drug has an excellent safety profile though it should be avoided with moderate to severe hepatic insufficiency. Adverse events differ little from placebo. Ezetimibe was approved by AFMSA in 2004 for all flying classes as therapy for hyperlipidemia in combination with any of the four authorized statins or as monotherapy for those unable to tolerate statins. Despite demonstrated LDL reduction, ezetimibe has not been shown to change cardiovascular outcomes to date.

3) The bile acid sequestrants bind bile acids, reduce the enterohepatic circulation of bile (derived from cholesterol), and indirectly prevent dietary fat/bile micelles from being absorbed. Subsequently, a greater percentage of cholesterol is converted to bile acids by the liver. These drugs can lower LDL by 20 to 30% while raising HDL and TGs. A major clinical trial showed relative reductions in coronary deaths and nonfatal myocardial infarction by 24% and 19%, respectively.[14] They should not be used to treat hypertriglyceridemia. Bile acid sequestrants can interfere with the absorption of fat soluble vitamins and medications. The side effects of constipation, abdominal discomfort, and nausea can be significant and make patient compliance difficult. Increased abdominal gas poses a serious concern for flyers in a hypobaric environment. This can be minimized by starting with a low dose and slowly increasing it until desired lipid levels are reached. A primary prevention study with cholestyramine showed a <2% reduction in myocardial infarction and death versus placebo. Air Force policy allows the use of the bile acid sequestrants cholestyramine (Questran®) and colestipol (Colestid®). Bile acid sequestrants require DNIF for ground trial until the potential for idiosyncratic reaction has been ruled out. A waiver is not required.

4) Fibric acid derivatives appear to increase lipoprotein lipase activity, the principle enzyme for conversion of TGs to FFAs. They primarily lower TGs by 25 to 50% and raise HDL about 10 to 35%, with a variable effect on LDL. Gemfibrozil lowered the relative risk of coronary events by 34% in the Helsinki Heart Study.[15] Side effects include nausea, abnormal LFTs, cholelithiasis, and myopathy. Aircrew should be briefed to report any symptoms indicating myopathy: muscle discomfort, weakness or brown urine. Serum lipids and liver function tests (LFTs) should be checked prior to starting therapy, at 12 weeks, yearly, and as clinically indicated. Current Air Force policy allows the use of gemfibrozil (Lopid®) or fenofibrate (Tricor®) to treat lipid disorders. Fenofibrate is preferred over gemfibrozil if combination therapy with a statin is anticipated, as discussed below.

5) Combination drug therapy may be necessary to achieve LDL levels promoted in the ATP III modified goals:
a.) Ezetimibe in combination with a low dose statin (Ex: ezetimibe + simvastatin, Vytorin®) achieves additional reductions in LDL of 15% or greater, similar to increasing the same statin to the highest approved dose. No additional monitoring is required beyond that for the statins when combined with ezetimibe. As noted above for ezetimibe, outcome changes have yet to be demonstrated with this medication.
b.) Bile acid sequestrants may also be used in combination with statins.
c.) Aircrew with refractory or combined hyperlipidemia may require a statin plus a fibrate to reach ATP III modified goals. Combination therapy with gemfibrozil or fenofibrate and any of the four authorized statins is approved for FC IIA. Fenofibrate is preferred over gemfibrozil in combination with a statin due to the improved safety profile of this combination. Risk factors for myopathy with combination statin-fibrate therapy include increased age, female gender, renal disease, liver disease, CYP450 3A4 inhibiting medications and grapefruit juice, diabetes, hypothyroidism, debilitation, excess alcohol consumption, and heavy exercise.[16, 17] Aircrew should be briefed to report any symptoms indicating myopathy: muscle discomfort, weakness or brown urine. Serum lipids and liver function tests (LFTs) should be checked prior to starting therapy, at 12 weeks, clinically when indicated and yearly. Creatinine kinase should be obtained at baseline and then clinically when indicated.

6) Fish oil, when given in higher doses (4 gm/day), significantly lowers serum triglyceride levels by 25-30%. The decrease in triglycerides is a result of inhibition of VLDL-Trig synthesis. Fish oil can also raise HDL cholesterol by as much as 3% in patients with markedly elevated triglycerides. There is little effect on the amount of LDL cholesterol, but fish oil therapy may cause an increase in size of LDL cholesterol particles (which are less atherogenic). The most common side effect of fish oil is nausea, which occurs in 4% of patients at doses < 3gm/day and 20% of patients on doses >3gm/day.

II. Aeromedical Concerns.

Hyperlipidemia is a widespread disease and the benefits from reducing the risk of CAD warrant treatment. The cardiovascular stress imposed by flying high performance aircraft and worldwide operations increase the risk for aircrew suffering an adverse cardiovascular event. The statins, bile acid sequestrants, and gemfibrozil have provided significant protection from adverse cardiovascular events in clinical trials. Except for bile acid sequestrants, a waiver is required for pharmacological therapy to manage lipids. Untoward effects vary with the class of medication used to lower lipid

levels. Subclinical myopathy can occur with use of a fibrate or a statin. The risk increases when fibrates and statins are used in combination. Any complaint of muscle pain in aircrew taking a fibrate or a statin should be promptly evaluated for possible drug-induced myopathy. The bile acid sequestrants need to be started at a low dose and gradually increased to minimize gastrointestinal side effects, especially barotrauma associated with abdominal gas.

III. Waiver Consideration.

Hypercholesterolemia requiring use of medication other than single approved statin or resin binder for control, or requiring multiple medications for control is disqualifying for Flying Classes I/IA, II, and III. For FC I/IA, any confirmed (repeated) serum fasting LDL cholesterol in excess of 190 mg/dl in association with one or no cardiac risk factor, or in excess of 160 mg/dl in association with two or more cardiac risk factors, is disqualifying. If controlled within a year on non-pharmacological intervention or if controlled on a bile acid sequestrant, statin, fibrate, or ezetimibe, then AETC may consider waiver. AETC will not waive hyperlipidemia controlled on statin plus a fibrate for FC I and IA. For statins alone or in combination with another drug, serum lipids and LFTs should be checked prior to starting therapy, at 12 weeks, when indicated clinically and yearly. Creatinine kinase should be obtained at baseline and then when indicated clinically.

Table 2 – Waiver guidelines for treatment of hyperlipidemia

Medications	Waiver Status/Authority	Information
Bile Acid Sequestrants	Not required/ N/A	Grounded until idiosyncratic reaction ruled out.
Statins (lovastatin, pravastatin, atorvastatin or simvastatin)	FC II and III/ MAJCOM/SGPA(may be delegated to local authority)	Waiver not required if on single approved statin medication for hyperlipidemia. Approved medications include simvastatin, pravastatin, and lovastatin up to 40mg/day and atorvastatin up to 80mg/day. Higher doses or combination of medication requires waiver. Requires at least 5 day ground trial when starting medication or for any adjustments to dosage to rule out idiosyncratic reactions. Follow up of lipids and LFTs should conform to accepted practice standards.
Ezetimibe	FC II and III/ MAJCOM/ SGPA	3-day ground trial for idiosyncratic reaction before waiver submission.
Gemfibrozil or fenofibrate	FC II and III/ MAJCOM/ SGPA	Grounded until idiosyncratic reaction ruled out then submit for waiver.
Statin plus fibrate	FC IIA and FC III/ MAJCOM/SGPA	For FC II personnel this combination is limited to FC IIA. Only MAJCOM can waive (may not be delegated).

A review of AIMWTS data in Oct 2009 revealed a total of 4799 aircrew with the diagnosis of hyperlipidemia. Of that total, 65 were FC I/IA, 2987 were FC II, 2 were FC IIU, and 1745 were FC III. There were a total of 200 aircrew with a disqualification disposition; 11 were FC I/IA, 89 were FC II, and 100 were FC III. The two FC IIU cases were both initial waivers and were approved. A representative sample of the DQ cases revealed that none of them were the result of the hyperlipidemia diagnosis.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver request should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. The goal of treating hyperlipidemia is reducing the risk of an adverse cardiovascular event. Serum lipid levels and pertinent risk factors must be addressed as part of this goal. If an adverse cardiovascular event has occurred, that must be addressed before a waiver for return to flying status will be favorably considered. A complete and thorough aeromedical summary is required for initial waiver consideration to include:

A. List and fully discuss all clinical diagnoses requiring a waiver.

B. A complete history to include risk factors for CAD (age, gender, tobacco use, hypertension, family history, and diabetes), diet and exercise patterns, and response to lifestyle changes and all treatments attempted with results to include all adverse effects.
C. Labs: all serial serum lipid levels and LFTs (for statins and fibrates). It is important to see the medication effect on the lab results.
D. Physical: evidence of arcus senilis, target organ damage from atherosclerosis, xanthomas or xanthelasmas.
E. Consultation report from the treating physician, if applicable.

Waiver Renewal: For a time limited waiver, a renewal aeromedical summary is needed. It should include all interim history and medical information necessary to update the case.

Drugs not approved for aviation duties include nicotinic acid or niacin (Niacor®, Niaspan®), bezafibrate (Bezalip®), rosuvastatin (Crestor®), fluvastatin (Lescol®), colesevelam (Welchol®), and the combination of nicotinic acid plus lovastatin (Advicor®).

ICD 9 codes for hyperlipidemia	
272.0	Pure hypercholesterolemia
272.1	Pure hyperglyceridemia
272.2	Mixed hyperlipidemia

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WAIVER GUIDE
Updated: Jul 2010
Supersedes Waiver Guide of Mar 2008
By: Maj Christopher Keirns (ACS internist) and Dr Dan Van Syoc

CONDITION:
Hypertension (Jul 2010)

I. Overview.

The relationship between blood pressure (BP) and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater is the chance of myocardial infarctions, heart failure, stroke, and kidney disease. For individuals 40–70 years of age, each increment of 20 mmHg in systolic BP (SBP) or 10 mmHg in diastolic BP (DBP) doubles the risk of CVD across the entire BP range from 115/75 to 185/115 mmHg.

The 7th Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VII) classification of hypertension, based on two or more properly measured readings, with confirmation of an elevated reading in the contralateral arm, at each of two or more visits after an initial screen, is listed in Table 1.

Table 1. Blood Pressure Classification.[1]

Condition	SBP (mmHg)	DBP (mmHg)
Normal BP	<120	and <80
Pre-hypertension (Pre-HTN)	120-139	or 80-89
HTN		
• Stage 1	140-159	or 90-99
• Stage 2	≥ 160	or ≥ 100

[1]These definitions apply to adults on no antihypertensive medications and who are not acutely ill. If disparity exists in categories between SBP and DBP, the higher value defines the severity of the HTN.

For aeromedical purposes, the USAF defines hypertension for flying personnel as a 3-day average systolic blood pressure greater than 140mm Hg or a 3-day average diastolic blood pressure greater than 90mm Hg. Asymptomatic trained flying personnel with average systolic blood pressure ranging between 140 mmHg and 160 mmHg, or average diastolic blood pressure ranging between 91 mmHg and 100 mmHg, may remain on flying status for up to 6 months (from the date the elevated blood pressure was first identified) while undergoing non-pharmacological intervention to achieve acceptable values.

While HTN is the dominant risk factor for stroke, coronary disease is associated with a number of other risk factors that are often co-morbid with HTN, and should be addressed at the same time. These include obesity, dyslipidemia, diabetes, cigarette smoking, and physical inactivity. Additional but non-modifiable risk factors for CVD include a family history of premature CVD and the patient's age.

The recommendations of JNC VII include considering identifiable causes of HTN in all patients, especially when HTN is initially diagnosed under the age of 35, or when the onset HTN is rapid, or when a patient's HTN does not respond to treatment. Although most HTN is idiopathic, relatively common causes of secondary hypertension include alcohol use, obesity, sleep apnea, and renal disease; these are readily addressed by history, physical exam, or initial lab studies. Pursuing a work-up for rarer causes of secondary HTN (e.g., renal vascular disease) should be guided by consultation with an internist or nephrologist.

Lifestyle modifications, which are listed in Table 2, are often effective at treating HTN and associated with improvement in a patient's other major CVD risk factors and should always be considered as first-line treatment. If lifestyle modifications alone are inadequate JNC VII recommends thiazide-type diuretics for most patients with HTN, either alone or in combination with another class of drug.

Table 2. Lifestyle modifications for treatment of hypertension

Modification	**Recommendation**	**Approximate SBP Reduction (Range)**
Weight reduction (10kg/22lbs)	Maintain normal body weight (body mass index 18.5–24.9 kg/m2).	5–20 mmHg
Adopt Dietary Approaches to Stop Hypertension (DASH) eating plan	Consume a diet rich in fruits, vegetables, and low fat dairy products with a reduced content of saturated and total fat.	8–14 mmHg
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2–8 mmHg
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 min per day, most days of the week).	4–9 mmHg
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (1 oz or 30 mL ethanol; e.g., 24 oz beer, 10 oz wine, or 3 oz 80-proof whiskey) per day in most men and to no more than 1 drink per day in women and lighter weight persons.	2–4 mmHg

In clinical trials, antihypertensive therapy has been associated with reductions in stroke incidence of approximately 35–40%; myocardial infarction, 20–25%; and heart failure, more than 50%. The Framingham Heart Study confirmed the benefit of long-term antihypertensive therapy on CVD

disease incidence and mortality with a 40% reduction of a 10-year risk of CVD death for treated versus untreated HTN. For aeromedical purposes the goal of antihypertensive therapy in patients with uncomplicated HTN is to reach a BP below 140/90 mmHg.

II. Aeromedical Concerns.

The long term vascular complications of HTN are an increased risk of cardiovascular events such as myocardial infarction and stroke, potentially resulting in sudden incapacitation, or death. Because lifestyle modifications are considered to be first line interventions, and are associated with negligible aeromedical side effects, each aviator should be individually evaluated for potential benefit from lifestyle modifications, used alone, or in combination with medication(s). While numerous medications are effective in lowering BP, some drugs have modes of action that may adversely affect the flyer. Medications that act via direct vasodilatation or autonomic vasoregulation are avoided in favor of those that work via volume reduction, such as diuretics, or via the renin-angiotensin axis, such as angiotensin converting enzyme inhibitors (ACEi), or angiotensin receptor blockers (ARB). Medications that affect cognitive capacity (e.g., central α-adrenergic agonists) are also avoided. It should be noted that hypertension is almost never a risk factor for sudden incapacitation, particularly if it is controlled. It is the secondary complications of hypertension that are of aeromedical significance.

The classes of antihypertensive agents available to USAF aviators include diuretics (thiazide, with or without triamterene), ACEi (lisinopril or ramipril) and ARB (losartan). These drugs are effective as monotherapy, and when used as such do not require a waiver as long as the blood pressure is controlled (<140/90) and there are no adverse affects from the medication. If those aviators on diuretics require potassium supplementation, they will require a waiver, or they should be switched to a medication that does not require potassium replacement. The combination of diuretic with ACEi or ARB is synergistic, and usually very effective at lowering BP; it is restricted to non-high performance aircraft. Beta-blockers (specifically atenolol) may be used as a third line drug, when diuretic combined with ACEi or ARB is insufficient. (Beta-blockers are often poorly tolerated in aviators due to fatigue, reduced exercise capacity, and impotence; whether used alone or in combination they are restricted to non-high performance aviators.) Calcium channel antagonists (specifically coat-core and GITS [Adalat CC® and Procardia XL®, respectively] and amlodipine [Norvasc®]) are also approved in aviators; whether used alone or in combination they are restricted to non-high performance aviators. Calcium channel antagonists are efficacious for the treatment of hypertension, particularly in low rennin hypertensives such as African-Americans and the elderly. Medical therapy for hypertension other than that noted at the beginning of this paragraph does require a waiver for continued flying or special duty activities.

III. Waiver Consideration.

Hypertension is disqualifying per AFI 48-123 for FC I/IA, FC II, FC IIU, FC III, and ATC/GBC personnel. It is not disqualifying for SMOD personnel, but the use of Nifedipine Coat Core or GITS does require a SMOD waiver. Also, SMOD personnel started on any other antihypertensive medication require a minimum 7-day DNIA/C until the potential for idiosyncratic reaction has been ruled out. Asymptomatic aviators with an average SBP ranging between 141 mmHg and 160 mmHg or an average DBP ranging between 91 mmHg and 100 mmHg who are without evidence of end organ damage may remain on flying status for up to six months (from the date the elevated blood pressure was first identified) while undergoing non-pharmacological intervention to achieve

acceptable values. Aviators with hypertension responsive to life-style modifications should have serial BP rechecks quarterly to semi-annually during the first year to assure success of the lifestyle modifications. Failure to achieve blood pressure control with lifestyle modifications, or an initial blood pressure average exceeding 160 mmHg systolic or 100 mmHg diastolic, requires initiation of pharmacotherapy. The rated or non-rated aviator (to include ATC/GBC personnel) with a history of isolated HTN who remains normotensive using lifestyle modifications or one of the following approved medications as monotherapy (thiazide, with or without triamterene, ACEi [lisinopril or ramipril], or ARB [losartan]) does not require a waiver. The aviator requires a minimum of seven days grounding after initiation of pharmacotherapy, plus BP controlled below 140/90 and be free of medication side effects, prior to return to full duty; this includes all subsequent dose adjustments.

Table 3. Anti-hypertensive medications and the waiver authority for specific flying classes.

Flying Class	Medications	Waiver Potential Waiver Authority	Duration
I, IA	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2] or losartan	Waiver not required	N/A
	HTN, if controlled on other medication than listed above and/or in combination.	No AETC	
II	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2] or losartan	Waiver not required	N/A
	HTN, if controlled on HCTZ combined with lisinopril, ramipril[2] or losartan; atenolol[3] alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination	Yes[4, 5] AFMSA	Up to 3 years
IIU	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2] or losartan	Waiver not required	N/A
	HTN, if controlled on HCTZ combined with lisinopril, ramipril[2] or losartan; atenolol[3] alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination	Yes[5] AFMSA	Up to 3 years
III	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2] or losartan	Waiver not required	N/A
	HTN, if controlled on HCTZ combined with lisinopril, ramipril[2] or losartan; atenolol[3] alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination	Yes[5] MAJCOM	Up to 3 years
ATC/GBC	HTN, if controlled with a thiazide[1] (HCTZ or chlorothiazide), lisinopril, ramipril[2] or losartan	Waiver not required	N/A
	HTN, if controlled on HCTZ combined with lisinopril, ramipril[2] or losartan; atenolol[3] alone or in	Yes MAJCOM	Up to 3 years

	combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination		
SMOD	Any antihypertensive medication	N/A-not disqualifying except for Nifedipine AFSPC	Up to 3 years for those requiring a waiver

1 With or without triamterene. If potassium is added, a waiver will be required.
2 Ramipril restricted to dosages of 5 mg to 20 mg.
3 Third line drug, used after all others failed or were not tolerable. For aviators not required to fly in high-G aircraft.
4. FC II aviators on these medications can be waived, but only for FC IIA.
5. Waiver authority for initial FC II, FC IIU, and FC III is AETC
AIMWTS search in Jul 2010 produced a total of 2125 Air Force members with a waiver submission for the diagnosis of hypertension. Breakdown of these waivers revealed 18 FC I/IA cases (7 disqualifications), 1005 FC II cases (76 disqualifications), 913 FC III cases (80 disqualifications), 10 FC IIU cases (3 disqualifications), 135 ATC/GBC cases (8 disqualifications), and 44 SMOD cases (3 disqualifications).

IV. Information Required for Waiver Submission.

Waiver package should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. Waiver is required for hypertension only if pharmacotherapy involves more than one medication (with the exception of HCTZ and triamterene) or the use of one of the following (alone or in combination with another approved medication): atenolol, amlodipine, and nifedipine.

The aeromedical summary for the <u>initial waiver</u> for essential hypertension should include the following:
A. List and fully discuss <u>all</u> clinical diagnoses requiring a waiver.
B. History - summary of blood pressures, risk factors/co-morbidities including negatives [diet (especially, alcohol and sodium intake), botanicals/supplements, cigarette smoking/tobacco use, physical activity level, family history of premature cardiovascular disease, dyslipidemia, diabetes mellitus, sleep apnea (snoring, observed apneas)], symptoms including negatives (flushing, headaches, nocturia, chest pain, and claudication), previous treatments, medications and side effects.
C. Physical - weight (BMI), fundus for hypertensive retinal changes, thyroid, heart, lungs, auscultation for carotid, abdominal, and femoral bruits, abdominal exam for enlarged kidneys, masses, and abnormal aortic pulsation, lower extremity exam for edema and pulses and neurological assessment.
D. Labs: - hematocrit/hemoglobin, fasting glucose, serum electrolytes, serum calcium, blood urea nitrogen (BUN), serum creatinine (Cr), lipid profile, thyroid stimulating hormone (TSH), and urinalysis.
E. Resting electrocardiogram (ECG).
F. 3-day blood pressure demonstrating stability (<140/90) at least one week after medication initiated.

The aeromedical summary for waiver renewal for essential hypertension should include the following:
A. Interval history - summary of the intervening blood pressure control, symptoms related to coronary artery disease or medications, diet (e.g., alcohol and sodium intake) and supplements, cigarette smoking/tobacco use, physical activity level, other co-morbid medical conditions since last waiver granted.
B. Physical - blood pressure readings over the course of the previous waiver, weight changes, hypertensive retinal changes, auscultation for carotid, abdominal, and femoral bruits, heart and lungs, abdominal exam for enlarged kidneys, masses, and abnormal aortic pulsation, lower extremity exam for edema and pulses, and neurological assessment..
C. Laboratories – for all medications a renal panel (to include Cr and potassium) annually.
D. 3-day blood pressure.

ICD9 codes for hypertension	
401.0	Malignant essential hypertension
401.1	Benign essential hypertension
401.9	Unspecified essential hypertension
405.0	Malignant secondary hypertension
405.1	Benign secondary hypertension
405.9	Unspecified secondary hypertension

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WAIVER GUIDE
Updated: Oct 2010
Supersedes Waiver Guide of Dec 2006
By: Lt Col David Trant (RAM 11) and Dr Dan Van Syoc
Reviewed by LtCol Tom Sauerwein, AF/SG Consultant in Endocrinology.

CONDITION:
Hypothyroidism (Oct 10)

I. Overview.

Hypothyroidism is a relatively common condition, and is due to a deficiency of thyroid hormone. The incidence of primary hypothyroidism is approximately 5% of the population, with secondary hypothyroidism occurring in less than 1% of all cases.[1] Hypothyroidism is much more commonly seen in women than men.

Primary thyroid disease accounts for over 99% of cases of hypothyroidism.[1, 2, 3] While dietary iodine deficiency is the most common cause of hypothyroidism worldwide, the most common cause of primary disease in the US and most developed countries is autoimmune (Hashimoto's) thyroiditis, resulting from progressive destruction of the gland by antibodies directed against thyroperoxidase (anti-TPO), thyroglobulin, or the thyroid-stimulating hormone (TSH) receptor.[1, 4] Ten percent of patients with histologic autoimmune thyroiditis will not have any circulating antithyroid antibodies[1]. Thyroid ablative therapy is another common cause of primary hypothyroidism, with neck irradiation, medications (amiodarone, interferon alpha, lithium, and stavudine), I^{131} therapy for Graves' disease, and post-partum thyroiditis also being contributory to disease.[2, 3]

Central hypothyroidism is due to thyrotropin (TSH) deficiency caused by either acquired or congenital hypothalamic or pituitary gland disorders. Congenital severe hypothyroidism (cretinism) occurs in 1 in 2000-4000 births.[5] The US Preventive Services Task Force (USPSTF) recommends that all newborns be screened for this disorder. Treated congenital hypothyroidism is occasionally encountered in the USAF population[6].

Symptoms of hypothyroidism may include fatigue, lethargy, physical and mental slowness, depression, apathy, headache, cold-intolerance, arthralgias, myalgias, dyspnea on exertion, thick-dry skin, hoarseness and constipation.[1,2,7] Diagnosis is often delayed due to the insidious onset of symptoms. Hypothyroidism is generally progressive and irreversible with the exception of drug-induced disease.

Subclinical hypothyroidism is more common than overt disease.[8] It is defined as asymptomatic mild elevations in TSH with a normal serum free thyroxine (T_4). The implications of mildly elevated TSH levels seen in subclinical hypothyroidism are not entirely clear, but in some cases this may represent the development of early primary hypothyroidism.

The USPSTF has concluded that there is insufficient evidence to support screening for hypothyroidism in asymptomatic adults.[9, 10] Testing for hypothyroidism should be conducted whenever a patient complains of any symptoms typical of hypothyroidism or if a goiter is found. Clinical testing for hypothyroidism should also be considered in patients with hyperlipidemia, or

unexplained hyponatremia, high serum muscle enzyme concentrations (hypothyroid myopathy), macrocytic anemia, pericardial or pleural effusions. Other candidates for testing include persons with previous thyroid injury (e.g., radioiodine therapy, thyroid or neck surgery, and external radiation therapy), pituitary or hypothalamic disorders, or persons with a history of autoimmune diseases.[9]

Laboratory evaluation includes TSH and free T_4 levels. An elevated TSH indicates the presence of primary hypothyroidism while a low T_4 confirms overt hypothyroidism. A normal T_4, with a high TSH, is indicative of subclinical hypothyroidism. Central hypothyroidism is characterized by a low serum T_4 concentration and a TSH concentration that is not appropriately elevated.[1,2,9]

Ultrasonography is reserved for evaluations of goiter and nodules. Ultrasonography can distinguish solid from cystic lesions and determine changes in the size of the nodules over time. If fine needle aspiration (based on the size) is needed, ultrasonography can be used to assist with aspiration of those nodules that are not easily palpable. Measurement of radioactive iodine uptake (RAIU) is rarely required in the evaluation of hypothyroidism.

The mainstay of primary hypothyroidism treatment is replacement therapy using levothyroxine (Synthroid®). Dosing is based upon producing a euthyroid state determined by monitoring of the TSH approximately 4-6 weeks after initiation of medication, after each change of dose, and as needed to ensure appropriate treatment. Patients must be followed on a regular basis indefinitely.[1,2,11] Treatment of central hypothyroidism is guided by free T_4 levels. The free T_4 goal is at the upper limit of normal.

II. Aeromedical Concerns.

The major aeromedical concern is the insidious nature of the disease which may delay diagnosis until symptoms become significant and pose a potential threat to flying safety. The symptoms of hypothyroidism may present dramatically and include lethargy, mental status changes and multiple physiologic problems. For this reason, close monitoring of patients with hypothyroidism and subclinical hypothyroidism is essential. Waiver is required whenever there is a validated elevation in TSH or treatment with thyroid replacement occurs. For a flyer with overt hypothyroidism, waiver should be submitted when the patient is clinically euthyroid and treatment has been stabilized.

III. Waiver Considerations.

Hypothyroidism is disqualifying for Flying Classes I/IA, II and III, but it is not listed in AFI 48-123 as disqualifying for FC IIU, ATC/GBC, and SMOD duties.

Table 1: Waiver potential for hypothyroidism

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	History of hypothyroidism, controlled on thyroid replacement therapy	Yes AETC
II/III*	History of hypothyroidism, controlled on thyroid replacement therapy	Yes MAJCOM
IIU	History of hypothyroidism, controlled on thyroid replacement therapy	N/A-not disqualifying
ATC/GBC	History of hypothyroidism, controlled on thyroid replacement therapy	N/A-not disqualifying
SMOD	History of hypothyroidism, controlled on thyroid replacement therapy	N/A-not disqualifying

*Certification authority for untrained FC II and FC III applicants is AETC

A review of the AIMWTS database through Aug 10 of revealed a total of 208 individuals with an aeromedical summary with the diagnosis of hypothyroidism. The breakout was as follows: FC I/IA – 9 (1 disqualified); FC II – 88 (6 disqualified): FC III – 88 (12 disqualified); FC IIU – 4 (2 disqualified): ATC/GBC – 13 (1 disqualified); and SMOD – 4 (0 disqualifications). Almost all of the disqualifications (22 total) were for problems not related to thyroid disease.

IV. Information Required for Waiver Submission.

Initial waiver requires consultation by an endocrinologist or internist. Information sought from the consultant includes the cause of the hypothyroidism and treatment recommendations. For previously diagnosed hypothyroidism on stable therapy, specialty care is not typically required except for women who are pregnant or considering pregnancy. When thyroid replacement is started, very close monitoring is required to assure the patient attains and sustains their euthyroid state. The TSH should normalize in primary hypothyroidism. Minimal elevations of TSH may be acceptable (still requires a waiver) provided there is documentation of a normal T_4 and no symptoms. With minimal elevations of TSH, a rough cutoff of 10 mU/L can be used as a guide for initiation of thyroid replacement if the diagnosis is primary hypothyroidism. Treatment for elevations of TSH below 10 mU/L is appropriate for symptomatic patients, but controversy exists regarding treatment of asymptomatic individuals with TSH values between 4.5 – 10 mU/L. Waiver renewal requires confirmation that the patient remains euthyroid and asymptomatic (i.e. recent TSH, +/-free T_4, history). If the cause of the hypothyroidism is other than primary hypothyroidism, the

primary disease process should be addressed appropriately and waiver should also be requested for any such disease(s) in accordance with the applicable section of the waiver guide.

Aeromedical waiver requests should only be submitted only after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for hypothyroidism should include the following:
A. History of all symptoms and treatments.
B. Physical exam to include thyroid gland and lateral and submandibular lymph nodes.
C. TSH, free T_4 (before and with treatment).
D. Ultrasonography, radioactive iodine scan, and/or fine-needle aspiration, if performed.
E. Endocrinology or internal medicine consult.

The aeromedical summary for waiver renewal for hypothyroidism should include the following:
A. Interim history since last waiver.
B. Physical exam to include thyroid gland and lateral and submandibular lymph nodes.
C. TSH, free T_4 (before and with treatment); confirmation that the aviator remains euthyroid.
D. Reports of any imaging studies if performed.
E. Report from treating physician.

ICD 9 code(s) for hypothyroidism	
243	Congenital hypothyroidism
244	Acquired hypothyroidism
245	Thyroiditis
246	Other disorders of the thyroid

V. References.

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WAIVER GUIDE
Updated: Aug 09
Supersedes Waiver Guide of Jan 07
By: Dr. Dan Van Syoc

CONDITION:
Hypogonadism and Testosterone Replacement (Aug 09)

I. Overview.

Male hypogonadism is an increasingly recognized phenomenon. The presentation normally includes fatigue, depression, decreased libido, impotence, decreased strength, depressed mood and infertility[1]. Due to the ease of application of new testosterone replacement formulations, there has been increased interest in diagnosis and treatment; the US has seen an increase of more than 500 percent in prescription sales of testosterone products since 1993[2]. The diagnosis is based on the above symptoms and a documented low morning serum testosterone level on two or more occasions.

Testosterone levels can vary widely over the course of the day in normal individuals, and it is not uncommon to see an isolated low testosterone in healthy males; however, it is not normal for the levels to remain <400ng/dl on repeated testing. Testosterone levels are highest in the early morning, therefore the diagnosis of androgen deficiency should be based on multiple early morning measurements; 8:00 AM is the recommendation of most experts. If the levels are below or at the lower limit of the laboratory normal, an assessment of gonadotropins and prolactin is recommended[3, 4]. Because testosterone is highly bound to sex hormone binding globulin (SHBG), at least one measurement of free and bioavailable testosterone should be done if there is a reasonable concern about protein binding abnormalities (SHBG is commonly decreased in obesity and increases with normal aging after the fourth decade).

The testis is responsible for two major functions in the adult male: sperm production and testosterone production. Sperm is produced in the seminiferous tubules and testosterone in the Leydig cells. Follicle stimulating hormone (FSH), produced in the pituitary under hypothalamic control, has control over activity of the seminiferous tubules, while luteinizing hormone (LH), also produced in the pituitary, controls Leydig cell functions[5].

Primary hypogonadism is caused by testicular failure. Lab testing would reveal low sperm counts and possibly low testosterone levels along with elevated gonadotropin levels, FSH and LH. Causes include cryptorchidism, infections (e.g., mumps), radiation, chemotherapeutic agents, trauma, environmental causes, testicular torsion, medications such as ketoconazole or steroids, autoimmune damage, genetic causes such as Klinefelter's syndrome or may be idiopathic. Primary hypogonadism is more likely to be associated with gynecomastia than is secondary hypogonadism[5, 6]. Secondary (central) hypogonadism is evidenced by low testosterone levels in the face of low or inappropriately normal FSH and LH levels[6, 7]. Causes of secondary hypogonadism include hypothalamic or pituitary masses, infiltrative diseases, hemochromatosis, infection or trauma. In adult males with new-onset hypogonadism, however, the most common etiology is idiopathic central (hypogonadotropic) hypogonadism. This is not well defined in the literature and is a diagnosis of exclusion. Obesity can also be a cause of low testosterone. Obesity leads to low total and free testosterone levels. Greater decreases are seen in the total testosterone level as obesity not

only decreases testosterone secretion but also lowers sex hormone binding globulin (SHBG) levels[8]. A loss in weight can produce an increase in the testosterone level and an increase in the SHBG level which may obviate the need for testosterone replacement therapy in some of these individuals[9].

Testosterone is a controlled substance mainly due to abuse by athletes. Careful attention should be made to inappropriate refill requests or overuse of the medication. Testosterone should be administered only to a man who is hypogonadal, as evidenced by distinctly subnormal serum testosterone concentrations on two or more occasions[10].

Testosterone can be replaced satisfactorily whether the acquired testosterone deficiency is due to primary or secondary hypogonadism. The principal goal of testosterone therapy is to restore the serum testosterone concentration to the normal range. Symptomatic improvement is seen with replacement given to those whose serum testosterone is consistently less than 200ng/dl. In general, the testosterone patch or gel formulations are more physiologic and better tolerated. The injections are associated with large hormone peaks that can be above the normal range, as well as troughs below the normal range. The injections are dosed based on the interval given, for example, 100mg weekly, 200mg every 2 weeks, or 400mg every 4 weeks. The higher doses last longer, but almost always have periods above and below normal levels. In contrast, the transdermal testosterone preparations have few side effects other than those of the drug itself. A local reaction to the patch can be treated by rotating the site of application, applying a low potency corticosteroid cream to the site, or changing the preparation to the gel formulation (Androgel®). Oral preparations are infrequently prescribed because it is virtually impossible to maintain a normal serum level and due to their association with substantial hepatotoxicity, to include development of benign and malignant neoplasms[10].

The major advantage of transdermal administration is maintenance of relatively stable serum testosterone concentrations, resulting in a more consistent energy, mood, and libido. Transdermal preparations rely upon chemical means to increase the absorption of testosterone across nonscrotal skin, and are meant to be worn on the arm or torso. A patch delivers approximately 5mg of testosterone per 24 hours and results in normal serum testosterone concentrations in the majority of hypogonadal men.

Patients who are treated with testosterone should be monitored to determine that normal serum testosterone concentrations are being achieved. They should also be monitored for both desirable and undesirable effects. Men whose hypogonadism is manifested by a decrease in libido and energy should note a marked improvement in these symptoms. Some of the actions of testosterone itself, while not side effects, are undesirable. Acne and gynecomastia can be seen in the first few months of therapy. Worsening of dyslipidemia has been reported with decreases in high density lipoprotein (HDL) and elevations in low density lipoprotein (LDL). Prostate volumes and serum prostate specific antigen (PSA) may increase in response to testosterone treatment, although the values increase, on average, merely to those of age-matched eugonadal men. Some men, especially those over the age of 50 years, are at an increased risk for benign prostatic hyperplasia (BPH) and, possibly, of prostate cancer, because both are testosterone dependent diseases. Sleep apnea and erythrocytosis may be worsened[11, 12]. Most experts encourage monitoring for prostate disease and erythrocytosis to reduce the risks of adverse effect with testosterone replacement therapy[13].

Transdermal preparations for primary male hypogonadism or hypogonadotropic hypogonadism include:

Androderm®**:** apply a 2.5 or 5.0 mg patch nightly to clean, dry area on the back, abdomen, upper arms, or thighs for 24 hours for a total of 5mg per day. Scrotal patches are no longer available in the US.
AndroGel®, Testim®: apply 2.5 or 5g of 1% gel (to deliver 50mg of testosterone with 5mg systemically absorbed) once daily (preferably in the morning) to clean, dry, intact skin of the shoulder and upper arms. AndroGel® may also be applied to the abdomen. Dosage may be increased to a maximum of 10g (100 mg). Upon opening the packet(s), the entire contents should be squeezed into the palm of the hand and immediately applied to the application site(s). Alternatively, a portion may be squeezed onto the palm of the hand and applied, repeating the process until entire packet has been applied. Application sites should be allowed to dry for a few minutes prior to dressing. Hands should be washed with soap and water after application. Testosterone gel should not be applied to the genitals.

The serum total testosterone should be measured three months after any dose or preparation change, and annually at a minimum, once established on a preparation[11]. The value should be well within the normal range (400 to 800ng/dL [13.9 to 27.7nmol/L]) and all blood draws should be at 0800 for standardization. These levels can be measured at any time in men who are using any of the transdermal preparations, with the recognition that the peak values occur six to eight hours after application of the patch. The concentrations fluctuate when the gel is used, but not in a predictable way, so at least two measurements should be made at any dose of gel; the time of measurement does not appear to matter. If injectable testosterone is used then one should initially measure a true peak three to four days after injection, and the trough level one to two days before the next dose. Once dosing with injectable testosterone is well established then serum testosterone can be measured midway between injections. The best decision is to consider not using the injectable form as it is less predictable while the topical formulations are so reliable.

In patients that have symptoms consistent with obstructive sleep apnea, a sleep study should be obtained prior to considering testosterone replacement. If OSA is diagnosed, treatment with testosterone may worsen OSA for unknown reasons. Treatment of OSA with CPAP may improve hypogonadism and is recommended as primary treatment. In patients on CPAP that are found to have hypogonadism, testosterone replacement should be followed by another sleep study to adjust the CPAP levels. Obesity may also exacerbate OSA and hypogonadism. Weight loss improves OSA and hypogonadism.

II. Aeromedical Concerns.

Hypogonadism from any cause is associated with decreased strength, decreased muscle mass, anemia, and possible depression, in addition to infertility and decreased libido. Further, some of the etiologies of hypogonadism are disqualifying in and of themselves. Complications of replacement therapy that would be of concern are the increased risk of prostate cancer, erythrocytosis, and the potential to worsen sleep apnea. Another concern is the increased variability in testosterone levels with injections; supraphysiologic levels with injection followed by sub-therapeutic levels prior to the next dose. If injections are used, one method to decrease this variability is to shorten the time between injections, two weeks at the most. There is a significant risk of local skin reactions with topical formulations, so this needs to be rectified before return to flying duties.

III. Waiver Consideration.

Table 1: Waiver potential for hypogonadism and testosterone replacement

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Maybe*# AETC	Yes
II	Yes*# MAJCOM	Yes
III	Yes*# MAJCOM	Yes

*No indefinite waivers
Minimum of 7-days ground trial, control of manifested symptoms before waiver submission. A change of dosage and/or preparation requires an additional 7-day observation period.

AIMWTS review in Mar 09 revealed a total of 20 cases with the diagnosis of hypogonadism. There were no FC I/IA cases. There were a total of 13 FC II cases with one resulting in a disqualification; that aviator had a craniotomy due to a craniopharyngioma which was the cause of the DQ. There were a total of 7 FC III cases with three resulting in a disqualification; one was an initial FC III case that also had substandard vision; another was an aviator involved in a serious MVA resulting in a severe closed head injury and a traumatic bilateral orchiectomy; and the last was a case that also involved a severe bout of depression.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.
Information required for an initial waiver for hypogonadism treated with testosterone replacement should include:
A. Complete history to include all symptoms of the condition and whether symptoms were present in adolescence and all prostate-related issues to include pertinent negatives. Discussion on whether case is primary or secondary hypogonadism, and give specifics to support assertion.
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Exam: testicular exam, muscle strength determinations, prostate exam (PSA if over age 50), hair distribution pattern.
D. Laboratory: Two or more pre-treatment testosterone levels less than 200ng/dl, FSH and LH levels (with normal ranges specified); in order to establish primary or central hypogonadism, baseline CBC; for secondary hypogonadism, basic chemistry and liver tests, prolactin and thyroid stimulating hormone (TSH) levels, and an MRI of the sella turcica.
E. Consult: Endocrinology, Internal Medicine or Urology report.
F. All medications; Current treatment doses, formulations, and documentation of therapeutic testosterone levels once the dose strength is stabilized; discuss any noted side-effects of the medication.

The following information will be required for waiver renewal (if any abnormalities surface in the interim, they will need to be addressed appropriately):

A. Interim history to include documentation of symptoms of BPH or sleep apnea since beginning testosterone therapy.
B. Current treatment doses, formulations and documentation of therapeutic testosterone levels (at least annually once established).
C. Documentation that current dosage leads to serum testosterone levels within normal range. Lab tests recommended every three months after any dosage change and annually thereafter.
D. Documentation of a normal digital rectal examination and serum PSA annually in those over age 50. The patient should be referred for prostate biopsy if a prostate nodule is palpated at any time or if the serum PSA concentration rises by more than 0.75ng/mL per year over two years or greater than 1.5ng/mL in one year.

ICD 9 code for hypogonadism	
257	Testicular dysfunction
257.2	Other testicular hypofunction/hypogonadism
253.4	Gonadotropic hypogonadism

Reviewed by LtCol Tom Sauerwein, AF/SG Consultant in Endocrinology.

V. References.

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WAIVER GUIDE
Updated: Oct 2010
Supersedes Waiver Guide of Dec 2006
By: Lt Col David Trant (RAM 11) and Dr Dan Van Syoc
Reviewed by LtCol Tom Sauerwein, AF/SG Consultant in Endocrinology.

CONDITION:
Hypothyroidism (Oct 10)

I. Overview.

Hypothyroidism is a relatively common condition, and is due to a deficiency of thyroid hormone. The incidence of primary hypothyroidism is approximately 5% of the population, with secondary hypothyroidism occurring in less than 1% of all cases.[1] Hypothyroidism is much more commonly seen in women than men.

Primary thyroid disease accounts for over 99% of cases of hypothyroidism.[1, 2, 3] While dietary iodine deficiency is the most common cause of hypothyroidism worldwide, the most common cause of primary disease in the US and most developed countries is autoimmune (Hashimoto's) thyroiditis, resulting from progressive destruction of the gland by antibodies directed against thyroperoxidase (anti-TPO), thyroglobulin, or the thyroid-stimulating hormone (TSH) receptor.[1, 4] Ten percent of patients with histologic autoimmune thyroiditis will not have any circulating antithyroid antibodies[1]. Thyroid ablative therapy is another common cause of primary hypothyroidism, with neck irradiation, medications (amiodarone, interferon alpha, lithium, and stavudine), I^{131} therapy for Graves' disease, and post-partum thyroiditis also being contributory to disease.[2, 3]

Central hypothyroidism is due to thyrotropin (TSH) deficiency caused by either acquired or congenital hypothalamic or pituitary gland disorders. Congenital severe hypothyroidism (cretinism) occurs in 1 in 2000-4000 births.[5] The US Preventive Services Task Force (USPSTF) recommends that all newborns be screened for this disorder. Treated congenital hypothyroidism is occasionally encountered in the USAF population[6].

Symptoms of hypothyroidism may include fatigue, lethargy, physical and mental slowness, depression, apathy, headache, cold-intolerance, arthralgias, myalgias, dyspnea on exertion, thick-dry skin, hoarseness and constipation.[1,2,7] Diagnosis is often delayed due to the insidious onset of symptoms. Hypothyroidism is generally progressive and irreversible with the exception of drug-induced disease.

Subclinical hypothyroidism is more common than overt disease.[8] It is defined as asymptomatic mild elevations in TSH with a normal serum free thyroxine (T_4). The implications of mildly elevated TSH levels seen in subclinical hypothyroidism are not entirely clear, but in some cases this may represent the development of early primary hypothyroidism.

The USPSTF has concluded that there is insufficient evidence to support screening for hypothyroidism in asymptomatic adults.[9, 10] Testing for hypothyroidism should be conducted whenever a patient complains of any symptoms typical of hypothyroidism or if a goiter is found. Clinical testing for hypothyroidism should also be considered in patients with hyperlipidemia, or

unexplained hyponatremia, high serum muscle enzyme concentrations (hypothyroid myopathy), macrocytic anemia, pericardial or pleural effusions. Other candidates for testing include persons with previous thyroid injury (e.g., radioiodine therapy, thyroid or neck surgery, and external radiation therapy), pituitary or hypothalamic disorders, or persons with a history of autoimmune diseases.[9]

Laboratory evaluation includes TSH and free T_4 levels. An elevated TSH indicates the presence of primary hypothyroidism while a low T_4 confirms overt hypothyroidism. A normal T_4, with a high TSH, is indicative of subclinical hypothyroidism. Central hypothyroidism is characterized by a low serum T_4 concentration and a TSH concentration that is not appropriately elevated.[1,2,9]

Ultrasonography is reserved for evaluations of goiter and nodules. Ultrasonography can distinguish solid from cystic lesions and determine changes in the size of the nodules over time. If fine needle aspiration (based on the size) is needed, ultrasonography can be used to assist with aspiration of those nodules that are not easily palpable. Measurement of radioactive iodine uptake (RAIU) is rarely required in the evaluation of hypothyroidism.

The mainstay of primary hypothyroidism treatment is replacement therapy using levothyroxine (Synthroid®). Dosing is based upon producing a euthyroid state determined by monitoring of the TSH approximately 4-6 weeks after initiation of medication, after each change of dose, and as needed to ensure appropriate treatment. Patients must be followed on a regular basis indefinitely.[1,2,11] Treatment of central hypothyroidism is guided by free T_4 levels. The free T_4 goal is at the upper limit of normal.

II. Aeromedical Concerns.

The major aeromedical concern is the insidious nature of the disease which may delay diagnosis until symptoms become significant and pose a potential threat to flying safety. The symptoms of hypothyroidism may present dramatically and include lethargy, mental status changes and multiple physiologic problems. For this reason, close monitoring of patients with hypothyroidism and subclinical hypothyroidism is essential. Waiver is required whenever there is a validated elevation in TSH or treatment with thyroid replacement occurs. For a flyer with overt hypothyroidism, waiver should be submitted when the patient is clinically euthyroid and treatment has been stabilized.

III. Waiver Considerations.

Hypothyroidism is disqualifying for Flying Classes I/IA, II and III, but it is not listed in AFI 48-123 as disqualifying for FC IIU, ATC/GBC, and SMOD duties.

Table 1: Waiver potential for hypothyroidism

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	History of hypothyroidism, controlled on thyroid replacement therapy	Yes AETC
II/III*	History of hypothyroidism, controlled on thyroid replacement therapy	Yes MAJCOM
IIU	History of hypothyroidism, controlled on thyroid replacement therapy	N/A-not disqualifying
ATC/GBC	History of hypothyroidism, controlled on thyroid replacement therapy	N/A-not disqualifying
SMOD	History of hypothyroidism, controlled on thyroid replacement therapy	N/A-not disqualifying

*Certification authority for untrained FC II and FC III applicants is AETC

A review of the AIMWTS database through Aug 10 of revealed a total of 208 individuals with an aeromedical summary with the diagnosis of hypothyroidism. The breakout was as follows: FC I/IA – 9 (1 disqualified); FC II – 88 (6 disqualified): FC III – 88 (12 disqualified); FC IIU – 4 (2 disqualified): ATC/GBC – 13 (1 disqualified); and SMOD – 4 (0 disqualifications). Almost all of the disqualifications (22 total) were for problems not related to thyroid disease.

IV. Information Required for Waiver Submission.

Initial waiver requires consultation by an endocrinologist or internist. Information sought from the consultant includes the cause of the hypothyroidism and treatment recommendations. For previously diagnosed hypothyroidism on stable therapy, specialty care is not typically required except for women who are pregnant or considering pregnancy. When thyroid replacement is started, very close monitoring is required to assure the patient attains and sustains their euthyroid state. The TSH should normalize in primary hypothyroidism. Minimal elevations of TSH may be acceptable (still requires a waiver) provided there is documentation of a normal T_4 and no symptoms. With minimal elevations of TSH, a rough cutoff of 10 mU/L can be used as a guide for initiation of thyroid replacement if the diagnosis is primary hypothyroidism. Treatment for elevations of TSH below 10 mU/L is appropriate for symptomatic patients, but controversy exists regarding treatment of asymptomatic individuals with TSH values between 4.5 – 10 mU/L. Waiver renewal requires confirmation that the patient remains euthyroid and asymptomatic (i.e. recent TSH, +/-free T_4, history). If the cause of the hypothyroidism is other than primary hypothyroidism, the

primary disease process should be addressed appropriately and waiver should also be requested for any such disease(s) in accordance with the applicable section of the waiver guide.

Aeromedical waiver requests should only be submitted only after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for hypothyroidism should include the following:
A. History of all symptoms and treatments.
B. Physical exam to include thyroid gland and lateral and submandibular lymph nodes.
C. TSH, free T_4 (before and with treatment).
D. Ultrasonography, radioactive iodine scan, and/or fine-needle aspiration, if performed.
E. Endocrinology or internal medicine consult.

The aeromedical summary for waiver renewal for hypothyroidism should include the following:
A. Interim history since last waiver.
B. Physical exam to include thyroid gland and lateral and submandibular lymph nodes.
C. TSH, free T_4 (before and with treatment); confirmation that the aviator remains euthyroid.
D. Reports of any imaging studies if performed.
E. Report from treating physician.

ICD 9 code(s) for hypothyroidism	
243	Congenital hypothyroidism
244	Acquired hypothyroidism
245	Thyroiditis
246	Other disorders of the thyroid

V. References.

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WAIVER GUIDE
Updated: Mar 2009
By: Dr. Dan Van Syoc

CONDITION:
Irritable Bowel Syndrome (Mar 09)

I. Overview.

Irritable bowel syndrome (IBS) is a very common malady that is characterized by the presence of abdominal discomfort or pain often associated with disturbed defecation[1]. It is the most commonly diagnosed gastrointestinal condition accounting for 25 to 50 percent of all referrals to gastroenterologists, and has an estimated prevalence of 12% among US adults. It is also the cause of a significant number of primary care visits, and is the second highest cause of absenteeism from work after the common cold[2]. IBS accounts for significant health care costs with annual direct and indirect costs estimated at $1.35 billion and $200 million, respectively[3].

The main symptoms of IBS are chronic or recurrent abdominal pain or discomfort often associated with altered bowel habits. Coexisting psychological symptoms are common, primarily anxiety, somatization, and symptom-related fears. These issues can contribute to impairment in quality of life and overutilization of health care resources[4]. The most widely accepted diagnostic criteria for IBS are the Rome III criteria (see Table 1) which were published in 2006. These criteria focus on the combination of abdominal pain and the association with bowel movements. The following are not part of the diagnostic criteria but are considered supportive symptoms: abnormal stool frequency (<3 bowel movements per week or >3 bowel movements per day); abnormal stool form (lumpy-hard stool or loose-watery stool); defecation straining; defecation urgency; a feeling of incomplete evacuation; passing mucus, and bloating[3]. An older diagnostic tool is the Manning criteria. These criteria are useful and date to the late 1970s, but have significant problems with sensitivity compared to the Rome III criteria and are not as widely used today[5].

IBS is a diagnosis that can often be suggested by history alone. Empiric therapy is often initiated with a minimum of initial testing, reserving a more aggressive workup to those who fail to respond to conservative therapy. By definition, no mechanical, biochemical, or overt inflammatory condition can explain the patient's symptoms and there are generally no alarming symptoms such as weight loss, fever, and intestinal bleeding. The cause of IBS is unknown, though associated pathophysiology includes altered gastrointestinal motility and increased gut sensitivity. Interplay between motor and sensory dysfunction appears to explain the symptoms of IBS[6, 7]. Patients may experience diarrhea, constipation or an alternating constipation or diarrhea; typically bowel symptoms are variable and intermittent[1]. Many people afflicted with IBS symptoms rarely, if ever, seek medical care. IBS can adversely affect health-related quality of life, to include impairment of physical, psychosocial, emotional, and role function[6].

The most important component in the treatment of IBS is the establishment of a therapeutic physician-patient relationship. The provider should be non-judgmental, establish realistic expectations with consistent limits, and involve the patient in all treatment decisions. Proper education of the patient is vital – they need to be well informed of the chronic and benign nature of the disease[8]. The major goal of therapy is a reduction in the severity and frequency of symptoms and an overall improvement in the quality of life[7]. Treatment is divided into nonpharmacologic

methods and pharmacologic methods with the former favored by most practitioners as a starting point. Dietary therapy is frequently a first step and enhancing fiber has long been recommended as a treatment for IBS. Due to its safety and low cost, a trial of fiber is a reasonable step, particularly in patients whose predominant symptom is constipation. There are many types of fiber, and not all have been well studied with IBS. Synthetic fibers are more soluble than natural fibers but may cause more gas symptoms. Wheat bran fiber should be avoided in patients with gluten senstivity[5, 8]. Fiber supplements have been effective in relieving IBS-related constipation, but have limited benefit in improving other IBS symptoms such as pain; the standard recommendation is for 20 to 40 grams of dietary fiber intake daily[10]. In addition, any foods that appear to routinely stimulate symptoms need to be eliminated from the diet – some patients are greatly benefited by eliminating lactose from their diet. Care should be taken to avoid an overly restrictive diet, since many IBS symptoms are random in their presentation and are unrelated to specific foods. Some patients, in their zeal to eliminate dietary triggers, put themselves on nutritionally inadequate diets.

For some patients who associate their symptoms with stressors, behavioral treatment can be helpful. Therapies that are utilized include hypnosis, biofeedback, and psychotherapy. Advantages to these types of therapy are that they all involve the patient and give them an opportunity to take responsibility for their treatment plan. These types of therapy are most helpful in those patients who are very motivated and have symptoms that are more severe[5, 8].

The goals of pharmacologic therapy are aimed at the patient's predominant symptom. For patients with moderate or severe symptoms, the provider needs to consider the use of medications. Antispasmodics such as hyoscyamine and dicyclomine are used frequently but efficacy for IBS has yet to be well established. Potential and troubling side effects include atropine-like effects such as visual disturbances, dry mouth, urinary retention and constipation, so they need to be used with caution (these side-effects are what prohibits their use in aviators)[10]. Laxatives are sometimes utilized in those patients not responding well to fiber. These can include stool softeners such as docusate, colonic stimulants such as bisacodyl and senna and osmotic agents such as polyethylene glycol, magnesium-containing compounds, and lactulose. Care should be taken to avoid the routine use of cathartic laxatives, such as senna or bisacodyl, given the habit-forming nature of these laxatives. For diarrhea symptoms, loperamide has demonstrated good efficacy but is not extremely helpful for pain symptoms[1, 10]. For both diarrhea and constipation, use of any of the agents needs to be done with caution as a significant number of patients have alternating diarrhea and constipation and the provider can inadvertently make the non-treated symptom worse.

Antidepressants have been shown to relieve pain at low doses. They work by modulating the perception of visceral pain. Tricyclic antidepressants have been studied most extensively, but large meta-analysis of their efficacy has shown variable results[5, 10]. A newer approach to the treatment of IBS is the use of 5-HT modulators. These medications, tegaserod, which is a partial agonist of the 5-HT_4 receptor, and alosetron, a 5-HT_3 receptor antagonist, need to be used only by gastroenterologists who are very familiar with the proper indications for their use and with the problems associated with these medications.[10.]

Table 1: Rome III diagnostic criteria* for irritable bowel syndrom[11]

Recurrent abdominal pain or discomfort at least 3 days per month in the last 3 months associated with 2 or more of the following:
(1) Improvement with defecation
(2) Onset associated with a change in frequency of stool
(3) Onset associated with a change in form (appearance) of stool

* Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis. Discomfort means an uncomfortable sensation not described as pain.

II. Aeromedical Concerns.

Urgency and frequency of defecation, as well as abdominal pain or discomfort, can be very distracting during flight. These can be further aggravated by the effects of rapid altitude changes in patients with abdominal distension, gas, and bloating. IBS symptoms can present inconveniences during long flights, extended trips, or austere living conditions, and symptoms may likely worsen as a result of these types of stressors. There is also great concern with aviators afflicted with IBS due to its chronicity. If dietary therapy is deemed necessary, the nature of the flying mission may make it extremely inconvenient if not impossible to comply[12]. Many medications used for treatment of IBS symptoms cause cognitive impairment, anticholinergic effects, hypotension, or disorientation, and are thus not on the approved list of medications for flyers.

III. Waiver Consideration.

IBS is disqualifying for all classes of Air Force flying. Due to the chronic and unpredictable nature of the disease, it is not wise to consider aviation applicants with the history of IBS for any flying class or position. These folks do not fare well with many stressful positions and run the risk of not being available, on short notice, for many sorties. For trained aviators with mild symptoms easily treatable with diet or other non-pharmacologic therapies, waiver can be considered. There are some cases that can be controlled on approved medications; these aviators can also be considered for a waiver.

Table 2: Waiver potential for Irritable Bowel Syndrome

Flying Class (FC)	Waiver Potential# Waiver Authority	ACS Evaluation or Review*
I/IA	No AETC	No
II - trained	Yes MAJCOM	Yes
II – untrained (initial Flt Surgeon applicants)	No AETC	Maybe
III – trained	Yes MAJCOM	Yes
III – untrained	No AETC	Maybe

*ACS review is at the discretion of the waiver authority in cases where the diagnosis is uncertain
#No indefinite waivers

AIMWTS review in Feb 2008 resulted in 84 cases with the diagnosis code of IBS. There were a total of 53 disqualifications which is 63% of all submitted cases. There were two FC I cases and both were disqualified due to the diagnosis of IBS. There were 32 FC II cases and 14 resulted in a disqualification, all but two were due to the IBS diagnosis; the disqualified pair were both due to multiple medical problems. There were a total of 50 FC III cases in the database and 37 were disqualified. Two were disqualified due to other medical problems and the remaining cases were due to IBS. In the disqualified FC III pool, 19 were initial FC III applicants, some of which were not symptomatic at the time of the waiver submission. As IBS in the general population is more skewed toward females, further analysis revealed that there were a total of 33 submitted female cases (39% of our total cases) and 24 of them were disqualified which was 73% of the total female population.

IV. Information Required for Waiver Submission.

Aeromedical summary for initial waiver for irritable bowel syndrome must include the following:
A. History specifically discussing the disease entity, frequency of events, specific symptoms, what relieves symptoms, pattern of recurrence, duration of attacks, and treatments (both pharmacologic and non-pharmacologic) used with their effectiveness.
B. Results of all labs and imaging tests, if performed.
C. Clinical consultation report from a gastroenterologist or internist.
D. Documentation that the aviator is asymptomatic off all daily medications, or is stable on medications currently on the approved medication list.

Aeromedical summary for waiver renewal for irritable bowel syndrome must include the following:
A. Interim history specifically discussing any recurrences or any changes in the disease pattern and all treatments used.
B. Testing: new labs and imaging results, if ordered, since last waiver.
C. Clinical consultation report from a gastroenterologist or internist unless aviator has been totally asymptomatic since last waiver.
D. Documentation that the aviator's condition is stable and that he or she is not on unapproved medication.

ICD 9 code for Irritable Bowel Syndrome	
564.1	Irritable Bowel Syndrome

Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology and by Col Patrick Storms, AF RAM and gastroenterologist.

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Waiver Guide
Updated Apr 2010
Supersedes waiver guide of Apr 2006
By Maj Todd Huhn (RAM X) and Dr. Dan Van Syoc
Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

CONDITION:
Keratoconus (Apr 10)

I. Overview.

Keratoconus is a progressive congenital noninflammatory corneal dystrophy characterized by progressive corneal steepening and thinning. The traditional prevalence rate in the general population before the advent of computerized corneal topography (CT) was 0.5%. It is usually found bilaterally; however, asymmetrical presentation is not uncommon, and rarely it may affect one eye only. The dystrophic process appears to be familial in nature, but no specific pattern of inheritance has been identified. Aeromedically, keratoconus should be suspected in cases with abnormal keratometry, CT that demonstrates a pattern consistent with corneal steepening or corneal irregularity, excessive and/or progressive corneal astigmatism, or in any aircrew who cannot be adequately corrected to at least 20/20 in the absence of any other ophthalmic explanation. Keratoconus of any degree is disqualifying for accession from any source and for all flying classes. This includes its mildest initial presentation, often referred to as keratoconus forme fruste. Progression occurs in over 67% of cases, but is variable and unpredictable, sometimes starting 8-10 years after initial diagnosis.

Visual symptoms usually start in the teenage years and may either stabilize, usually over one or two decades, or progress at an unpredictable rate. Rarely, it may remain subclinical. Frequent changes in contact lenses or spectacles are usually necessary to maintain adequate safety of fit and to optimize quality of vision. Eventually, penetrating keratoplasty (corneal transplant) may become necessary to recover useful vision. The onset of keratoconus is usually manifested by quality of vision changes. Increasing astigmatism, failure to correct visually with spectacles, and distorted images are typical signs and symptoms. Contact lenses are usually preferred to correct these problems, however, because of the unusual corneal shape, these fittings are usually complicated, often requiring special hard contact lenses. Abnormal CT can be diagnostic and usually precedes all other signs or symptoms. Slit lamp findings of keratoconus, such as Rizzuti's sign (conical reflection on the nasal cornea when a penlight is shone from the temporal side), Fleisher's ring (pigmented ring in the mid-peripheral cornea resulting from iron deposition), Vogt's striae (fine stress lines in the posterior cornea caused by stretching and thinning), corneal thinning, and Munson's sign (a V-shaped indentation in the lower eyelid when the patient's gaze is directed downwards), are all late clinical signs. Early signs include scissoring reflex (action of two light reflex bands moving toward and away from each other like scissor blades) on retinoscopy and distortion of the mires reflex with manual corneal keratometry.

Aircrew that develop keratoconus, or abnormal CT, require a full Aeromedical Consultation Service (ACS) evaluation. Trained aircrew that develop keratoconus are entered into an ACS clinical management group. With the introduction of computerized CT analysis, corneal patterns were identified that appeared similar to those seen in keratoconus. Without other clinical signs of keratoconus, such a pattern became known as "topographical pattern suggestive of keratoconus" or

"TPSK" within the USAF. This term does not appear in the literature; however, the term "Keratoconus Suspect" (KCS) appears as synonymous in recent publications. Such a pattern is a recognized contraindication to corneal refractive surgery because of the potential for underlying keratoconus.

Because there was little data available on suspicious CT patterns in the literature to determine keratoconic progression and progression rates, the USAF opened a TPSK management group in 1997 to determine whether TPSK pattern was indicative of early keratoconus or was a benign, normal variant pattern. USAF aircrew applicants, who had TPSK on CT, but without any other clinical signs of keratoconus, were waivered for TPSK, entered into this prospective management group, and followed by the ACS. However, continued analysis of that management group revealed that TPSK subjects progressed to keratoconus at an alarming rate (to date in over 35% of cases), a number that continues to increase steadily. Within this management group, progression occurred as early as 1-2 years after initial waiver, while in some, not occurring until 5-8 years later. This clinical progression was consistent with past non-CT medical studies of the earliest form of keratoconus (forme fruste) which progressed to obvious keratoconus in 67% of cases over a 2-8 year period of observation. Consequently, because of high progression rates over a short-period of time, the TPSK management group was officially closed in September 2005. Current TPSK management group members will continue to be followed by the ACS for ten years; however, TPSK, with or without any other clinical findings of keratoconus, are no longer waiverable for USAF flying training at any crew position.

II. Aeromedical Concerns.

Keratoconics are known to have poor quality of vision. Optical correction mitigates those effects somewhat, but most cases eventually require hard contact lenses to optimize correction. These contact lens fittings, however, are complicated, frequent, and not always successful. Blurred vision, distorted images, decreased contrast sensitivity, degradation in stereopsis, monocular diplopia, and optical side effects caused by keratoconus are undesirable and detrimental to flight safety. It is imperative that aircrew carry a set of spectacles on all missions in the event problems arise with contacts, making removal necessary.

III. Waiver Considerations.

Keratoconus is a disqualifying condition for all flying classes in the Air Force, to include FC IIU, and is not waiverable for FC I/IA, initial FC II, and initial FC III. Waiver for keratoconus is possible in trained aircrew, provided visual standards and correction are met functionally and clinically. Contact lenses, if worn, must be fitted appropriately and achieve adequate wearing times. Aircrew diagnosed with keratoconus require frequent evaluations and management to ensure that they are adequately corrected to mitigate the optical side effects of the condition. Although contact lenses, particularly rigid hard lenses, are frequently required to optimize vision performance in these cases, aircrew must also be adequately corrected with spectacle back-ups. A key element in correction of keratoconus is to also ensure adequate stereopsis with both contact lenses and spectacles. An acute loss of stereopsis associated with keratoconus can be problematic. Hard and soft contact lenses for keratoconus are fitted and dispensed only by the ACS.

Table 1 - Waiver potential for keratoconus.

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Keratoconus or TPSK	No AETC	Yes#
II	Initial FC II, Keratoconus or TPSK*	No AETC	Yes
	Keratoconus or TPSK	Yes MAJCOM	Yes
IIU	Initial FC IIU, Keratoconus or TPSK*	Maybe AFMSA	Yes
	Keratoconus or TPSK**	Maybe AFMSA	Yes
III	Initial FC III, Keratoconus or TPSK*	No AETC	Yes
	Keratoconus or TPSK	Yes MAJCOM	Yes

*Untrained FC II and FC III flyers will be managed in same manner as FC I/IA
**Pilots or navigator s with TPSK will most likely be granted a waiver for IIU duties. For those with diagnosed keratoconus, a navigator is unlikely to get a IIU waiver, but a pilot will most likely get the IIU waiver.
#Most of the FC I/IA candidates are diagnosed at the ACS. If the diagnosis is known prior to waiver consideration, ACS evaluation is not required and the candidate does not meet waiver requirements.

AIMWTS review in Feb 2010 revealed 219 aircrew with waiver dispositions for keratoconus or TPSK. There were 53 FC I/IA cases, 114 FC II cases, 2 FC IIU cases, and 59 FC III cases. There were a total of 56 disqualifications; 41 were FC I/IA, 6 FC II, 1 FC IIU, and 8 FC III (6 were initial FC III applicants). Nine of the 12 FC I/IA approved cases were later granted a FC II waiver for keratoconus or TPSK; there is no record of a FC II waiver request for the other 3 approved FC I/IA cases. There were 2 ETP cases, both for FC I/IA; one was denied (disqualification upheld) and the other was approved, but for FC III. Only one disqualification was for a non-vision cause.

IV. Information Required for Waiver Submission:

Initial waiver for keratoconus in trained aircrew requires an ACS evaluation. Following initial waiver, trained aircrew with keratoconus (or TPSK) will be followed at the ACS every 1-3 years depending on clinical and optical stability.

The aeromedical summary for an initial waiver for keratoconus should include the following:
A. History – history of previous refractions and progression of astigmatism, other visual symptoms, family history of keratoconus, medications, and any impact on job/daily life.
B. Rule out conditions such as Marfan's, retinitis pigmentosa, and vernal keratoconjunctivitis.

C. Physical – full eye exam with particular attention to corneal issues; include locally obtained CT; current visual correction.
D. Optometry/ophthalmology consultation report.
E. ACS report or review.

Waiver renewal requires an interval AMS with particular attention to clinical changes. The AMS should include a full eye exam and updated CT. The AMS should be requesting a repeat ACS evaluation as this is mandatory for continuation of a waiver. The ACS may request specific tests based on the history of the aviator in question.

ICD 9 code for keratoconus	
371.6	Keratoconus

V. References.

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WAIVER GUIDE
Initial Version: Feb 2010
Supersedes Decreased Renal Function Waiver Guide of Mar 1999
By: Dr Dan Van Syoc

CONDITION:
Kidney Disease, Chronic (Feb 10)

I. Overview.

Chronic kidney disease (CKD) is a worldwide public health problem and in the US, the incidence and prevalence of kidney failure are rising as evidenced by the age-, sex-, and race-adjusted incidence of end-stage renal disease increasing by 43% during the decade following 1991.[1] The major outcomes of CKD, regardless of the underlying etiology, include progression to kidney failure, complications associated with decreased kidney function, and cardiovascular disease (CVD).[2] Approximately 19 million Americans older than age 20 have CKD, and an additional 435,000 have end-stage renal disease. CKD is 100 times more prevalent then end-stage renal disease, and its incidence in increasing at an even faster rate.[3] The financial burden of end-stage renal disease is substantial, with an estimate of nearly $23 billion in annual direct medical costs in the US.[4]

CKD is defined as a glomerular filtration rate (GFR) <60 mL/min/1.73 m^2 of body surface area for > 3 months.[5] An alternate disease definition is the presence of kidney damage or decreased level of kidney function for three months or more, irrespective of diagnosis.[6] In the US, the major causes of CKD are diabetes, hypertension, glomerulonephritis, and tubulointerstitial disease. Most patients are totally asymptomatic until later in the disease process. Symptoms and/or signs of renal failure would include weakness, anemia (from chronic disease), easy fatigability (from the anemia), anorexia, vomiting, mental status changes or seizures, and edema.[7] There is also a strong associated between frailty and CKD in the general US population, and is particularly strong among persons with a GFR <45 mL/min/1.73 m^2. Frailty is also independently associated with mortality.[8]

Earlier stages of chronic kidney disease can be detected through laboratory testing. Treatment of these early stages of chronic kidney disease is effective in slowing the progression toward kidney failure. Unfortunately, chronic kidney disease is ‘‘under-diagnosed’’ and ‘‘under-treated’’ in the United States, resulting in lost opportunities for prevention. One reason is the lack of agreement on a definition and classification of stages in the progression of chronic kidney disease, as well as the best target group of patients to screen. Measurement of serum creatinine and estimation of GFR can identify patients with reduced kidney function. Measurement of urinary albumin excretion can identify some, but not all, patients with kidney damage. Screening asymptomatic individuals at increased risk could allow earlier detection of chronic kidney disease.[6] High-risk groups that should be screened for CKD include patients who have a family history of the disease and patients with diabetes, hypertension, recurrent urinary tract infections, urinary obstruction or any systemic illness that affects the kidneys. Of those at high risk, diabetes is the most common cause of CKD.[3]

In most cases, the GFR estimate (eGFR) is calculated from the measured serum creatinine level after adjustments for age, sex and race. A GFR of 100 mL/min/1.73 m^2 is considered normal for women and 120 mL/min/1.73 m^2 is normal for men. There are two commonly used formulas for estimating the GFR; the Modification of Diet in Renal Disease (MDRD) study equation or the

Cockroft-Gault equation. The MDRD equation is considered by most to be more accurate, but has been found to underestimate the GFR in healthy patients.[3, 9] Proteinuria, specifically albuminuria, in CKD patients is associated with more rapid progression of disease and an increasing likelihood of developing end-stage renal disease. Early detection of any proteinuria is essential for the treatment of this condition. One major study has shown that screening for proteinuria is not cost-effective unless selectively directed at high risk groups which was defined as patients older than 60, and those with hypertension.[3, 6, 10]

Most CKD patients should be considered for renal imaging studies as part of their initial evaluation. The most common test is renal ultrasonography which is normally utilized to document the size of the kidneys. With ultrasound, CKD usually manifests as small, echogenic kidneys, but occasionally, bilateral echogenic kidneys may be due to bilateral renal artery stenosis, so if that condition is suspected, CT or MR with associated angiography is recommended. Rarely, hydronephrosis can cause renal insufficiency, so ultrasound can identify the rare cases of bilateral hydronephrosis (usually due to a pelvic tumor). Occasionally, infiltrative processes can cause decreased renal function and ultrasound will identify large echogenic kidneys. Lastly, autosomal dominant polycystic kidney disease (ADPCKD) may result in renal dysfunction and ultrasound is good at identifying the enlarged kidneys with multiple cysts.[3, 7, 11]

Proper staging of CKD will facilitate application of clinical practice guidelines, clinical performance measures and quality improvement efforts to the evaluation and management of chronic kidney disease (see Table 1). Management of the disease includes blood pressure control, glycemic control in diabetic patients and reduction of proteinuria with an angiotensin-converting enzyme (ACE) inhibitor or angiotensin II receptor blocker (ARB). Other interventions that may be beneficial include lipid lowering measures, especially with HMG CoA reductase inhibitors (statins), limiting dietary protein intake to 0.60 to 0.75 g/kg body weight in patients with a GFR below 25 mL/min/1.73 m^2, and partial correction of anemia[3, 6]. Regarding the use of ACE inhibitors and ARBs, there is growing evidence that higher doses of these medications are necessary to provide optimal reduction in proteinuria and that both of these agents provide similar renoprotective effects.[12]

Table 1 – Stages of Chronic Kidney Disease[6]

Stage	**Description**	**GFR (mL/min/1.73m^2)**
1	Kidney Damage with normal or ↑ GFR	≥90
2	Kidney Damage with mild ↓ GFR	60 - 89
3	Moderate ↓ GFR	30 - 59
4	Severe ↓ GFR	15 - 29
5	Kidney Failure	<15 (or dialysis)

Most patients with CKD do not die of kidney failure, but rather of CVD complications, which are often worsened by diabetic disease. Studies have indicated that anemia, ↓GFR and microalbuminuria are associated with the CVD prevalence, and when all three are present, approximately 25% of the CKD patients had documented CVD. Regarding the outcome of mortality, neither CKD nor diabetes had a hazard ratio as high as that of CVD in the study sponsored by the National Kidney Foundation.[4, 13] Additionally, CKD is associated with increased morbidity and mortality in heart failure patients.[5] Accordingly, increased lipids need to be managed

aggressively in patients with CKD. The current CKD guidelines recommend an LDL cholesterol goal of less than 100 mg/dL[3].

A frequent question with CKD patients is when to refer to nephrology. In the primary care setting, all patients should undergo evaluation with internal medicine or nephrology regarding the etiology of renal dysfunction. Young patients (e.g., the active duty population) should be followed closely in an internal medicine or nephrology clinic since the preservation of remaining renal function is particularly important. In general, patients with GFR <30 mL/min/1.73 m^2 (CKD Stages 4–5) and those with >500mg/24 hr proteinuria should be referred to a nephrologist.[6]

II. Aeromedical Concerns.

Progressive kidney disease is not compatible with military aviation since the nature of the military mission may keep the aviator away from necessary medical care and speed the decline of the disease. Documented decreased renal function in an applicant for aviation service should not be waiverable as there is a reasonable chance the condition may progress. In a trained aviator, stable decreases in renal function without systemic effect (such as electrolyte disturbances) may be acceptable for waiver. A primary concern with this population is the risk of cardiovascular disease. These folks need to be closely monitored on a regular basis with strict cardiac risk factor modification.

III. Waiver Consideration.

All forms of chronic kidney diseases are disqualifying for aviation duty in the Air Force. The only medications considered for waiver are those on the approved medication list at the time of the waiver submission.

Table 2: Waiver potential for Chronic Kidney Disease (CKD)

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Any form of CKD	No AETC	No
II*@	Stages 1-3	Yes MAJCOM	If requested by MAJCOM
	Stage 4	Maybe MAJCOM	Yes
	Stage 5	No MAJCOM	Only if requested
IIU*@	Stage 1-3	Yes AFMSA	Only if requested
	Stage 4	Maybe MAJCOM	Yes
	Stage 5	No AFMSA	No
III*@	Stages 1-3	Yes MAJCOM	No
	Stage 4	Maybe MAJCOM	Yes, if waiver being considered
	Stage 5	No MAJCOM	Only if requested

* No waivers for untrained assets
@ No indefinite waivers

AIMWTS review in Sep 09 revealed five cases submitted for the diagnosis of chronic kidney disease. There were 0 FCI/IA cases, 4 FC II cases and 1 FC III case. All of the FCII cases were disqualified; 2 had gone on to kidney transplant, 1 had co-existent left ventricular hypertrophy and the other had several other medical problems. The FC III case was a stable stage 2 case being treated with lisinopril and was given a waiver.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver for CKD should include the following:

A. Complete history of the problem to include all consultants seen.

B. Physical exam results.

C. Labs – all urinalysis tests to include protein and albumin results, BUN/Cr, eGFR, 24 hour urine (if applicable), renal biopsy results if done.

D. Imaging results if accomplished.

E. Nephrologist or internist consultation report.

F. Current treatment to include all medications and dates started.

G. Results of MEB.

H. Detail of all other medical problems, if applicable.

The aeromedical summary for waiver renewal for CKD should include the following:

A. Updated history since last waiver.

B. Physical exam results.

C. Labs – all urinalysis tests, other labs and additional imaging and biopsy results (if applicable) since last waiver.

D. Nephrologist or internist consultation report.

E. Current treatment to include all medications and dates started.

ICD 9 code for Chronic Kidney Disease	
585	Chronic Kidney Disease

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WAIVER GUIDE
Updated: Aug 09
Supersedes Waiver Guide of Feb 06
By: Dr Dan Van Syoc

CONDITION:
Lattice Degeneration (Aug 09)

I. Overview.

Lattice degeneration (LD) of the retina is the most common of all the hereditary vitreoretinal degenerations, with an estimated prevalence of 7% to 11% in the general population[1, 2]. Males and females appear to be equally affected with no racial preference. LD is significant because it can lead to retinal breaks and retinal detachment (RD) and is the most clinically recognizable abnormality that is a precursor of rhegmatogenous retinal detachment (RRD), which is a full-thickness retinal break[3].

LD was first recognized by Jules Gonin in 1930 and the term was first used by Schepens in 1952 because of the ophthalmoscopic similarity of the white lines seen to a lattice or trellis. It was later well described by Straatsma through the examination of eyes from 800 autopsies, as well as by Byer's careful fundoscopic examinations of over 1300 consecutive patients in a large vision clinic[1, 3, 4, 5].

Ophthalmoscopically, LD appears as one or more linear bands of retinal thinning located in the equatorial region. Fine white lines, which account for the term lattice degeneration, are present in only about 9% of lesions, but pigmentary disturbances are present in most cases[6]. LD is characterized by multiple pathological features, including sharply demarcated, circumferentially oriented, oval or round areas of retinal thinning with overlying vitreous liquefaction and exaggerated vitreoretinal attachments along its edges. Other features that can be, but are not always, present include fine white lines (lattice-like) in the crossing retinal vessels, alterations of retinal pigment, small white-yellow particles at the margin of the lesion surface, punched out areas of extreme retinal thinning, or excavations and atrophic retinal holes. Retinal tears can occur at the posterior or lateral margin of the lesion from vitreous traction following posterior vitreous detachment. The size and area of lattice degeneration lesions vary tremendously and both eyes are affected in up to half of cases[3, 4].

Approximately 80% of RDs occur within the age group greater than 40 years old. Patients with lattice degeneration have detachments at younger ages and have more myopia than patients with detachments caused by simple retinal tears and holes. Higher degrees of myopia are associated with detachments at younger ages of onset than with emmetropia or hyperopia. Approximately 20% of the United States population is myopic to some degree, whereas about 60% of detachments are associated with myopic refractive errors[7].

Retinal holes are often associated with LD. The incidence of retinal holes in LD ranges from 15-44%[2]. Two types of holes can occur: round atrophic holes, centrally located within the LD area and retinal holes/breaks on the peripheral edge of the lattice. Central lattice holes are usually not associated with vitreous traction because the overlying vitreous has liquefied as part of the pathogenic changes associated with the process. LD can cause RRD by two mechanisms, including

either round holes without posterior vitreous detachment (PVD) or tractional tears associated with PVD. Younger myopic patients who have LD with round holes need regular follow-up visits, because they can develop small, localized retinal detachments, which occasionally slowly enlarge to become clinical retinal detachments. Treatment should be considered if the detachments are documented to increase in size[8]. However, holes or horseshoe breaks at the edge of the LD patch are associated with vitreo-retinal traction and are more serious. Multiple holes of different types may be present in the same area of LD. Both types of holes can lead to RRD, but the peripheral type of hole/break constitutes the more significant risk for progression to RRD. All holes, therefore, need careful examination to identify the type involved and to determine if vitreo-retinal traction, or other signs of impending RD, i.e., subretinal fluid, are present. This is best accomplished by an ophthalmologist, ideally a retinal specialist.

Although LD remains stable in most cases (97%), it can cause, or be associated with RD, especially in higher degrees of myopia. LD is the direct cause of RD in 21% of cases, and is present in 41% of all RD cases. Seventy percent of RD, associated with LD, occurs in patients younger than 40 years of age. LD is more common in myopia; 70% of RD are seen in myopic eyes, with 75% of those RD in myopes with refractive error of -3.00D or greater. The risk of RD in association with any amount of LD increases with the degree of myopia, especially when the refractive error is greater than -5.00D. In this case, the lifetime risk of RD in the general population increases 10 times to 35.9%, whereas those with lesser myopic refractive errors between -1.00D and -3.00D, incur a 5.3% lifetime RD risk[7].

There is no specific treatment for lattice degeneration, but high risk atrophic holes or breaks can be treated by cryothermy, laser photocoagulation, or diathermy. In an evidence-based analysis of prophylactic treatment of asymptomatic retinal breaks and LD, a panel of vitreoretinal experts reviewed the ophthalmology literature. They concluded that there was insufficient information to strongly support prophylactic treatment of lesions other than symptomatic flap tears[6, 9]. If the condition leads to a retinal detachment, the vast majority can be repaired permanently, allowing the flyer to return to aviation duty[10].

A theoretical concern with LD is an increased risk of open angle glaucoma, specifically from pigment dispersion. It is recognized that various types of pigmentary disturbances can be seen in up to 80% if LD cases, particularly in cases with high myopia[11].

II. Aeromedical Concerns.

Retinal detachment is the primary aeromedical concern. This can result in decreased or loss of vision, visual field changes, abnormal stereopsis, and proliferative vitreoretinopathy. All of these conditions can compromise visual function to such a degree that continued aviation duty is not possible.

III. Waiver Consideration.

Lattice degeneration is disqualifying for all classes of Air Force aviation.

Table 1: Waiver potential for Lattice Degeneration

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA*+	LD, ≤-5.50 diopters, no untreated atrophic holes outside areas of lattice	Yes AETC	Yes
	LD, >-5.50 diopters, or untreated high risk retinal holes	No AETC	At discretion of AETC
II*#+	LD with/without retinal holes	Yes MAJCOM	At discretion of MAJCOM
III*#+	LD with/without retinal holes	Yes MAJCOM	At discretion of MAJCOM

* LD may be waived for FC I/IA, as well as initial FC II and FIII, if the member has been evaluated by a retinal specialist who has ruled out the presence of untreated high risk peripheral holes or breaks, retinal traction or sub-retinal fluid, and native refractive error (pre-corneal surgery, if applicable) does not exceed -5.50 diopters.
# Waiver for history of retinal detachment is possible if treatment results in stable vision that is within accepted standards.
+ No indefinite waivers.

Review of AIMWTS data in July 2009 revealed a total of 293 cases with a listed diagnosis of lattice degeneration. There were a total of 64 FC I/IA cases with 16 disqualifications, 126 FC II cases with 3 disqualifications, and 103 FC III cases with 14 disqualifications. Regarding the disqualifications, FC I/IA, initial FC II and FC III cases were most often disqualified if the lattice was in conjunction with excessive refractive error. The remainder of the disqualified cases were primarily for other diagnoses. There was also one case that was waived for IFC III but had been disqualified for FC I

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Aeromedical summary for <u>initial waiver</u> for lattice degeneration must include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Symptoms, degree of lattice degeneration, and degree of myopia (pre-refractive surgery, if applicable).
C. If there is a history of retinal detachment, discuss fully to include all treatments and post-treatment results (visual acuity, visual fields, status of other eye).

D. Details of complete ophthalmologic exam, to include presence and location of retinal holes, presence or absence of subretinal fluid, and presence or absence of vitreo-retinal traction.
E. Retinal specialist exam.
F. Copies of any photos if they exist (photograph or digital).
G. Medical Evaluation Board results, if applicable.

Aeromedical summary for waiver renewal for lattice degeneration must include the following:
A. Interim history specifically discussing any recurrences or any changes in the disease pattern and vision status.
B. Details of complete ophthalmologic exam.
C. Retinal specialist exam, to include presence and location of retinal holes, presence or absence of subretinal fluid, and presence or absence of vitreo-retinal traction.

ICD 9 codes for Lattice Degeneration	
362.6	Peripheral retinal degenerations
362.63	Lattice degeneration

Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

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WAIVER GUIDE
Updated: Feb 09
By: Dr. Dan Van Syoc

CONDITION:
Learning Disabilities (Feb 09)

I. Overview.

A learning disability is a persistent higher order cognitive deficit that interferes with learning and academic achievement, especially in reading, spelling, writing and/or arithmetic in the context of average or above average intelligence. The term, "learning disability," once associated with reading problems, is often misunderstood, and is a non-specific term for numerous disorders of cognition in various combinations and levels of severity. Such variability leads to a spectrum of aeromedical significance, so that knowledgeable evaluation of the individual and a thorough history on educational achievement, rather than simply identifying the diagnosis, is essential to making a correct aeromedical decision. Previously unrecognized and otherwise irrelevant mild cognitive inefficiencies can prove to be dangerous and result in safety of flight and mission performance issues in military aviation. Due to problems with overall learning, people identified with learning disabilities as children often suffer from low levels of academic achievement[1]. Success in later educational endeavors can be potentially compromised unless the parents and/or school recognize the problem early and provide appropriate remediation.

There are multiple variations of learning disabilities, but three widely accepted categories, and a given individual may have more than one form of learning disability. The first category is reading disorder which is defined as a significant impairment in reading that does not have any demonstrable cause in visual, hearing or physical disorders; is not related to mental retardation, emotional disturbance; nor does it have any environmental, cultural or economic disadvantage[6]. Dyslexia is the most commonly recognized form of reading disorder. One author defined dyslexia as an unexpected difficulty in reading in children and adults who otherwise possess the intelligence and motivation necessary for accurate and fluent reading[5]. It is estimated that up to one in five children have a significant problem learning to read. Reading disorder is seen in up to 80 percent of school children labeled with a learning disability, or about four percent of the school-age population[3, 6]. All children with this disorder share three key symptoms: inaccurate reading, slow reading, and poor reading comprehension. The severity of impairment in individuals with this disorder varies widely.

Reading is a totally different skill than oral language. It requires the brain to link written markings to spoken language. To break it down further, the act of reading is actually at least two different processes: basic reading which has to be taught and is letter-sound knowledge along with word recognition, storing and decoding; and reading comprehension, which is the ultimate goal[7]. There are numerous models being developed in an effort to identify children at an early age and to intervene in an effective manner[2]. Patients with reading disabilities require lifelong assistance, and for secondary and college students, the emphasis is on accommodations, to include extra time, and help with different study skills and test taking[3].

The second category of learning disabilities is mathematics disorder which is an impairment of arithmetic or mathematic skills that is sufficiently serious to interfere with academic achievement or

daily living. This may affect up to six percent of school age children. The only proven treatment of mathematics disorder is systematic instruction[6].

The last major category is the disorder of written expression, which some call dysgraphia. It is a significant impairment in written communication that is not attributable to the same issues outlined under reading disorder. It is commonly expressed with spelling, grammatical/syntax or punctuation errors, poor paragraph organization, and excessively poor handwriting[6]. Most studies to date indicate that individuals with the disorder have persistent problems with written language into late childhood and adolescence[7].

Until the past couple of decades, little thought was given to adult manifestations of learning disabilities. Clinicians now realize these disorders, once felt to "burn themselves out" in adolescence, can persist into adulthood. Even though it does not disappear, given early intervention and positive educational experiences, many of these people can show a remarkable ability to learn and succeed[4]. Both genetic and environmental factors are undoubtedly important in the etiology of these disorders. Physiological as well as anatomic markers are being sought. Still, current science requires thorough clinical, historical, and, often, psychometric evaluation in order to make these diagnoses. Learning disabilities may be associated with underlying abnormalities in cognitive function, including deficits in attention, memory, or linguistic processes. Impaired vision or hearing may affect learning ability and should be investigated through audiometric or visual screening tests. A learning disability may be diagnosed in the presence of such sensory deficits *only* if the learning difficulties are in excess of those usually associated with these deficits.

II. Aeromedical Concerns.

Typically, significant problems will become manifest in childhood or adolescence and well before an individual is considered as an applicant for aviation service, and the individual will not be selected for flying duties on the basis of low academic performance and/or screening tests (such as the AFOQT). Additionally, it is unlikely that a person with an identified learning disability for which remedial services were provided will be able to successfully complete rigorous military aviation training. As otherwise intelligent officers will have great difficulty keeping up with the rigors of training and operational flying, a confirmed diagnosis of LD is disqualifying for flying class FC I duties. A history of a learning disorder will not necessarily disqualify a member. Severity and nature of the disorder should be documented. In addition, LD and other psychiatric diagnoses made during childhood are occasionally found to be unsubstantiated in light of a careful, accurate history and instead can be the result of over-eager achievement-driven parents. This is particularly true if the service member has had no symptoms since early childhood.

III. Waiver Considerations.

A history of a learning disability is disqualifying for appointment, enlistment and induction into the US Air Force. It is also disqualifying for retention in the military. A history of a persistent learning disorder is disqualifying for FC I/IA . Although the AFI does not specifically list learning disabilities as disqualifying for FC II and III, the retention standards apply to these aviators.

Table 1. Waiver potential for Learning Disabilities for FC I/IA, II and III.

Flying Class (FC)	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Maybe AETC	Maybe*
II	Maybe MAJCOM+	Yes
IIU	Maybe AFMSA+	Maybe*
III	Maybe MAJCOM+	Yes

+ For untrained FC II, FC IIU and FC III personnel, waiver authority is AETC, otherwise it is the MAJCOM of assignment.
*ACS review/evaluation if requested by AETC for initial FC I/IA, FC II, FC IIU and FC III applicants.

For FC I/IA applicants to receive a waiver, their academic record must have been achieved without any accommodations and there must be no evidence of current problems. Waiver may be considered for aircrew with a history of LD, providing they are symptom free and have not manifested a degradation of their performance of aircrew duties.

AIMWTS review for all variations of learning disabilities revealed a total of 8 cases in 7 aviators. One flyer was at UPT and disqualified for dyslexia due to problems with academics, but a later waiver qualified him to reenter his previous career field of loadmaster. There were a total of 4 FC I/IA cases, one was disqualified – this was an Academy cadet who had been on academic probation several times secondary to dyslexia. There was only 1 FC II case, the disqualified UPT student noted above. There were a total of 3 FC III cases with 1 disqualification. This member was applying for loadmaster duties and could not pass the Reading Aloud Test which was felt to be secondary to English not being his native language (member inappropriately labeled as LD).

IV. Information Required for Waiver Submission.

A. Aeromedical summary detailing any social, occupational, administrative or legal problems, including an analysis of the aeromedical implications of this particular case history.
B. Mental health evaluation summary, *specifically including* psychological and neuropsychological evaluation reports (with their raw data), and any pertinent past medical or mental health records.
C. Any pertinent current neurological or other medical consultation reports.
D. For FC I/IA, detailed history of academic achievement and use of any accommodations.
E. For trained FC II or III, a letter from the flier's aviation supervisor or commander supporting a return to flying status.

ICD 9 Codes for Learning Disabilities	
315.0	Specific Reading Disorder
315.02	Developmental Dyslexia
315.1	Mathematics Disorder
315.2	Other Specific Learning Difficulties
315.3	Developmental Speech or Language Disorder
784.61	Alexia and Dyslexia

This waiver guide was reviewed by Col Timothy Sowin, ACS chief of Neuropsychiatry and Dr. John Patterson, AF/SG Consultant, Aerospace Clinical Psychology

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WAIVER GUIDE
Updated: Apr 2010
Supersedes Waiver Guide of Sep 2006
By: Maj Bret Heerema (RAM-X), Dr William Kruyer and Dr Dan Van Syoc

CONDITION:
Left Bundle Branch Block (LBBB) (Apr 10)

I. Overview.

Left Bundle Branch Block (LBBB) is a relatively uncommon pattern seen on electrocardiogram (ECG). The normal heart's electrical impulse originates in the sinus node, spreads across the atria, and travels through the atrioventricular node. The impulse penetrates into the ventricles via the His bundle where it then enters the two bundle branches. Soon after, the right and left bundle branches transmit the electrical impulse to the right and left ventricle, respectively. This entire process of ventricular depolarization is completed within about 100 msec and thus the normal width of the QRS complex is less than 100 msec. In a normally functioning heart, the ventricles contract nearly simultaneously.[1] LBBB usually reflects intrinsic impairment of conduction in the left bundle system, i.e. an intraventricular conduction disturbance. With a LBBB the impulse through the left bundle branch is disrupted. The electrical impulse is transmitted only through the right bundle branch and activation of the left ventricle occurs after the signal spreads across the right ventricle. Thus contraction of the left ventricle is delayed and occurs after the right ventricle. The impairment can be chronic or transient. It may also appear only when the heart rate exceeds some critical value (rate- or acceleration-dependent LBBB). A much less common type is bradycardia-dependent LBBB, in which LBBB occurs only at low heart rates. The responsible mechanism for this seemingly paradoxical situation is not known.[2]

The total time for left ventricular depolarization is prolonged with LBBB and leads to prolongation of the QRS interval and sometimes to alterations in the QRS vector. The degree of prolongation depends upon the severity of the impairment.[3] A QRS interval greater than or equal to 120 msec is considered a complete LBBB while incomplete LBBB has a shorter 100 – 120 msec interval. The ECG patterns most commonly seen in LBBB are the characteristic notched or W-shaped QRS complex in lead V_1 and M-shaped complex in lead V_6.[4] It should be noted that LBBB renders the ST segment of chest leads unreliable during stress testing.

Unlike right bundle branch block, LBBB is more often a sign of organic heart disease. LBBB is considered a marker of one of four underlying conditions: advanced coronary heart disease, long-standing hypertension, aortic valve disease, or cardiomyopathy. Often, more than one contributing factor may be identified and most patients with LBBB have underlying left ventricular hypertrophy.[4] Thus LBBB is an important clinical consideration as it may be the first clue to previously undiagnosed, but clinically important abnormalities.

The incidence of LBBB increases with age.[5] It has been reported in 0.01%-0.1% of healthy military aviators versus 0.2%-0.7% of various civilian populations.[6, 7] Ten percent of the aviators found to have LBBB in the above study were also found to have significant coronary artery disease, twice that of the estimated background prevalence. Rate- or acceleration-dependent LBBB has also been shown to be associated with a greater degree of underlying coronary artery disease.[8]

II. Aeromedical Concerns.

The prognosis of isolated LBBB in young men is generally benign.[9] However, there are two major aeromedical concerns for LBBB. First, does LBBB increase the risk for progressive conduction system disease? And second, is LBBB predictive of current or future underlying cardiac disease? The risk of progressive conduction system disease for newly diagnosed LBBB has not been shown to be increased in otherwise apparently healthy young males.[10] However, acquired LBBB may be the result of advanced and advancing coronary artery disease (CAD).[11] In the USAF male aviator population aged 35-55 years, estimated background prevalence of significant CAD is about half that of those with LBBB (5% vs. 10%).[6] Thus LBBB has a two-fold increase in risk of underlying significant CAD. In the future, noninvasive coronary angiography may become aeromedically acceptable to exclude coronary heart disease for select aircrew position and airframes. However, considering the possibility of underlying coronary heart disease and the inaccuracy of many noninvasive tests in the presence of LBBB, coronary angiography might be warranted for definitive diagnosis, especially in older or high-risk aviators.[12] In the absence of underlying cardiac disease, return to unrestricted flying is acceptable.

III. Waiver Consideration.

LBBB is disqualifying for all classes of flying duties. It may be waiver eligible for any class of unrestricted flying duties after evaluation. All cases that are being considered for a waiver MUST be seen at the Aeromedical Consultation Service (ACS). Angiography is preferably done during the ACS evaluation. If coronary angiography is normal, waiver is usually recommended for unrestricted flying duties. If angiography is abnormal, waiver status will be determined primarily by the extent of CAD and the CAD waiver policy. Re-evaluations for LBBB are typically at three-year intervals and are primarily to follow for the possible development of dilated cardiomyopathy.

Table 1: Waiver potential for Left Bundle Branch Block

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Yes AETC	Yes
II	Yes MAJCOM	Yes
IIU	Yes AFMSA	Yes
III	Yes MAJCOM	Yes

AIMWTS review in March 2010 produced a total of 55 cases with the diagnosis of left bundle branch block. Of this total, 6 were for FC I/IA, 31 were for FC II and 18 were for FC III. All but 3 of the total of 55 cases were granted waivers; of the three disqualifications, two were FC II cases and one was a FC III case. All three disqualifications had other conditions such as a cardiomyopathy or coronary artery disease that contributed to the final disposition.

IV. Information Required for Waiver Submission.

All aircrew with LBBB require ACS evaluation prior to waiver consideration. The aeromedical summary for initial waiver for left bundle branch block should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. History of symptoms along with a good time line of events.
C. List all treatments (medications if any) attempted with response.
D. Original copy of the 12-lead ECG or other ECG tracing documenting the LBBB.
E. Reports of any local consultations.
F. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, stress nuclear imaging).

The aeromedical summary for waiver renewal for left bundle branch block should include the following:
A. Interim history since last waiver submission to include symptoms.
B. Treatments – current medications for the condition, if any.
C. Recent 12-lead ECG.
D. Reports of any local consultations.

ICD 9 code for Left Bundle Branch Block	
426.3	Left bundle branch block

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WAIVER GUIDE
Updated: Jul 2009
Supersedes Waiver Guide of Mar 99
By: LtCol Alan Delos Santos (RAM 09B) and Dr Dan Van Syoc

CONDITION:
Leukemia (Jul 09)

I. Overview.

The leukemias are a diverse group of diseases of the hematopoietic system where malignant proliferation of a single cell line (clone) replaces production of the other bone marrow cells. This can result in secondary anemia, thrombocytopenia or granulocytopenia. Leukemias are divided into lymphocytic or myelogenous based on the origin of the precursor cell. Lymphocytic leukemia arises from lymphocytes and myelogenous leukemia, also called myelocytic leukemia, arises from granulocytes or monocytes. Each type is further divided into acute or chronic forms of disease.

Acute lymphoblastic leukemia (ALL) is a malignant condition that is characterized by blast cell (from either B or T cell lineage) proliferation in the bone marrow and extramedullary sites or "sanctuaries", such as meninges.[1] There are many subtypes of this form of leukemia. It is the most common cancer in children younger than 15 years of age; it occurs mainly in children but any age can be affected. It represents 12% of all leukemias and 20% of adult leukemias. Males are more commonly affected than females. In most age groups, the incidence of ALL is higher in those of European descent than in those of African descent. Cure rates are 80% for children and 40% for adults. The disease can lead to anemia, thrombocytopenia, and neutropenia[1]. No specific cause can be identified in most cases, but there is increased risk associated with patients who underwent antineoplastic treatment or those exposed to ionizing radiation and toxins.[2] Treatment consists of induction therapy, central nervous system-directed treatment or prophylaxis, and consolidation or maintenance therapy. Induction chemotherapy may include glucocorticoids, conventional chemotherapy, and/or targeted therapy. The central nervous system (CNS) may be a site for relapse as it commonly serves as a sanctuary for leukemic cells. To prevent relapse from a CNS source, treatment targeting the CNS is indicated with the use of systemic and intra-thecal chemotherapy or cranial irradiation.[1, 2] Consolidation or maintenance therapy may include conventional chemotherapy or high dose chemotherapy followed by bone marrow transplantation of an allograft from a matched sibling.[1, 2] In those patients treated with prophylactic CNS radiation as a child, there is concern about the lifetime risk of neurocognitive difficulties, a second cancer and endocrinopathies, as well as problems with bleeding from intracranial vessels. The approach currently has shifted to a more aggressive intrathecal and systemic chemotherapeutic regimen for CNS therapy.

Acute myelogenous leukemia (AML) is a hematopoietic malignancy leading to the infiltration of blast cells in the marrow and the decreased production of normal blood cells; consequently, anemia, neutropenia and thrombocytopenia develop. There are numerous predisposing factors in the development of AML, from genetic abnormality to use of chemotherapeutic drugs, but most patients have no significant exposure.[1, 2] Also disturbing is the increasing incidence of treatment-related myelodysplasia and leukemia in survivors of tumors of childhood and young adulthood such as Hodgkin's disease, sarcomas, breast and testicular cancers, and lymphomas. Ionizing radiation and occupational exposure to benzene and petrochemicals are also associated with AML.[3] It

represents 35% of all leukemias in the US and is responsible for about 20% of acute leukemia in children and 80% of adult acute leukemia cases. Increased frequency is seen among Jews of Eastern European origin. Induction therapy includes agents such as daunorubicin, cytarabine, idarubicin and mitoxantrone.[1, 2] Post-induction treatment utilizes allogeneic bone marrow transplantation, autologous bone marrow transplantation, or use of the chemotherapeutic agent cytarabine.[2] Central nervous system involvement (meningeal) occurs in 2% of cases at the time of presentation. In these cases, CNS treatment is recommended; high-dose or intrathecal therapy is more commonly used than cranial radiation due to less toxicity.[1] Remission is the more accepted term with AML rather than cure and the remission rates have improved dramatically, but remission, 5-year survival, and cure rates are most dependent on the patient's age when AML occurs. Initial remission rates now approach 90 percent in children, 70 percent in young adults, 50 percent in middle-aged subjects, and 25 percent in the elderly.[1]

Chronic lymphocytic leukemia (CLL) is a malignant proliferation of small mature looking B-lymphocytes in the vascular and lymphatic systems, as well as in the bone marrow. It is a disease of unknown etiology with a long clinical course. CLL is the most common adult leukemia in the western world but is rare in Asia. In the U.S., male incidence is twice that of females, and it comprises 30% of all leukemias. The risk increases with age, occurring mostly in the middle-aged and elderly with a median age of onset of 65 years. The treatment regimen is usually chlorambucil, prednisone and fludarabine or other deoxyadenosine analogues.[1, 2] Survival with this form of leukemia is variable with an estimated 5-year survival of at least 60%.[2]

Chronic myelogenous leukemia (CML) is an acquired malignant disorder that is associated with the presence of the Philadelphia chromosome. It commonly results in anemia, granulocytosis, immature granulocytosis, basophilia, thrombocytosis and splenomegaly. CML comprises 15% of all leukemia cases, with males being affected more commonly than females. It is a disease of octogenarians but may occur in any age; the risk of developing the disease increases with age and the median age at presentation is 53. Exposure to high doses of ionizing radiation has been thought to be a major risk factor. The treatment regimen is usually imatinib mesylate. The prognosis for these patients is better than in the 1970s and 1980s, but the median survival still is only 2.5 to 5.0 years after diagnosis.[1]

Hairy cell leukemia is a neoplastic proliferation of B lymphocytic cells that is similar to CLL but the cell has larger cytoplasm with “hairy projections”. Its prevalence is higher in males with a male to female ratio of 4:1 and is most common between the ages of 40 and 60. It represents 2% of all leukemias. Patients with hairy cell leukemia may be asymptomatic or present with splenomegaly, pallor, ecchymosis, weakness, fatigue, or infections. Usual treatment includes 2-chloro-2-deoxyadenosine (2-CdA). Life expectancy has greatly improved with this disease; newer therapies have led to overall survival rates greater than 95% at four years.[1]

Patients with a prior history of ALL or AML will be the most common in our active duty aviation personnel, but any form of leukemia can be encountered.

II. Aeromedical Concerns.

Most of the leukemias present with symptoms of fatigue, lethargy and malaise associated with infections, anemia and/or hemorrhage. Other signs and symptoms may develop as the disease progresses and affect other parts of the body, such as abdominal discomfort due to splenomegaly.

Disseminated intravascular coagulation is a common complication of ALL and a sub-set of AML and can cause sudden, fatal hemorrhage or disabling bone pain. Relapse of all leukemias can present with mild to severe CNS symptoms.

Radiation therapy for the treatment of leukemia is not a significant treatment modality except for the prevention of CNS relapse. Prophylactic CNS radiation in cases of ALL can produce leukoencephalopathy with ataxia and confusion. The long-term complications of brain irradiation include seizures, microangiopathy, endocrine abnormalities with growth hormone deficiency and thyroid problems, brain tumors, obesity, osteopenia, cataract, dental problems, and when given to very young patients, cognitive impairment.[4] Spinal cord radiation can result in transient myelopathy, a self-limited condition that is characterized by L'hermitte's sign due to transient demyelination of the spinal cord.[5]

Treatment regimens, both chemotherapeutic and CNS irradiation, for virtually all types of leukemia can have a multitude of side effects and complications that degrade performance and safety. Ongoing therapy is not compatible with a waiver.

III. Waiver Consideration.

A history of leukemia requires a MEB before aeromedical disposition and is disqualifying for all classes of flying. Waiver consideration should be delayed until at least one year following completion of active treatment. The patient must be asymptomatic and in remission. Due to the heterogeneity of disease and the multitude of factors affecting prognosis and risk, waivers are evaluated on a case-by-case basis. Waiver is unlikely to be granted following allogenic bone marrow transplant.

Table 1: Waiver potential for Leukemia for FC I/IA, II and III.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	All forms of Leukemia	Yes#† AETC&	Yes
II	All forms of Leukemia	Yes+*† MAJCOM&	Yes
III	All forms of Leukemia	Yes+*† MAJCOM&	Yes

For FC I/IA individual waiver may be considered after 5 years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered 12 months after treatment completed, in remission, and asymptomatic.
* For untrained FC II and III, waiver may be considered after 5 years of remission.
& AFMOA is the ultimate authority for all cancers, but the case is to be submitted initially to the MAJCOM
† No indefinite waivers

AIMWTS review in May of 2009 revealed a total of 11 cases. There were 2 FC II and 1 FC III cases with ALL that were approved, while 1 FC I and 2 FC III cases were disqualified. For AML, 1 FC I case and 1 FC III were approved and 1 FC II case was disqualified.

IV. Information Required for Waiver Submission.

Waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines and recommendations.

The aeromedical summary for an initial waiver for leukemia should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. Physical exam – focus on CNS, skin, abdominal and chest exams.
C. Hematology/oncology consults to include the six month and twelve month follow-ups - all consistent with National Comprehensive Cancer Network (NCCN) guidelines for the specific type of leukemia.
D. Labs – all with dates, including bone marrow biopsy.
E. Imaging studies, if obtained.
F. In patients who received prophylactic CNS radiation, a neurology and psychology review is necessary.
G. Tumor board report, military or civilian, if applicable.
H. Medical evaluation board results.

The aeromedical summary for a waiver renewal for leukemia should include the following:
A. History – interim history since last waiver request to include any recent or planned therapy.
B. Physical exam – see above physical exam elements.
C. Hematology/oncology consults.
D. Labs – all test results since previous waiver.
E. Imaging studies since last waiver, if done.

ICD 9 codes for leukemia	
204.0	Acute Lymphoblastic Leukemia
205.0	Acute Myelogenous Leukemia
204.1	Chronic Lymphocytic Leukemia
201.1	Chronic Myelogenous Leukemia
202.4	Hairy Cell Leukemia

This waiver guide was reviewed by LtCol Erika J. Struble, AF/SG consultant for adult hematology/oncology.

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WAIVER GUIDE
Updated: Aug 2010
Supersedes Waiver Guides of Dec 2003 (Abnormal Liver Function Testing) and Nov 2006 (Gilbert's Syndrome)
By: Dr Dan Van Syoc
Waiver Guide reviewed by Col Patrick Storms, AF RAM and gastroenterologist.

CONDITION:
Liver Function Testing (Transaminases) and Gilbert's Syndrome (Aug 2010)

I. Overview.

Liver function tests are the markers of diseases that carry aeromedical implications. As such, abnormal liver function tests alone are not disqualifying. The diseases that cause the abnormal tests may well be. The following topics in AFI 48-123 relate specifically to liver disease: history of viral hepatitis, with carrier state, persistent transaminase elevation or evidence of chronic active or persistent hepatitis, marked enlargement of the liver from any cause, hepatic cysts, congenital hyperbilirubinemias, e.g. Gilbert's disease, do not require waiver if asymptomatic. Drugs are a relatively common cause of liver injury, which usually is defined by abnormalities seen with serum liver testing. At least 300 agents have been implicated in drug-induced liver injury.[1] Among tens of thousands of chemical compounds in commercial and industrial use, several hundred are listed as causing liver injury by the National Institute for Occupational Safety and Health (NIOSH), as published in their most recent *Pocket Guide to Chemical Hazards*.[2]

The aminotransferases are a class of enzymes that catalyze the transfer of amino groups to ketoacids to form amino acids. Aspartate aminotransferase (AST) was formerly referred to as serum glutamate oxaloacetate transaminase (SGOT) and the term alanine aminotransferase (ALT) has replaced serum glutamate pyruvate transaminase (SGPT).[3] AST is found, in decreasing order of concentration, in the liver, cardiac muscle, skeletal muscle, kidneys, brain, pancreas, lungs, leukocytes, and erythrocytes. The highest level of ALT is in the liver, and levels of it are accordingly a more specific indicator of liver injury.[4] Bilirubin is a tetrapyrrole that is an end-product of heme degradation. The normal bilirubin concentration in the serum of adults is less than 1 to 1.5 mg/dL. Less than 5% of circulating bilirubin is present in conjugated form. In general, jaundice is not evident until the serum bilirubin concentration exceeds 3 mg/dL.[5]

Transaminases (AST/ALT) and gamma glutamyl transpeptidase (GGT) are sensitive indicators of hepatocellular injury due to their abundance in hepatocytes. Normal range is generally 30-40 U per liter, but varies widely among laboratories. They are released into the bloodstream in increasing amounts when the liver cell membrane is damaged. Most common causes of elevated transaminase levels are: alcohol, chronic viral hepatitis, autoimmune hepatitis, hepatic steatosis and steatohepatitis, hemochromatosis, toxins, drugs, ischemia, Wilson's disease, alpha-1 antitrypsin deficiency, and (more recently recognized) celiac sprue. An AST to ALT ratio of > 2:1 should raise concern about alcohol injury. With a ratio of 3:1, 96% of patients in one study were confirmed to have alcoholic liver disease.[6]

Gamma glutamyl transpeptidase (GGTP) is found in the cell membranes of a wide distribution of tissues including liver (both hepatocytes and cholangiocytes), kidney, pancreas, spleen, heart, brain, and seminal vesicles. It is present in the serum of healthy persons. Serum levels are not different

between men and women and do not rise in pregnancy. Although an elevated serum GGTP level has high sensitivity for hepatobiliary disease, its lack of specificity limits its clinical utility. The primary use of serum GGTP levels is to identify the source of an isolated elevation in the serum alkaline phosphatase level; GGTP is not elevated in bone disease. GGTP is elevated in patients taking phenytoin, barbiturates, and some drugs used in highly active antiretroviral therapy.[7]

Any diagnostic evaluation must begin with repeating the suspect liver function tests to confirm that an abnormality does indeed exist. The history and physical are very important in narrowing the focus of the investigation and preventing a "shotgun" approach that may raise more questions than it answers. Abstinence from alcohol is required in any patient being evaluated for abnormal liver function tests, and this must be specifically addressed with the aviator. Careful attention to medications and environmental/toxic exposures may prevent the frustration of a long and expensive workup. Almost any medication can cause elevation in liver enzymes, with common offenders including NSAIDs, antibiotics, HMG CoA reductase inhibitors, and anti-tuberculous drugs.[4] Stop current medications, whenever possible, and remove the individual from known toxic/environmental exposure sources, then assess the impact on the abnormal liver tests. This simple maneuver may answer the diagnostic questions without the need for additional testing. Most liver specialists would agree that persistent elevation of serum ALT for greater than six months is an indication to begin an investigation.[8]

Hepatic steatosis ("fatty liver") is a common cause of transaminase elevation, and is unlikely to progress to cirrhosis. Weight loss is the most important aspect of treatment in obese aviators. Such fatty infiltration can often be detected by sonography, and rarely leads to transaminase elevations beyond four times the normal value. In steatosis, the AST/ALT ratio is at or less than 1:1. When weight loss does not result in normalization of transaminase levels, non-alcoholic steatohepatitis must be considered. This condition is more serious than simple hepatic steatosis, and may progress to cirrhosis. Liver biopsy is indicated for its specific diagnosis.

A recent report of sprue as the cause for chronically elevated transaminases in 13 of 140 asymptomatic patients suggests that screening for sprue with antigliadin antibodies could be valuable if more common causes of transaminase elevations have been excluded.[9] Occasionally, transaminases can be of extra-hepatic origin, as may be the case in rhabdomyolysis. Markedly elevated CPK measurements may suggest a muscular origin of elevated transaminases. While severe rhabdomyolysis may cause the appearance of an acute elevation of transaminases, it is highly unlikely to be a cause of chronic transaminase elevation.

The routine measurement of serum iron/iron-binding capacity (Fe/TIBC), ceruloplasmin, and serum protein electrophoresis in patients with demonstrated transaminase elevations and no clear history to suggest a specific etiology may seem like a "shotgun" approach, but the conditions in question are often difficult to detect without specific testing, and each has significant long-term implications with respect to the development of cirrhosis. A transferrin saturation of > 45% suggests hemochromatosis; the ceruloplasmin, if low, suggests Wilson's disease; and the lack of a peak alpha-globulin band on SPEP suggests alpha-1 antitrypsin deficiency. Measurement of antinuclear antibodies (ANA) in female aviators may indicate a diagnosis of autoimmune hepatitis.

In those individuals with no firm diagnosis in spite of hepatic sonography and the battery of blood tests discussed above, focus must shift to a discussion of the need for liver biopsy and the functional status of their liver. With transaminases less than twice normal and well-preserved hepatic

function, liver biopsy is not currently recommended.[4] Where transaminases exceed twice normal, liver biopsy may be considered to assess the extent and severity of hepatic inflammation, and of any fibrotic or cirrhotic changes. Liver biopsy should only be performed after consultation with a gastroenterologist/hepatologist. Although a liver biopsy may change the final diagnosis is some patients with nonspecific asymptomatic liver test abnormalities, modifications in management are usually minor.[10] In addition, liver biopsy has several well-documented drawbacks, including sampling error, variability in pathologist interpretation, cost, and morbidity. Serious complications have been noted in 0.3% of cases and mortality in 0.01%.[11] One group in Cleveland has advocated for expectant clinical follow-up as the most cost-effective strategy in the management of asymptomatic patients with negative viral, metabolic and autoimmune markers in patients with chronically elevated transaminase levels.[12]

Imaging techniques are being used more frequently in the early assessment of suspected liver disease. Ultrasound is typically the first-line imaging modality used in the assessment of liver function test abnormalities. CT and MRI are now being used more frequently if non-alcoholic steatohepatitis (NASH) is a suspected cause of the liver function abnormalities. A novel variation on traditional ultrasonography is the use of transient or dynamic elastography to detect hepatic fibrosis. This technique analyzes the axial propagation of a transient, mechanically generated shear wave through the liver, a process that is related to tissue elasticity or stiffness. A proprietary device called the FIBROSCAN has been studied as a non-invasive method to determine liver elasticity, and thereby to predict the presence of cirrhosis.[13] Additional studies will be needed to validate the utility of this new technique in the assessment of patients with abnormal liver function tests.

Evaluation of abnormal transaminases also requires assessment of hepatic function. Demonstration of well-preserved hepatic function demands no history of encephalopathy, a physical exam free of stigmata of chronic liver disease (angiomata, palmar erythema, ascites, truncal wasting), and blood tests demonstrating preserved hepatic function. Such testing should include a normal prothrombin time, normal CBC with platelet count, and normal serum albumin. A radionuclide liver/spleen scan may add additional information when assessing liver function, since the scan can indicate overall intensity of the liver image and shunting of activity to the spleen.

While the gamma-glutamyltransferase (gamma-GT) level is so nonspecific as to provide little insight when ordered as a stand-alone test, it can be very useful when combined with other blood tests. A gamma-GT greater than two times normal in the face of an elevated AST/ALT ratio strongly suggests alcohol as the etiology of the elevated LFTs. As mentioned previously, it may also be useful in confirming the hepatic origin of an elevated alkaline phosphatase level.

This is a recommended test battery for patients with abnormal transaminases and no specific diagnosis implicated by history or physical examination: - AST/ALT (repeat); GGT if AST > 2X ALT; hepatitis C serologies (Hep C antibody with Hep C PCR if antibody positive); hepatitis B serologies (Hep B Surface Antigen, IgM Hep B Core Antibody); hepatitis A serology (Hep A antibody); Fe/TIBC, ferritin; ceruloplasmin; serum protein electrophoresis; hepatic sonogram (to look for ductal abnormalities or fatty infiltration); prothrombin time; CBC with platelet count; and serum albumin.

In 1901, Gilbert and Lereboullet described a syndrome of chronic, benign, intermittent jaundice, characterized by mild hyperbilirubinemia in the absence of bilirubinuria or signs or symptoms of liver disease. Gilbert's syndrome is also known as low-grade chronic hyperbilirubinemia.[14]

Gilbert's syndrome is the most common of the hereditary hyperbilirubinemias (Gilbert's syndrome, Type I and Type II Crigler-Najjar syndrome, Dubin-Johnson syndrome, and Rotor's syndrome) with a genotypic prevalence of ≤12% and a phenotypic prevalence of ≤7%. The fact that Gilbert's syndrome is most often recognized in the second or third decades of life and rarely diagnosed before puberty appears to be attributable to pubertal changes in the plasma bilirubin concentration.[14] In older subjects, the diagnosis is made most often after routine screening blood tests or when fasting associated with surgery or concomitant illness unmasks the hyperbilirubinemia. Gilbert's syndrome results from defective conversion of unconjugated bilirubin to bilirubin mono- and diglucuronides by a specific UDP-glucuronosyltranferase isoform designated UGT1A1 encoded on the UGT1 gene complex. Patients with Gilbert's syndrome have 10-33% of normal UGT1A1 enzymatic functioning and accounts for the typically low hyperbilirubinemia (1.5 to ~4 mg/dl). Despite earlier evidence to the contrary, Gilbert's syndrome is inherited as an autosomal recessive trait.[15]

The hyperbilirubinemia in Gilbert's is mild (usually less than 6mg/dl). Plasma bilirubin levels are most often less than 3mg/dl with considerable daily fluctuation associated with stress, fatigue, alcohol ingestion, and concurrent illness. The plasma bilirubin may be normal on occasion in up to one-fourth of patients. Bilirubinuria is absent since the plasma bilirubin is virtually all unconjugated. Most patients with Gilbert's are asymptomatic, apart from the presence of occasional, mild jaundice, and are unaware of the abnormality until it is detected by incidental laboratory examination or in the course of family studies. Other patients may have a variety of nonspecific symptoms, including vague abdominal discomfort, fatigue, or malaise. In general, these symptoms do not correlate with the plasma bilirubin level.

The diagnosis of Gilbert's syndrome is a diagnosis of exclusion suggested by the clinical finding of mild, chronic, unconjugated hyperbilirubinemia. Conventional hepatic biochemical tests are normal.[16] A family history should be sought and evidence of other hepatic or hematological disorders, including hemolysis, excluded. Pertinent history of jaundiced should include duration and previous attacks of jaundice, pain, fever, chills, or other systemic symptoms, itching, exposure to drugs (prescribed and illegal), biliary surgery, anorexia or significant weight loss, color of urine/stool, contact with other jaundiced patients, history of blood transfusions, and occupation. Caution must be exercised to eliminate the possibility that the chronic unconjugated hyperbilirubinemia is not due to some acquired disease state, such as cardiac disease, fatty liver and alcoholism, cirrhosis, biliary tract disease, viral hepatitis, malignant tumors, infections, portocaval shunts, or thyrotoxicosis. Elevated bilirubin also may be present in people living at high altitudes. Confirmed Gilbert's syndrome is usually benign in nature with excellent prognosis. Since hyperbilirubinemia in Gilbert's may be exacerbated by fasting, it is common that a fasting chemistry profile may uncover a latent Gilbert's patient. Drawing a repeat bilirubin level on the well-hydrated (non-fasting) patient will often ease concerns caused by identification of an isolated elevation of the serum bilirubin, and avoid costly follow-up testing.

II. Aeromedical Concerns.

As noted above, abnormal LFTs are not of themselves disqualifying. The underlying etiology of the transaminase elevations must be diagnosed. Since AFI 48-123 lists "any chronic liver disease" as disqualifying, the entire range of diagnoses discussed above is disqualifying. Of the diagnoses listed, steatosis, drug-induced hepatitis, and alcohol-related liver injury are all potentially "curable". Chronic hepatitis, hemochromatosis, Wilson's disease, alpha-1 antitrypsin deficiency, autoimmune

hepatitis, and sprue are chronic diseases with unique waiver concerns. Waiver consideration requires a firm diagnosis; once a diagnosis is made, the safety issues related to an individual so afflicted in the aerospace environment can be evaluated.

Most patients with Gilbert's syndrome are asymptomatic and should not experience problems with sudden incapacitation or mission completion. A few may experience a variety of nonspecific symptoms, including vague abdominal discomfort, nausea, diarrhea, constipation, fatigue, or malaise and will need to be individually assessed as to whether performance may be affected. If the hyperbilirubinemia is sufficiently elevated, cholelithiasis is possible.

III. Waiver Consideration.

For abnormal liver function tests, waiver consideration will hinge on the specific diagnosis and the functional hepatic capacity, as described above. The specific disqualifying diagnoses should be the focus of waiver package preparation. The initial waiver request should address, in a comprehensive manner, the diagnostic testing resulting either in a specific diagnosis, or the exclusion of other diseases to result in a diagnosis of "abnormal liver function tests of unclear etiology". Re-evaluation requests should focus on any new testing that could reveal a diagnosis not previously made (if appropriate), or that testing which demonstrates stability of hepatic function over time. Congenital hyperbilirubinemia diseases, i.e. Gilbert's, are not disqualifying if the patient is asymptomatic; no waiver is required. If an individual has Gilbert's syndrome with symptoms then a waiver would be required and recommend an internal medicine or gastroenterology consult is recommended. Liver disease is not listed as disqualifying for FC IIU, ATC/GBC, or SMOD.

Table 1: Waiver potential for abnormal liver function tests and Gilbert's Syndrome

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	Abnormal LFTs or Gilbert's syndrome	Yes AETC
II*	Abnormal LFTs or Gilbert's syndrome	Yes MAJCOM*
IIU	Abnormal LFTs or Gilbert's syndrome	N/A-not disqualifying
III*	Abnormal LFTs or Gilbert's syndrome	Yes MAJCOM*
ATC/GBC	Abnormal LFTs or Gilbert's syndrome	N/A-not disqualifying
SMOD	Abnormal LFTs or Gilbert's syndrome	N/A-not disqualifying

* AETC is waiver authority for initial certification for FC II and FC III

AIMWTS review in May 2010 resulted in 28 aviators with a waiver submitted liver disease that included abnormal liver functions tests. There was 1 FC I/IA case, 13 FC II cases, 9 FC III cases, 1 FC IIU case, 2 ATC/GBC cases, and 2 SMOD cases. There were a total of 3 disqualifications; 1 ATC/GBC, 1 SMOD, and 1 FC II. One disqualified case was for alcohol dependence, another for rheumatoid arthritis on Enbrel therapy and the last was for coronary artery disease.

AIMWTS review in June 2010 resulted in 11 aviators with a waiver submitted for Gilbert's syndrome. There were 0 FC I/IA cases, 9 FC II cases, 2 FC III cases, and no cases for FC IIU, ATC/GBC, or SMOD. There were 2 disqualifications, both FC II, and neither was related to liver disease.

IV. Information Required for Waiver Submission.

Waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for liver disease with abnormal liver function tests or Gilbert's syndrome should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of any diagnosed liver disease and abnormal liver function testing to include any family history of liver diseases.
C. Labs: all liver function test results, CBC, hepatitis profile. For Gilbert's, also need a reticulocyte count, as well as unconjugated and conjugated bilirubin levels.
D. Imaging: all results of any performed imaging tests.
E. Consultation from a gastroenterologist or internal medicine specialist.

The aeromedical summary for waiver renewal for liver disease with abnormal liver function tests or Gilbert's syndrome should include the following:
A. Interval history from past waiver request with any pertinent updated information.
B. All applicable labs and imaging tests as in the initial aeromedical summary. Gilbert's syndrome requires a repeat bilirubin in 12-18 months to confirm the unconjugated level.
C. Consultation from a gastroenterologist or internal medicine specialist.

ICD 9 codes for abnormal liver function tests	
790.4	Nonspecific elevation of levels of transaminase or lactic acid dehydrogenase [LDH]
790.6	Other abnormal blood chemistry
277.4	Disorders of bilirubin excretion

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Jul 2007
By: Lt Col L. Renee Boyd (RAM XI) and Dr Dan Van Syoc
Reviewed by LtCol Michael Forgione, AF/SG consultant for Infectious Diseases

CONDITION:
Lyme Disease (Jan 11)

I. Overview.

Lyme disease is the most common tick-borne disease in the United States (U.S.) caused by the spirochete, *Borrelia burgdorferi*. It occurs worldwide and has been reported on every continent except Antartica.[1] Lyme disease surveillance in the U.S. began in 1982 at the Centers for Disease Control (CDC) and became a nationally reportable disease in 1991. In the U.S., the number of reported cases has been steadily increasing from over 11,000 cases/ year in 1995 to over 28,000 cases/ year in 2009.[2] In 2009, the highest number of confirmed Lyme cases were in Pennsylvania (4,950) New Jersey (4,598), New York (4,134), Massachusetts (4,019), and Connecticut (2,751).[3] In the Northeastern and North-central U.S., the black-legged tick (or deer tick, *Ixodes scapularis*) transmits Lyme disease and in the Pacific coastal U.S., the disease is spread by the western black-legged tick (*Ixodes pacificus*). A cluster of cases identified in 1975 had their epidemiological epicenter in Lyme, Connecticut, for which the disease was named.[4] Documentation of this disease dates back to 1883 in Breslau, Germany by a physician named Alfred Buchwald. He described an expanding, ring like lesion now known as erythema migrans (EM), the most common symptom associated with early Lyme disease, and speculated that the rash came from the bite of an *Ixodes* tick.[5]

Three distinct foci occur in the United States: the Northeast (Maine to Maryland), the North Central (Wisconsin and Minnesota) and the West (northern California and Oregon). In Europe, most cases occur in the Scandinavian countries and in central Europe (Germany, Austria, and Switzerland), although cases have been reported in the United Kingdom (South Downs and New Forest areas).[6] Other prevalent worldwide locations include Russia, China and Japan.[7]

The ticks have larval, nymphal and adult stages, each stage requiring a blood meal. In the Northeast and North Central US, an efficient cycle of infection of *B. burgdorferi* between nymphal ticks and white footed mice yields a high frequency of infection during the spring and summer months in humans. An abundance of deer, the adult ticks' preferred host, fulfill a similar role in the Northeast. *I. scapularis*, also known as *I. dammini,* serves as the tick vector.[7] The principle vector in the Northwestern US is *I. pacificus*. The frequency of human infection is relatively low in the Northwest, as *I. pacificus* tends to feed on lizards, which are not susceptible to the infection, and only occasionally feed on the dusky-footed woodrat while in the larval stage. In Europe and Asia the principal vectors include *I. ricinus* and *I. persulcatus*, respectively, which also serve as vectors of tick-borne encephalitis virus.[8]

Even though the likelihood of infection is twice as high in adult ticks than in the nymphal stage, most cases of transmission of early Lyme disease occur in the spring and summer months when the nymph is seeking a blood meal. Adult ticks are much larger and easier to identify and remove prior to transmission of infection. Animal studies confirm that approximately 36 - 72 hours are required

for transmission of the infection to the animal host once the tick has attached itself to the host. During this time spirochetes in the midgut of the tick multiply and migrate to the tick's salivary glands, in preparation for transmission to the animal host.[4, 9] Only ticks that are partially engorged with blood are associated with the development of EM at the site of the bite.[9]

Lyme disease occurs in three broad stages. The clinical symptoms of each stage may overlap. Individuals may also present in a later stage without presenting with symptoms of an earlier stage.[8, 10] The most common clinical manifestation of the first phase is EM. EM occurs between 3 and 30 days, although it most commonly develops between 7 and 14 days. In the U.S., EM (single or multiple) is found in about 90% of patients with objective evidence of infection with *B. burgdorferi*.[11] This lesion is usually greater than or equal to 5 cm in diameter, often with a central clearing, bull's-eye or target like appearance. Approximately 45 percent of patients with EM have spirochetemia which is not related to the size or duration of the presenting skin lesion.[4] Hematogenous dissemination from the primary infection site may yield secondary lesions.

Lyme disease has a myriad of dermatologic, neurologic, cardiac, and musculoskeletal manifestations. The most common symptoms during the primary stage often resemble those of a viral infection, including myalgias, arthralgias, fatigue, headache, neck pain and possible fever. Rarely, respiratory, gastrointestinal or ocular complaints such as conjunctivitis, iritis, and keratitis may be reported.[4, 12] EM spontaneously resolves in approximately four weeks without treatment.[7] Given these vague initial symptoms, this represents a challenge in early detection and initial treatment.

The second stage is manifested by dissemination of the disease within days up to 10 months following the initial tick bite.[8, 10] It is associated with hematogenous spread of the spirochete to extracutaneous sites. Sixty percent of untreated patients with EM will progress to mono or oligoarticular arthritis, usually involving the knee. Ten percent will manifest with neurologic complications, the most common of which is facial-nerve palsy. Neurologic involvement may occur within weeks. Acute neuroborreliosis may develop in up to 15 percent of untreated patients in the US. Potential manifestations include lymphocytic meningitis with episodic headache and mild neck stiffness, subtle encephalitis with difficulty with mentation, cranial neuropathy (particularly unilateral or bilateral facial palsy), motor or sensory radiculoneuritis, mononeuritis multiplex, cerebellar ataxia or myelitis.[8] In children blindness may result secondary to increased intracranial pressure on the optic nerve.[8] Acute neurologic abnormalities spontaneously improve or resolve over a period of weeks or months, even in untreated patients. Cardiac involvement may occur several weeks after the initial onset. Approximately five percent of untreated patients experience cardiac involvement, to include atrioventricular block, acute myopericarditis, mild left ventricular dysfunction and rarely cardiomegaly or fatal pancarditis.[8]

The third stage includes late disease which may occur months to years following the initial tick bite.[8, 10] Individuals experiencing joint involvement may sustain several brief attacks of arthritis with the potential for persistent joint inflammation. In up to 10 percent of cases, the arthritis may persist for months or years despite 30 days of intravenous (IV) or 60 days of treatment with oral antibiotics.[4] Large joints, especially the knee are susceptible, presenting with joint swelling and pain which is thought to be mediated by the immune response by the spirochete in the joint.[12] Up to five percent of untreated patients may experience chronic neuroborreliosis. This may occur after long periods of latent infection. In the US and Europe, a chronic axonal polyneuropathy may develop manifesting as spinal radicular pain or distal paresthesia. In Europe, chronic

encephalomyelitis may occur. It is most often characterized by spastic paraparesis, cranial neuropathy or cognitive impairment with marked intrathecal production of antibodies against the spirochete. In the US, Lyme encephalopathy, a mild, late neurologic syndrome with subtle cognitive disturbances, has been reported.[7]

Diagnosis in the US is usually based on the recognition of the characteristic clinical findings, a history of exposure in an area where the disease is endemic and except in patients with erythema migrans, an antibody response to *B. burgdorferi* by enzyme-linked immunosorbent assay (ELISA) and Western blotting. IgM antibody titers during the first month of infection are unreliable. IgG antibody responses are prevalent in most patients infected for one month. Even with antibiotic treatment, IgM and IgG titers may persist for many years.[7]

Treatment recommendations during the first stage of Lyme disease include: doxycycline 100 mg twice daily for adults; amoxicillin 500 mg three timed daily for adults; and cefuroxime axetil 500 mg twice daily for adults. The duration of therapy has traditionally been three weeks, although some studies suggest that a 10 to 14 day duration of therapy may be as effective.[10] Doxycycline is not recommended for children under 8 years of age or for pregnant or lactating women. Individuals with chronic musculoskeletal pain, neurocognitive symptoms or both that persist after antibiotic treatment for well-documented Lyme disease may have considerable impairment in their health-related quality of life. However further treatment with an extended (90 day) course of antibiotics in a controlled clinical trial in individuals without evidence of persistent infection by *B. burgdorferi* received no added benefit over those who received placebo. A substantial increase in the risk of morbidity and even death in patients secondary to extended antimicrobial therapy was noted in this study.[14]

Second (early disseminated) and third (late) stages of Lyme disease may be treated with intravenous (IV) ceftriaxone, a third generation cephalosporin. Recommended dosages include 2 g once daily in adults. Similarly, cefotaxime 2 g every eight hours is also recommended in adults. Additionally penicillin G divided into doses given every four hours in patients with normal renal function may be effectively used. Eighteen to 24 million units per day in adults is the recommended dosage. Recommended duration of IV therapy is two to four weeks. Four weeks is the current standard in many communities, although there is no evidence to support greater efficacy of four versus two weeks. There is also no evidence that treating for more than four weeks is beneficial.[10]

Prevention may be accomplished through avoidance of tick-infested areas, wear of protective clothing, the use of repellents and acaricides, tick checks and modifications of landscapes in or near residential areas.[7] In December 1998, GlaxoSmith- Kline gained US Food and Drug Administration approval for a *B burgdorferi* outer surface protein A (OspA)-based Lyme disease vaccine, LYMErix.[15] The efficacy was 49 percent after two injections and 76 percent after three injections.[7] The vaccine, however, was voluntarily withdrawn from the market because of poor sales.[15] Antimicrobial treatment within 72 hours of a tick bite with a single 200 mg dose of doxycycline has been suggested as effective prophylaxis against the development of Lyme disease. Although a study reported an efficacy of 87 percent, it was limited by the number of participants in whom Lyme disease developed, resulting in a wide 95 percent confidence interval. This study is in direct contrast to other studies demonstrating no clear protection attributable to antimicrobial prophylaxis administered after a tick bite.[9] Regardless, it may be prudent in aircrew to consider doxycycline prophylaxis within 72 hours of a tick bite from an endemic area to preclude progression of possible Lyme disease, since doxycycline is an approved aircrew medication after ground testing.

II. Aeromedical Concerns.

The symptoms during primary Lyme disease, included arthralgias, fatigue, headache, neck pain and possible fever are obviously not optimal in the flying environment. As with all infectious diseases, if recognized and treated early with full resolution of symptoms, return to flight status is appropriate. However, if untreated, then aeromedical concerns of this disease are its debilitating effects in regards to the neurologic, cardiovascular, and arthritides that may result. Neurocognitive impairment, cardiac arrhythmias and arthritic pain are all manifestations that could impact the safety of the individual and mission.

III. Waiver Considerations.

Patients should be DNIF while symptomatic and under treatment. Once all symptoms of the disease have resolved, the aviator can be returned to status without a waiver (true for all aviation classes). Lyme disease is not mentioned by name as disqualifying for any aviation class, but the residual symptoms mentioned above may require a waiver. In these cases, waiver for flying class I/IA, II, IIU, and III, as well as for ATC/GBC and SMOD personnel may be considered, depending on the success of the therapy. An ACS review of cardiologic or neurologic complications is recommended.

Table 1: Waiver potential for Lyme disease

Flying Class	**Condition**	**Waiver Potential Waiver Authority**	**ACS review/evaluation**
I/IA	Stage II and III Lyme disease with complications or residual symptoms	Yes* AETC/MAJCOM	Yes
II/III	Stage II and III Lyme disease with complications or residual symptoms	Yes* MAJCOM	Yes
IIU	Stage II and III Lyme disease with complications or residual symptoms	Yes* AFMSA	Yes
ATC/GBC	Stage II and III Lyme disease with complications or residual symptoms	Yes* MAJCOM	Yes
SMOD	Stage II and III Lyme disease with complications or residual symptoms	Yes* AFSPC or GSC	Yes

*FC I/IA candidates and all other initial training candidates need to be totally disease-and-complication free for at least 12 months prior to waiver consideration. Waiver authority in such cases is AETC for all except SMOD personnel which is AFSPC.

Review of the AIMWTS data base through Nov 10 revealed a total of five cases submitted for waiver consideration with the diagnosis of Lyme disease. There was 1 FC I case, 3 FC II cases and 1 SMOD cases. All were granted waivers except for the SMOD case which resulted in a disqualification for persistent neurological symptoms.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for cardiology involvement should include:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Copies of reports and tracings/images of any cardiac tests (e.g. electrocardiogram, echocardiogram, treadmill, Holter monitor, cardiac cath, cardiac CT or MRI) performed locally for clinical assessment (i.e., serial ECG's for uncomplicated 2nd degree AV blocks; serial Holters/echos depending on the level of cardiac involvement to begin with; etc.). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
C. Any procedure-related reports (e.g. pacers, EP studies, etc), as applicable.
D. Results of serologic studies.

Note 1: Call ACS to get correct mailing address for all required videotapes and CDs.
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

The aeromedical summary for neurological involvement should include:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Neurology consultation report.
C. Neuropsych testing, as appropriate.
D. Results of serologic studies.

The aeromedical summary for arthritic involvement should include:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.
B. Rheumatology consultation report.
C. Results of serologic studies.

ICD 9 code for Lyme disease	
088.81	Lyme disease

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Apr 2006 (formerly titled Antimalarials)
By: Dr Dan Van Syoc
Reviewed by LtCol Michael Forgione, AF/SG consultant for Infectious Diseases

CONDITION:
Malaria/Antimalarials (Jan 11)

I. Overview.

The use of antimalarials by aircrew with flight surgeon approval is common because deployments to areas endemic for malaria frequently occur. In order to prevent malaria and maintain the health of aircrew, a proper understanding of the disease and of prescribed use of antimalarials is a necessity.

Malaria has been described as far back as 2700 BC in both Chinese and Egyptian writings. It arrived in Rome by 200 BC and had spread throughout Europe during the 12th century. Malaria had spread to the US through the importation of African slaves and by the early 1800s it was found worldwide. Malaria has had a greater impact on world history that any other infectious disease, as it has impacted the outcome of wars, population movements, and the development and decline of various nations.[1]

Malaria in humans is caused by one of five protozoan species of the genus *Plasmodium*: *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae*, or *P. knowlesi.* Infection from each of these species is transmitted by the bite of an infected female *Anopheles* mosquito, which occurs mainly from dawn to dusk. Hence, most of the prevention measures are directed toward night-time hours.[2] Transmission can occasionally occur by blood transfusion, organ transplantation, needle sharing, or congenitally from mother to fetus.[3] The vast majority of all deaths in travelers from the western world to malaria endemic areas are due to infection with *P. falciparum*.[4, 5]

Malaria is a tremendous global public health concern. Worldwide, malaria causes 350-500 million infections and approximately 1 million deaths annually. It is estimated that up to 40% of the world's population is at risk for acquiring malaria.[6] Approximately 1500 cases of imported malaria are reported annually to the Centers for Disease Control (CDC) and one half to two thirds of these are due to *P. falciparum*.[7, 8] Malaria is one of the top three leading causes of death due to an illness contracted while traveling.[9] Transmission of malaria occurs in large areas of Central and South America, parts of the Caribbean, Africa, Asia (including South Asia, Southeast Asia, and the Middle East), Eastern Europe, and the South Pacific. The risk for a traveler acquiring malaria differs substantially from region to region and from traveler to traveler, even within a single country.

The bite of an infected mosquito transmits sporozoites into the host which then invade the host liver and multiply to form tissue schizonts, which contain thousands of merozoites. Approximately 6-16 days (or longer) after infection, the schizonts rupture and the daughter merozoites invade erythrocytes. It is at this point that the first symptoms appear, though the classic fever, caused by the 48- or 72-hour life cycles of the respective organisms with the red cell, is rare this early in the infection. The merozoites mature to trophozoites within red cells, and then divide into new

daughter merozoites, which are released when the red call ruptures. With *P. vivax* and *P. ovale* infections, some organisms remain dormant within the liver as hypnozoites, and can cause late relapse months or years after the primary infection. (Primaquine is the only approved drug capable of destroying such latent infections). Neither *P. falciparum* nor *P. malariae* develop hepatic hypnozoites, so late relapses do not occur, though the latter organism will often result in an indolent infection that may remain subclinical for prolonged periods.[7, 10]

The first line of defense (primary prevention) for malaria prevention is personal protective measures that include multiple strategies to minimize mosquito bites. The first strategy is to minimize the exposure of bare skin by providing a barrier with clothing or protective equipment. Ideally when wearing clothing in an area with known malaria, the pant legs should be tucked into the boot or sock, sleeves rolled down, and top button closed at the neck. At times when you may not be able to take advantage of the proper use of clothing, protective equipment can be used, such as a permethrin treated mosquito netting over a cot or mattress. The second strategy is to use repellents such as 33% time-released DEET on exposed skin and pre-treat clothing with permethrin. The final strategy is avoidance of the known habitat such as areas of standing water and exposure during peak hours of activity for the mosquito. These personal protective measures are not only important in preventing malarial disease, but are also effective to prevent any other arthropod borne disease. A manual is available at http://www.afpmb.org/coweb/ppm.htm for more details.

Medications: Chemoprophylaxis is not 100% effective in preventing malarial infection and is truly the second line of defense (secondary prevention). These medications will help eliminate any early infection before the disease becomes symptomatic.[11]

Chloroquine phosphate 500 mg (300 mg base) weekly starting one to two weeks prior to exposure and terminating four weeks after departing risk area. Adverse side effects may include nausea, abdominal pain, diarrhea, headache, lightheadedness, pruritus, and fatigue. Currently, resistance to chloroquine in malaria caused by *P. falciparum* is widespread in all areas except for Central American and some regions of southwestern Asia.[12]

Doxycycline 100 mg daily starting one to two days prior to exposure and terminating 28 days after departing risk area. The medication should be taken with the evening meal with a lot of fluid to minimize gastrointestinal side effects and reduce photosensitivity risks. Pill esophagitis is a potential complication. Other adverse symptoms may include nausea, abdominal discomfort, fatigue, and vaginal candidiasis in women.

Malarone 1 tab each day (250 mg atovaquone/ 100 mg proguanil) starting one day prior to exposure and continued for seven days after exposure. One of the advantages to this drug combination is that it does not require the advanced loading and prolonged dosing after travel that other drug choices require.[13] Adverse side effects may include abdominal discomfort, nausea, vomiting, and headache. There is minimal risk of photosensitivity to this medication (unlike doxycycline).

Primaquine is typically used for terminal prophylaxis for treatment of residual *P. vivax* and *P. ovale*. The dose for terminal prophylaxis is 30 mg base (52.6 mg salt) each day started after exposure and for a period of two weeks. Terminal prophylaxis is contraindicated in G-6-PD deficiency. Adverse reactions to primaquine include abdominal discomfort, nausea, headache,

pruritus, interference with accommodation, leukopenia, agranulocytosis, anemia, and methemoglobinemia.

Mefloquine is the drug of choice for non-flyers deploying to chloroquine-resistant regions. Dosage is 250 mg once a week beginning two weeks prior to departure and continuing for four weeks after returning to home station. The concern about potential neurotoxic side effects of this drug is the reason that it is unapproved for use in aircrew. If an aircrew member takes this by mistake, then they must remain DNIF for 4 wk, being observed for any neurological or psychiatric side effects.[14]

Determining need for medication and appropriate regimen:

Our aircrew often deploy at the last minute, can traverse multiple countries over a few days, and also deploy to barren areas with little medical infrastructure. These factors make determining the need for malaria prophylaxis and the appropriate regimen more difficult than for the average traveler. There are currently numerous policies on the need and regimen for malaria prophylaxis. A MAJCOM can have a policy for all their personnel due to the unique nature of their mission. Also, theater commands often set policy in their area. Other sources of guidance include your own Public Health Officer (PHO), the National Center for Medical Intelligence (NCMI), formerly the Armed Forces Medical Intelligence Center, (subscribe at http://www.military-medical-technology.com/mmt-archives/24-mmt-2008-volume-12-issue-5/146-national-center-for-medical-intelligence.html), and the CDC traveler's website at http://www.cdc.gov/travel/regionalmalaria/index.htm.[15] These sources will be vital to determining not only the need for malaria chemoprophylaxis, but also will assist with determining the appropriate regimen. A decision tree is included below to aid flight surgeons.

When determining the need for chemoprophylaxis in an aircrew member it is important to not only consider the area where the exposure will occur, but also the length of time in that area. For example, a flyer may be on the ground in a controlled environment for less than a couple of hours for transload of equipment and have minimal chance of exposure. Also, CENTAF's "Policy on Malaria Chemoprophylaxis" dated Jan 2005 stated that unless a person would be exposed for seven days they would not need prophylaxis in Iraq.[16] When lacking a policy, look at AFMIC and the CDC traveler's site and discuss with your PHO and Senior Flight Surgeon.

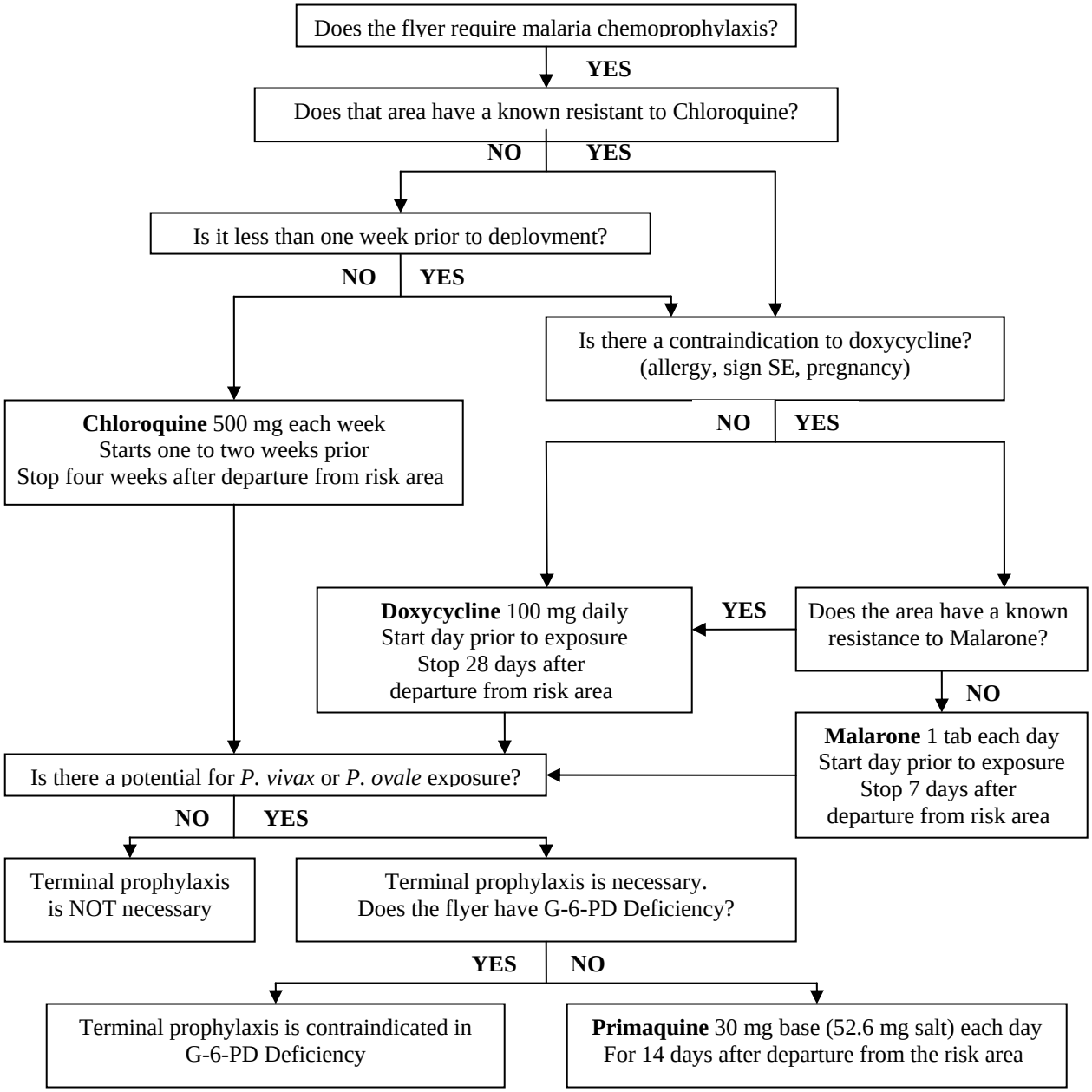
After determining whether a person needs prophylaxis, it is important to determine if the area has chloroquine resistance. Most areas have resistance to chloroquine, but there are still a few that have sensitivity particularly in Latin America and the Middle East. If the area is chloroquine sensitive, then it is important to find out if the aircrew member is leaving within the week since it takes at least one week to preload chloroquine for it to be affective for malaria prophylaxis.

If the area is resistant to chloroquine, doxycycline is the first line agent for malaria chemoprophylaxis for aircrew. For individuals with a contraindication to taking doxycycline, such as previous significant allergic reaction, photosensitivity, GI intolerance or pregnancy, Malarone is approved as a second-line agent. Doxycycline and Malarone should be single dose ground tested prior to operational use.

After determining the medication for malaria chemoprophylaxis, it is necessary to determine if terminal prophylaxis is required. Primaquine is affective against the hypnozoite state of *P. vivax* and *P. ovale*. If the area does not have known *P. vivax* or *P. ovale* (such as Haiti and the Dominican

Republic), then terminal prophylaxis is not necessary. Another important point is that primaquine is contraindicated in all personnel who are G-6-PD deficient. Thus, G-6-PD status must be documented and reviewed prior to prescribing this medication to any personnel.

Decision Tree for Malarial Prophylaxis in Aircrew



II. Aeromedical Concerns.

There are several medications for malaria prophylaxis per AFI 48-123 available to the flight surgeon, which may be used without removal from flight duty once the potential for idiosyncratic reactions has been excluded. Approved medications include chloroquine phosphate, primaquine phosphate, and doxycycline. Additionally Malarone has recently been approved by AFMSA for use in aircrew as a second-line agent for use when doxycycline is not tolerated. Single dose ground testing is advised (except doxycycline where a 3-day grounding period is recommended). MEFLOQUINE IS NOT APPROVED FOR AIRCREW. As noted above, if an aircrew takes mefloquine by mistake, the flyer must be placed DNIF for a period of four weeks while being observed for neuropsychological side effects.

III. Waiver Consideration.

Waiver is not required for malaria chemoprophylaxis with approved medications. Aircrew that contract malaria need to be grounded until cured and recovered, without exceptions.

IV. Information Required for Waiver Submission.

N/A

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WAIVER GUIDE
Updated: March 2012
Supersedes Waiver Guide of May 2008
By: Maj Nguyen V.T. Tran (RAM 12) and Dr Dan Van Syoc
Reviewed by Col Steven Ritter, AF/SG Consultant for Dermatology

CONDITION:
Malignant Melanoma (Mar 12)

I. Overview.

Melanoma accounts for just 4% of all dermatological cancers and it is curable in early stages, but it causes 73-80% of all deaths from skin cancer.[1, 2] Over the period of 2004-2006, more than 45,000 cases of melanoma and about 8,000 deaths occurred each year and in the United States.[3] It is also the second leading cause of lost productive years among cancers.[4] Risk factors for melanoma include family history of melanoma in first-degree relative, Caucasian race, individuals who burn easily and had at least one episode of traumatic sunburn before age 18 years (2- to 3-fold increase), melanocytic naevi with increased number and size, immunosuppression, and increased age (however, it is one of the few cancers seen in younger people).[5] For aviators this condition is of concern because it affects young and middle aged people more often than other cancers and because flyers may have more episodes of both intense occupational exposure and/or recreational exposure.[6]

Melanoma is the 3rd leading cause of brain metastasis after lung and breast cancer. Of those with recurrent disease, approximately 13-20% present with a first distant metastasis to the central nervous system (CNS).[7, 8] In a study of 81 individuals with brain metastasis, 48% had seizures and 21% had seizures as the first manifestation of the brain metastasis.[9] In another study of 702 individuals with clinically significant brain metastasis, initial presentation included 39% with focal neurological symptoms, 13% with seizures, 3% with neurological catastrophes and 2% with behavioral changes, all of which could be of major concern in flight.[10] Autopsy data demonstrate that 49-73% of individuals who die of disseminated metastatic melanoma have brain involvement and in a large autopsy review of 216 individuals who had a diagnosis of melanoma, 118 (55%) had metastasis to the brain, 52 (24%) to the meninges and 28 (13%) to the pons and medulla.[11] Another study showed 70-90% of individuals dying of melanoma had intracranial metastases at autopsy.[9] Furthermore, cerebral metastases are among the most common causes of death from melanoma, accounting for 20-54% of deaths.[12] The life span of a person with these metastases is relatively short, ranging from 2 to 7 months.[8, 12] The ten-year survival rate of patients with distant metastatic melanoma ranges from 2-16%.[13]

Melanoma screening in the clinic for high-risk individuals is considered cost effective and able to improve survival through earlier diagnosis.[14] Clinical features used to screen for melanoma include mole asymmetry, border, color variation, diameter larger than 6 mm (the ABCD), and irregularity. Suspicion should be raised with evolving changes such as bleeding, itching or tenderness within the pigmented lesion.

An excisional biopsy of the entire lesion should be performed on suspicious lesions and submitted to pathology. After melanoma is histologically confirmed, pathologic staging determines prognosis and treatment. Sentinel lymph node biopsy is a key to assess staging and prognosis for melanomas over 1.0 mm thick or with other negative prognostic features such as ulceration or high mitotic

rates.[4, 15, 16] The following are recommendations for surgical margins for wide excision of primary melanoma: melanoma-in-situ requires 0.5 cm margins, melanoma ≤1 mm requires 1 cm margins, 1.0-2.0 mm requires 1-2 cm margins if anatomically possible and 1 cm otherwise, and for melanoma 2-4 mm thick a 2 cm margin is required.[4, 17] Margins may be modified to meet the individual anatomic or functional considerations. The most powerful negative predictors of survival are greater tumor thickness, ulceration, and high mitotic rate.[15, 18, 19, 20] Other important factors include micro satellites, in-transit metastasis, lymph node involvement and distant metastasis.[21] Additional negative prognostic factors include trunk location of primary tumor, vertical growth phase, higher mitotic rate, regression of the primary tumor, absent tumor infiltrating lymphocytes and angiolymphatic invasion.[7, 21] Multiple primary melanomas are classified according to the primary with the worst prognosis.[13] In addition to the histological features, key characteristics of the primary lesion that are more likely to be associated with subsequent brain metastasis are location in mucosal, head, neck and trunk areas, acral lentiginous and nodular histology and visceral or lymph node spread.[10] Individuals with intraocular melanomas have survival rates that approximate stage III disease.[12] Routine lab tests have not been shown to help in screening asymptomatic patients and these tests are reserved for patients with stage II or higher.[4]

The 2009 American Joint Committee on Cancer Staging System (AJCC) for Melanoma reflects that the histological features of primary melanoma (thickness, mitotic rate, and ulceration) are important hallmarks for prognosis and staging.[15, 22, 23]

Table 1 & 2 TNM, Clinical and Pathologic Staging[15]

Table 1. TNM Staging Categories for Cutaneous Melanoma

Classification	Thickness (mm)	Ulceration Status/Mitoses
T		
Tis	NA	NA
T1	≤ 1.00	a: Without ulceration and mitosis < 1/mm^2 b: With ulceration or mitoses ≥ 1/mm^2
T2	1.01-2.00	a: Without ulceration b: With ulceration
T3	2.01-4.00	a: Without ulceration b: With ulceration
T4	> 4.00	a: Without ulceration b: With ulceration
N	No. of Metastatic Nodes	Nodal Metastatic Burden
N0	0	NA
N1	1	a: Micrometastasis* b: Macrometastasis†
N2	2-3	a: Micrometastasis* b: Macrometastasis† c: In transit metastases/satellites without metastatic nodes
N3	4+ metastatic nodes, or matted nodes, or in transit metastases/satellites with metastatic nodes	
M	Site	Serum LDH
M0	No distant metastases	NA
M1a	Distant skin, subcutaneous, or nodal metastases	Normal
M1b	Lung metastases	Normal
M1c	All other visceral metastases	Normal
	Any distant metastasis	Elevated

Abbreviations: NA, not applicable; LDH, lactate dehydrogenase.
*Micrometastases are diagnosed after sentinel lymph node biopsy.
†Macrometastases are defined as clinically detectable nodal metastases confirmed pathologically.

Table 2. Anatomic Stage Groupings for Cutaneous Melanoma

	Clinical Staging*				Pathologic Staging†		
	T	N	M		T	N	M
0	Tis	N0	M0	0	Tis	N0	M0
IA	T1a	N0	M0	IA	T1a	N0	M0
IB	T1b	N0	M0	IB	T1b	N0	M0
	T2a	N0	M0		T2a	N0	M0
IIA	T2b	N0	M0	IIA	T2b	N0	M0
	T3a	N0	M0		T3a	N0	M0
IIB	T3b	N0	M0	IIB	T3b	N0	M0
	T4a	N0	M0		T4a	N0	M0
IIC	T4b	N0	M0	IIC	T4b	N0	M0
III	Any T	N > N0	M0	IIIA	T1-4a	N1a	M0
					T1-4a	N2a	M0
				IIIB	T1-4b	N1a	M0
					T1-4b	N2a	M0
					T1-4a	N1b	M0
					T1-4a	N2b	M0
					T1-4a	N2c	M0
				IIIC	T1-4b	N1b	M0
					T1-4b	N2b	M0
					T1-4b	N2c	M0
					Any T	N3	M0
IV	Any T	Any N	M1	IV	Any T	Any N	M1

*Clinical staging includes microstaging of the primary melanoma and clinical/radiologic evaluation for metastases. By convention, it should be used after complete excision of the primary melanoma with clinical assessment for regional and distant metastases.
†Pathologic staging includes microstaging of the primary melanoma and pathologic information about the regional lymph nodes after partial (ie, sentinel node biopsy) or complete lymphadenectomy. Pathologic stage 0 or stage IA patients are the exception; they do not require pathologic evaluation of their lymph nodes.

Treatments in addition to excision can include complete lymph node excision for positive sentinel nodes. The survival benefit of a therapeutic lymph node dissection following a positive sentinel node has not been clearly established. Systemic therapy remains the mainstay therapy for metastatic melanoma. This includes cytotoxic chemotherapy, immunotherapy, or the combination of both.[24]

Interferon alpha 2b has significant toxicity when used at doses that may slow recurrence (not altering survival); however, there are no standard systemic therapeutic regimens that offer significant prolongation of survival for individuals with metastatic melanoma. Granulocyte-macrophage colony-stimulating factor has shown improvement in progression-free survival in high risk of recurrence individuals in early trials. Radiation therapy is more commonly used for palliation of symptomatic sites of melanoma metastases and has been used as primary treatment of ocular melanoma and lentigo maligna melanoma.[21]

II. Aeromedical Concerns.

The ultimate aeromedical concern is the risk of an in-flight incapacitating event. For melanoma the clinical issue of most aeromedical concern is CNS recurrence/metastasis. However, only survival rates (no recurrence rates) for the AJCC melanoma staging system were available. At autopsy the majority of melanoma individuals had evidence of metastasis to the CNS. Therefore, waiver considerations were based on survival rates. Other factors that must be considered prior to granting

a waiver include surgical wounds, scars, and skin graft sites affecting range of motion, and proper/comfortable fit of flying/life support equipment.

III. Waiver Considerations

History of melanoma is disqualifying for all flying classes; although not specifically noted as disqualifying for ATC/GBC and SMOD duties, the disease is disqualifying for retention and requires an MEB. Therefore, a waiver is also required for these personnel. The table below outlines the waiver potential for flying class (FC) I/IA, II and III based on AJCC melanoma staging system.

Table 1: Waiver potential based on flying class and melanoma stage.

Flying Class	**Melanoma Stage**	**Waiver Potential Waiver Authority**
I/IA	0	Maybe#† AETC
	IA, IB, IIA, IIB, IIC, IIIA, IIIB, IIIC, IV	No AETC
II (pilot)	0, IA	Yes†$ MAJCOM
	IB,IIA, IIB, IIIA, IIC, IIIB, IIIC, IV	No MAJCOM
II (other than pilot) III	0, IA, IB	Yes†$ MAJCOM‡
	IIA, IIB, IIIA, IIC, IIIB, IIIC	Maybe*† MAJCOM
	IV	No MAJCOM
ATC/GBC SMOD**	0, IA, IB	Yes† MAJCOM
	IIA, IIB, IIIA, IIC, IIIB, IIIC	Maybe*† MAJCOM
	IV	No MAJCOM

Waiver may be considered if no risk factors such as history of dysplastic nevus syndrome (greater than 50 atypical nevi, family history of atypical nevi and family history of melanoma) are present.
† No indefinite waivers will be granted except for Stage 0.
$ Waiver in untrained FC II/III may be considered if **no** risk factors such as history of dysplastic nevus syndrome (greater than 50 atypical nevi, family history of atypical nevi and family history of melanoma) are present.
* Waiver may be considered by MAJCOM after five years of disease free.

** Waiver authority for SMOD personnel is AFSPC or GSC.
‡ For FC II (e.g. navigator, flight surgeon) AFMSA is the waiver authority.

All waivered cases require close follow-up for life, at intervals recommended by the evaluating dermatologist or oncologist, at least annually.

AIMWTS review through March 2012 showed 248 cases of melanoma; six FC I, 1 FC IA, 156 FC II, 4 FC IIA, 3 FC IIC, 53 FC III, 17 ATC, 5 SMOD, and 3 GBC. Of these, 231 (93%) received waivers and 17 (7%) were disqualified. The vast majority approved were Stage 0 or IA. Of the 17 disqualified Airmen, ten were disqualified due to the melanoma and 7 for other conditions. Six of the disqualifications due to Melanoma were for FC II, 3 were FC III, and 1 for SMOD. The other 7 Airmen were disqualified due to several other medical conditions, including CAD, depression, migraine, Crohn's Disease, multiple sclerosis, neprholithiasis, and vertebral disc herniation.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver should include the following:
A. History – summary of disease course, risk factors, review of systems, and activity level.
B. Physical - special attention to skin and lymph nodes. Need to also exam fundus and conjunctiva.
C. Dermatological consultation (and oncology/surgery consultation if indicated), with specific comments regarding work-up to rule-out metastatic disease.
D. Pathology report, specifically indicating histologic diagnosis of melanoma, presence or absence of tumor ulceration, and tumor thickness (AJCC melanoma staging system).
E. Confirmation of histology, ulceration, and thickness by AFIP or a DoD accredited dermatopathologist, with a copy of report attached.
F. Copies of all laboratory studies, radiological studies, and any other studies.
G. Statement that incision site does not interfere with flying duties and wearing of aircrew flying and life-support equipment.
H. Medical evaluation board (MEB) report.
I. Outline plan for follow-up.

The AMS for waiver renewal should include the following:
A. History – AJCC melanoma staging, interval frequency and results, and review of systems.
B. Physical – skin and lymph node. Need to also exam fundus and conjunctiva.
C. Dermatology consult to include follow-up plan.

ICD 9 code for Malignant Melanoma	
172	Malignant Melanoma of the Skin

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WAIVER GUIDE
Updated: Dec 2011
Supersedes Waiver Guide of Oct 2008
By: Col Roger Hesselbrock (ACS Neurologist) and Dr Dan Van Syoc

CONDITION:
Meningitis and Encephalitis (Dec 11)

I. Overview.

Meningitis is an inflammatory process involving the tissues surrounding the central nervous system. Encephalitis involves the brain parenchyma. Some patients will have symptoms and signs suggesting involvement of both brain and meninges, blurring the distinction between the two; characterization as meningitis or as encephalitis reflects the more dominant features although in some instances a diagnosis of meningoencephalitis is more appropriate.[1] The process may be acute or chronic. Clinical abnormalities in brain function such as altered mental status, motor or sensory deficits, altered behavior and personality changes, and speech or movement disorders are expected in encephalitis.[2] In meningitis the patient may be uncomfortable, lethargic, or distracted by headache but will likely maintain normal cerebral function. Seizures may occur in encephalitis or meningitis. Simple aseptic meningitis is commonly diagnosed when there is no abnormality in brain function, when the cerebrospinal fluid (CSF) findings include a mild pleocytosis (100-1000 cell/mm^3 with either mononuclear or polymorphonuclear cell predominance), negative bacterial smears and cultures, normal to mildly elevated protein concentration, and normal to slightly depressed glucose level; additionally, the clinical course is relatively short and uncomplicated.[3]

Diagnosis of meningitis or encephalitis is dependent on the history, patient presentation, and exam. A key component of the exam is evaluation of the CSF. For viral infections, the opening pressure should be normal or slightly increased and there will most likely be a mild lymphocytic pleocytosis, a normal to slightly increase protein concentration, and a normal glucose concentration.[4] For bacterial meningitis, patients frequently present with fever, neck stiffness, and an altered mental status. There is almost always an increased opening pressure, a white blood cell count of 100 to 10,000 cells/mm^3 with a predominance of polymorphonuclear leukocytes, an elevated protein concentration, and a CSF to plasma glucose ratio below 0.6.[5] Cases of meningitis can persist for weeks or months and then can often be referred to as chronic meningitis. Impairment of consciousness, epileptic seizures, neurological signs and symptoms may evolve over time indicating the development of meningoencephalitis, encephalitis, or even granuloma and/or abscess formation. These cases are much more complex and difficult to treat.[6]

Etiologies for meningitis and encephalitis include viral, bacterial, fungal, and parasitic infectious agents as well as neoplastic, vasculitic, and immune entities. In the United States viral etiologies account for more infections than all other sources combined.[7] For community-acquired bacterial meningitis, the most common organisms are S. pneumonia, N. meningidits, and L. monocytogenes. Common viral etiologies for aseptic meningitis include enteroviruses, herpes simplex virus, HIV, and West Nile. Common viral etiologies for encephalitis include H. simplex type 1, arboviruses (St. Louis, Japanese encephalitis), and West Nile. Histoplasmosis and coccidiomycosis are the most common fungal etiologies while cysticercosis is a common parasitic form.[2] A comprehensive evaluation is necessary to identify the etiological agent. Despite an intense evaluation, an exact agent may not be identified in a substantial number of cases of encephalitis.[8]

Prognosis is dictated by the agent responsible for the meningitis or encephalitis and the initial severity. Long-term neurological complications are seen in about 28% of bacterial meningitis survivors.[9, 10] Long-term complication rates depend upon the viral agent, ranging from rare to 46%. St. Louis encephalitis is associated with extended convalescence in 30–50% of patients while West Nile virus has a mortality rate of 5-10% in patients who exhibit neurological symptoms. Symptoms can persist for months or years on patients with encephalitis.[11] Tuberculous meningitis can lead to mortality and serious long-term sequelae in up to 50% of patients.[12] Late unprovoked seizures may occur in up to 65% of patients following H. simplex encephalitis; the presence of acute seizures increases the risk of long-term seizures 22-fold while the absence of acute seizures is associated with a 10-fold increase in long-term seizures.[13, 14] Other neurological complications may be seen including a high incidence of neurocognitive and movement disorders in West Nile and Japanese encephalitis.[13]

Management of patients with meningitis or encephalitis is driven by the symptoms and whether or not an infectious agent can be identified. Many will need to be admitted, often to intensive care units, leading to long-term management issues.[15] The history will also be a key factor in selection of therapies. The following factors may be very important for therapeutic decision making: serious drug allergies, recent exposure to someone with meningitis, recent infection (particularly respiratory or ear infections), recent travel to endemic areas, history of IV drug abuse, significant rash on the patient, recent history of head trauma, otorrhea or rhinorrhea, HIV infection, and any other immunocompromising factors.[7] It is paramount to avoid delay in instituting therapy as this can lead to severe results.[16]

II. Aeromedical Concerns.

Both acute and chronic neurological complications are of aeromedical concern. Acutely cognitive impairment, obtundation, focal neurological deficit including cranial nerve deficits and hemiparesis, and seizures are significant issues. Residual neurocognitive impairments, movement disorders, and seizures are of concern.

For purposes of aeromedical disposition, aseptic meningitis is defined as no abnormality in brain function (e.g., altered cognitive function, focal neurological deficit), when the CSF findings include a mild pleocytosis (100-1000 cell/mm^3 with either mononuclear or polymorphonuclear cell predominance), negative bacterial smears and cultures, normal to mildly elevated protein concentration, and normal to slightly depressed glucose level, and when the clinical course is relatively short. If there is any alteration of cognitive function, obtundation, focal neurological deficit, or complicated hospital or recovery course, then for purposes of aeromedical waiver that is considered to be no longer simple aseptic meningitis but is in the meningoencephalitis or encephalitis continuum.

The prognosis is highly variable depending upon the agent responsible for the meningitis or encephalitis. However in general the simple aseptic (viral) meningitis has an excellent prognosis. More complicated forms of viral meningitis such as West Nile virus or HIV as well as meningitis secondary to bacterial, fungal, or parasitic agents do not share the same good prognosis. All forms of encephalitis or meningoencephalitis have a significant risk of chronic neurocognitive or neurological impairment.[17]

III. Waiver Considerations.

History of central nervous system infection (e.g., meningitis, encephalitis, meningoencephalitis) is disqualifying for all flying classes and for ATC/GBC duties. Waiver may be considered as soon as the individual is symptom free, cleared by neurology and has normal studies. Neurologic infections are not listed as disqualifying for retention or for SMOD duties.

Table 1. Waiver potential for meningitis and encephalitis.

Flying Class	Condition	Waiver Potential Wavier Authority	ACS review/evaluation
I/IA	Simple aseptic meningitis within 3 years.	Yes+ AETC	Yes, probable review only
	Simple aseptic meningitis greater than 3 years ago	Yes+ AETC	No
	Bacterial, fungal, parasitic meningitis, any meningoencephalitis or any encephalitis within the previous 3 years.	Yes+ AETC	Yes
	Bacterial, fungal parasitic meningitis, any meningoencephalitis or any encephalitis greater than 3 years ago.	Yes+ AETC	Yes, probable review only
II/III, including untrained.	Simple aseptic meningitis.	Yes+ MAJCOM	No
	Bacterial fungal, parasitic meningitis, any meningoencephalitis or any encephalitis within the previous 3 years.	Yes+ MAJCOM	Yes
	Bacterial fungal, parasitic meningitis, any meningoencephalitis or any encephalitis greater than 3 years ago.	Yes+ MAJCOM	Yes, probable review only
ATC/GBC, including untrained	Any history of meningitis or encephalitis	Yes+ MAJCOM	At the discretion of the waiver authority
SMOD	Any history of meningitis or encephalitis	N/A	N/A

+ Indefinite waiver.

Review of AIMWTS in November 2011 showed 54 cases of encephalitis and/or meningitis; 6 FC I/IA (0 disqualifications), 23 FC II (2 disqualifications), 1 FC IIU (0 disqualifications), 22 FC III (2 disqualifications), and 2 ATC/GBC (0 disqualifications). Of the 4 disqualified, one was

disqualified for meningitis and cerebral spinal fluid leak and 3 for other medical conditions. Further breakdown of the cases revealed 5 with meningitis of unknown or unclear etiology, 4 of bacterial origin, 25 of viral origin, 10 designated as aseptic meningitis and there were 10 cases identified as encephalitis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for encephalitis, meningoencephalitis or bacterial, fungal, or parasitic meningitis within the last 3 years should include the following:
A. History – initial signs and symptoms, lumbar puncture results, treatment, current symptoms, and activity level.
B. Physical – neurological exam.
C. Neurology consult.
D. ACS Neuropsychological testing results.
E. EEG with awake and sleep recording.
F. MRI scan of the head.
G. Audiogram.

The AMS for simple aseptic meningitis within the last 3 years should include the following:
A. History – initial signs and symptoms, lumbar puncture results, treatment, current symptoms, and activity level.
B. Physical – neurological exam.
C. Neurology consult.
D. MRI/CT scan of the head.

The AMS for encephalitis, meningoencephalitis, bacterial, fungal, or parasitic meningitis, or aseptic meningitis that occurred 3 years or greater ago should include the following:
A. History – signs, symptoms, lumbar puncture results, treatment, current symptoms, and activity level.
B. Physical – neurologic exam.
C. Copy of medical records of illness.

ICD9 Codes for Meningitis and Encephalitis	
047.9	Unspecified viral meningitis
320.9	Meningitis due to unspecified bacterium
322.9	Meningitis, unspecified
323.9	Unspecified cause of encephalitis, myelitis and encephalomyelitis

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WAIVER GUIDE
Initial Version: May 2010
Supersedes Waiver Guides for Impulse Control Disorder (Feb 2002), Psychological Factors Affecting Medical Conditions (Feb 2002) and Sexual Dysfunctions (Feb 2002)
By: Dr. Dan Van Syoc
Reviewed by Col (sel) Kent McDonald, psychiatrist and chief of the ACS Neuropsychiatry Branch

CONDITION:
Mental Health Diagnoses, Misc (May 10)

I. Overview
Previously there were several psychiatric diagnostic categories in the waiver guide which have since been removed. The reason for so doing is that there have been practically no AIMWTS submissions in these categories, and the few cases submitted had a strong predilection for a permanent disqualification or administrative/punitive separation from military service. Good initial screening of our aviation applicants significantly minimizes the chances of these individuals ever achieving flight status.

Having said this, there are rare cases of aviators with a disorder that falls in one of the above diagnostic categories, or who have another miscellaneous condition not on the current waiver guide list, who will be successfully treated by mental health professionals and deemed cured or in a long-term state of remission. After a thorough evaluation it may be determined that the aviator may be fit for waiver consideration.

II. Aeromedical Concerns.

Most flyers with the more unusual mental health diagnoses typically have other concurrent emotional disturbances such as anxiety, depression, or substance abuse/dependence that may be aeromedically significant. Others have personality issues or traits that are problematic. Flyers with these unusual diagnoses should be individually assessed with attention given to rule out Axis I or II conditions.

Some of the diagnoses (primary such as an impulse control disorder or secondary such as antisocial personality traits/disorder) tie in closely with reliability, integrity, and security concerns. Returning these aviators to flight status may cause subsequent issues in the squadron and morale problems among the flight crew. Many of these individuals also have unstable interpersonal relationships with family which can have a significant negative impact on flying operations. Administrative, legal, or security clearance action may be required even if the primary problem is not medically disqualifying.

III. Waiver Considerations.

There are numerous conditions listed in the AFI 48-123 Psychiatric Disorders sections that do not have a corresponding waiver guide. If any of those conditions apply to the aviator under consideration for a waiver, the guidance in this topic applies.

Before submitting the case for waiver consideration, the base-level flight surgeon must first discern whether the condition is unsuiting vs. unfitting for service. If the Airman requires a fit/unfit determination, the case needs MEB action; if the airman requires suited/unsuited determination, the case then needs consideration of an administrative separation or discharge via the chain of command.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver should include the following, at a minimum:
A. History of mental health condition, all treatment performed and any side effects from medications used (if any). Provide good time lines.
B. Family history of any mental health conditions.
C. A medical work-up to include a toxicology screen and basic labs (CBC, Chem20, TSH).
D. A section summarizing mitigating factors for disqualifying condition and why member is now at low risk for recurrence.
E. Consultation reports from all mental health providers involved with the care of the aviator to include all treatment notes from treating mental health professionals as well as an MEB-type narrative summary of the mental health record.
F. Letter of support from squadron commander.
G. MEB results if applicable.

The aeromedical summary for waiver renewal should include the following:
A. History – interim history since last waiver.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s) if accomplished since last waiver request.

V. References.

1. AFI 48-123

WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Aug 2007
By: Dr Dan Van Syoc
Reviewed by Dr. Bill Kruyer, ACS Chief Cardiologist

CONDITION:
Mitral Regurgitation (Insufficiency) – Primary (Jan 11)

I. Overview.

Abnormalities of the mitral valve annulus, the valve leaflets, the chordae tendinae, or the papillary muscles can cause mitral regurgitation (MR). In the United States and much of the Western world, the most common cause is mitral valve prolapse, accounting for as much as one-half to two-thirds of MR cases. In the aircrew population clinically significant MR is also most commonly associated with mitral valve prolapse/myxomatous mitral valve disorder. Other causes include rheumatic heart disease, endocarditis, ischemic heart disease, collagen vascular disease, and dilated cardiomyopathy.[1, 2] Primary MR is mitral regurgitation in the absence of any apparent underlying etiology. This waiver guide will focus on primary MR. MR due to mitral valve prolapse (MVP) is discussed in a separate MVP waiver guide. Aeromedical considerations for other etiologies of MR will be addressed per the underlying disease process and in this waiver guide.

In the aircrew population, MR will typically be diagnosed on an echocardiogram (echo) done for systolic murmur evaluation or for a variety of other clinical or aeromedical indications, such as an abnormal electrocardiogram. MR is graded on echo as trace, mild, moderate and severe. Primary MR graded on echo as trace or mild is considered a normal variant (not disqualifying) and therefore no waiver is required. For FC I/IA/II individuals, echos read locally as trace or mild MR require Aeromedical Consultation Service (ACS) review via the ECG Library. The report and a CD/videotape copy are required for confirmation and to exclude underlying pathology such as MVP. ACS review is optional for FC III, and can be requested by the local flight surgeon or the waiver authority. Waiver is required for all classes of flying duties for primary MR graded as greater than mild.

Symptoms depend on the etiology and severity of MR. Symptoms due to chronic MR are related to progressive severity of the volume overload with resultant pulmonary congestion and left ventricular dysfunction. Moderate or less MR should be asymptomatic. Expected symptoms with severe MR include reduced exercise tolerance, chronic weakness, fatigability, exertional dyspnea, dyspnea at rest, and orthopnea. However, subjects may be asymptomatic with severe MR, even with some associated left ventricular dysfunction. Symptom onset may be insidious and not appreciated by the patient. A careful history is important to elicit subtle symptoms or lifestyle changes due to the patient "slowing down" as a result of progressive MR. Atrial fibrillation may occur with severe MR.[1, 2]

In early 2007, the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[3] Endocarditis prophylaxis was recommended only for specified high risk groups, and only for dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart

conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Such common conditions no longer recommended for endocarditis prophylaxis included, but are not limited to, mitral valve prolapse, bicuspid aortic valve, mitral or aortic regurgitation with normal valve (e.g. primary MR) and uncorrected small defects of the atrial and ventricular septum.

II. Aeromedical Concerns.

Two categories of aeromedical events must be considered with moderate and severe primary MR. Events which might occur abruptly and impact flying performance include sudden cardiac death, cerebral ischemic events, syncope, presyncope and sustained supraventricular and ventricular tachydysrhythmias. Other aeromedical concerns include progression to severe mitral regurgitation (MR), requirement for surgical mitral valve repair or replacement, other thromboembolic events and nonsustained tachydysrhythmias. ACS experience with moderate and severe primary MR is very limited. A review of the ACS experience with 404 trained aviators with MVP may be applicable, however.[4, 5] This review yielded event rates of 1.5% per year for all aeromedical endpoints examined. However, most of these could be readily tracked by serial evaluations and presented a low risk for sudden incapacitation. For those events which might suddenly impact flying performance, the rate was 0.3% per year. Most of these MVP subjects did not have moderate or severe MR. For primary MR, sudden incapacitation event rates would be comparable and likely less. The primary concern for moderate to severe primary MR would be development of symptoms and progression to severe MR that meets published guidelines criteria for surgical repair or replacement of the mitral valve. These surgical criteria are echocardiographic parameters that can be tracked by serial studies. Patients who are followed closely will usually be identified for surgery before onset of symptoms.

Static or isometric exercises may worsen MR and thus have deleterious effects. In general, exercise produces no significant change or a mild decrease in MR because of reduced systemic vascular resistance. However, patients with elevation of heart rate or blood pressure with exercise may manifest increased MR and pulmonary capillary pressures. Hence, static exercise that increases arterial pressure is potentially deleterious. Ejection fraction usually does not change or decreases slightly with exercise, although the ejection fraction response may be completely normal in younger, asymptomatic subjects. These concerns may be more theoretical than documented, but result in recommendation for restricted static exercise in competitive athletes with significant MR.[6] In the aeromedical environment, “pulling” Gs is a similar situation and thus reduced +Gz tolerance and +Gz-induced tachydysrhythmias would be concerns with severe MR. ACS experience with significant primary MR is again very limited. In the ACS MVP database review, 95 aviators had a monitored centrifuge assessment. Nonsustained supraventricular tachycardia and nonsustained ventricular tachycardia each occurred in one individual (1/95, 1%). G-loss of consciousness occurred in two individuals (2/95, 2%) without associated dysrhythmia in either case. These occurrences are less than that reported for apparently healthy centrifuge subjects or trainees.[7] A slight reduction in +Gz tolerance has previously been reported for MVP but was operationally nonsignificant.[8-11] Monitored centrifuge assessment is no longer required for MVP and is not required for primary MR. Unrestricted waiver may be considered for moderate MR; waiver consideration for severe MR is limited to low performance aircraft.

Medications to reduce afterload, such as ACE inhibitors, have documented clinical benefit in acute MR and chronic aortic insufficiency, but no studies have shown such a clinical benefit for chronic MR. Although some studies have shown hemodynamic improvement and relief of symptoms, this has not been shown to delay the need for surgery or improve surgical outcome, as is the case for severe aortic insufficiency. Use of these medications in asymptomatic MR may or may not be beneficial, but is probably common clinical practice. Use in symptomatic MR is appropriate, but at that stage the aviator should be disqualified; aeromedical disposition should be secondary to consideration of proper timing of valve surgery. The use of approved ACE inhibitors is acceptable in aviators with moderate or asymptomatic severe MR.[1]

III. Waiver Consideration.

Per AFI 48-123, primary MR graded moderate or worse is disqualifying for all classes of flying duties and ACS evaluation is required for waiver consideration. For FC IIU and ATC/GBC personnel, symptomatic valvular heart disease or asymptomatic moderate to severe valvular disease associated with hypertrophy, chamber enlargement, or ventricular dysfunction is disqualifying. MR is not listed as disqualifying for SMOD duties.

Moderate MR may be eligible for unrestricted FC II or FC III waiver. Asymptomatic severe MR that does not yet meet published guidelines for surgery may be considered for waiver restricted to low performance aircraft. Asymptomatic severe MR that meets published guidelines criteria for surgical repair/replacement and symptomatic severe MR are disqualifying without waiver recommendation.[12] ACS re-evaluations will typically be performed at 1-2 years intervals, depending on degree of MR and other related considerations, such as cardiac chamber dilation and left ventricular function. As discussed above, the use of approved ACE inhibitors for afterload reduction is acceptable in aviators with moderate or asymptomatic severe MR. Waiver may be considered after surgery; please refer to the "Valve Surgery – Replacement or Repair" waiver guide. In summary:

Table 1. Summary of Associated Clinical Conditions and ACS Requirements for Mitral Regurgitation

Degree of Primary Mitral Regurgitation (MR) Graded on Echocardiogram	Flying Class	Waiver Potential Waiver Authority	ACS Review and/or Evaluation Required
Trace or mild MR (normal variant)	FC I/IA	Qualified* N/A	ACS review
	FC II/III/IIU and ATC/GBC	Qualified* N/A	FC II & IIU ACS review, FC III not required
Moderate MR	FC I/IA	No AETC	ACS review
	FC II/III	Yes MAJCOM	ACS evaluation
	FC IIU**	Yes AFMSA	ACS Review
	ATC/GBC**	Yes MAJCOM	ACS Review
Severe MR – asymptomatic and nonsurgical per guidelines	FC I/IA	No AETC	ACS review
	FC IIA only	Maybe AFMOA	ACS evaluation
	FC III (low performance only)	Maybe MAJCOM	ACS evaluation
	FC IIU**	Yes AFMSA	ACS Review
	ATC/GBC**	Yes MAJCOM	ACS Review
Severe MR – symptomatic or surgical per guidelines	FC I/IA	No AETC	ACS review
	FC II/III	No MAJCOM	ACS review
	FC IIU**	Maybe AFMSA	ACS review
	ATC/GBC**	Maybe MAJCOM	ACS review

*Qualified means no waiver required, however, for FC I/IA/II individuals, echos read locally as trace or mild MR require ACS review via the ECG Library. The report and a CD/videotape copy are required for confirmation and to exclude underlying pathology such as MVP.
**No waiver required if member asymptomatic and there is no associated hypertrophy, chamber enlargement, or ventricular dysfunction.

Additional considerations for waiver recommendation include but are not limited to: normal left ventricular and left atrial size, normal left ventricular function, no prior thromboembolic events, no associated tachydysrhythmias and no symptoms attributable to MR. Associated tachydysrhythmias will be addressed per their appropriate waiver guide and on a case-by-case basis.

AIMWITS search in early September 2010 revealed a total of 151 individuals with an aeromedical summary containing the diagnosis of mitral regurgitation. Of the total, there were 8 FC I/IA cases (3 disqualifications), 90 FC II cases (9 disqualifications), 50 FC III cases (6 disqualifications), 1 FC IIU case (waiver approved), 1 ATC cases and 1 SMOD case (both of the latter were disqualified). Most of the disqualified cases were disqualified for issues related directly to the mitral valve issue or another cardiac issue.

IV. Information Required for Waiver Submission.

ACS evaluation is required for all classes of flying duties for moderate and severe primary MR. No additional studies are routinely required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for waiver consideration for moderate or severe primary MR.

For initial ACS evaluation the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
B. Report and complete tracings of the echo documenting primary MR. (Notes 1 and 2)
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

For ACS follow-up evaluations (re-evaluations) the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI

Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 code(s) for	
394.1	Rheumatic mitral insufficiency
424.0	Mitral valve disorders
746.6	Congenital mitral insufficiency

V. References:

1. Kruyer WB. Cardiology. In: Rayman RB, ed. *Clinical Aviation Medicine*, 4th ed. New York: Graduate Medical Publishing, LLC. 2006; 199-201.

2. Kruyer WB, Gray GW, Leding CJ. Clinical aerospace cardiovascular medicine. In: DeHart RL, Davis JR eds. *Fundamentals of Aerospace Medicine*, 3rd ed. Philadelphia: Lippincott Williams & Wilkins. 2002; 349-350.

3. Wilson W, chair. Prevention of infective endocarditis: Guidelines from the American Heart Association. Circulation. 2007; 115: 1-19.

4. Osswald SS, Gaffney FA, Kruyer WB, Pickard JS, Jackson WG. Analysis of aeromedical endpoints and evaluation in USAF aviators with mitral valve prolapse. Submitted for publication.

5. Osswald SS, Gaffney FA, Hardy JC. Mitral Valve Prolapse in Military Members: Long-term Follow-up and Clinical Risk Analysis. J Am Coll Cardiol, 1997; 29(Suppl A): 506A.

6. Bonow RO, Cheitlin MD, Crawford MH, Douglas PS. 36th Bethesda conference: Eligibility recommendations for competitive athletes with cardiovascular abnormalities. Task force 3: Valvular heart disease. J Am Coll Cardiol, 2005; 45: 1334-40.

7. Whinnery JE. Dysrhythmia comparison in apparently healthy males during and after treadmill and acceleration stress testing. Am Heart J. 1983; 105: 732-737.

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11. Whinnery JE. Acceleration-Induced Ventricular Tachycardia in Asymptomatic Men: Relation to Mitral Valve Prolapse. Aviat Space Environ Med. 1983; 54(1): 58-64.

12. Bonow RO, chair. ACC/AHA 2006 guidelines for the management of patients with valvular heart disease. A report of the American College of Cardiology/American Heart Association task force on practice guidelines. J Am Coll Cardiol, 2006; 48): e1-e148.

WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Aug 2007
By: LtCol Michael Madrid (RAM XI) and Dr. Dan Van Syoc
Reviewed by Dr. Bill Kruyer, ACS Chief Cardiologist

CONDITION:
Mitral Valve Prolapse (Jan 11)

I. Overview.

The prevalence of mitral valve prolapse (MVP) is reported to be 2-5% in the general U.S. population. In the USAF database of Medical Flight Screening echocardiograms (echo) performed on pilot training candidates, the prevalence of MVP has been about 0.5% in males and females.[1, 2] This lower prevalence may partly be due to the young age of this population and also due to elimination of some more obvious cases in the flying class (FC) I examination process. MVP may be diagnosed or suggested by the typical auscultatory finding of a midsystolic click with or without late systolic murmur, but by current standards it is more typically an echocardiogram (echo) diagnosis. Echo criteria have evolved significantly over the years, but current standards are widely accepted and unlikely to change significantly in the near future. These criteria have been followed at the Aeromedical Consultation Service (ACS) for over a decade, since their earliest acceptance in the academic cardiology community.

Progressive mitral regurgitation (MR, also termed mitral insufficiency) is one of the primary clinical and aeromedical concerns for MVP. Abnormalities of the mitral valve annulus, the valve leaflets, the chordae tendinae, or the papillary muscles can cause MR. In the United States and much of the Western world, the most common cause is MVP, accounting for as much as one-half to two-thirds of MR cases. In the aircrew population clinically significant MR is also most commonly associated with mitral valve prolapse/myxomatous mitral valve disorder. Other causes include rheumatic heart disease, endocarditis, ischemic heart disease, collagen vascular disease, and dilated cardiomyopathy.[1, 2] Primary MR is mitral regurgitation in the absence of any apparent underlying etiology. Primary MR is considered in a separate waiver guide (Mitral Regurgitation – Primary). Aeromedical considerations for other etiologies of MR will be addressed per the underlying disease process and the primary MR waiver guide. This waiver guide will limit discussion to MVP.

In early 2007 the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[3] Endocarditis prophylaxis was recommended only for specified high risk groups, and only for dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Such common conditions no longer recommended for endocarditis prophylaxis included, but are not limited to, mitral valve prolapse, bicuspid aortic valve, mitral or aortic regurgitation with normal valve and uncorrected small defects of the atrial and ventricular septum.

II. Aeromedical Concerns.

Two categories of aeromedical events must be considered with MVP. Events which might occur abruptly and impact flying performance include sudden cardiac death, cerebral ischemic events, syncope/presyncope and sustained supraventricular and ventricular tachydysrhythmias. Other aeromedical concerns include progression to severe mitral regurgitation (MR), requirement for surgical mitral valve repair or replacement, other thromboembolic events and nonsustained tachydysrhythmias. Review of the ACS experience with 404 trained aviators with MVP yielded event rates of 1.5% per year for all aeromedical endpoints examined. However, most of these could be readily tracked by serial evaluations and presented a low risk for sudden incapacitation. For those events which might suddenly impact flying performance, the rate was 0.3% per year. A subset of this cohort had MVP by auscultation only; all available echos on these aviators did not meet current criteria for MVP. In this group there were no potentially incapacitating events in the first ten years of follow-up and none of them progressed to severe MR or mitral valve surgery. In the echo-positive subset, annual event rate at ten years was about 0.5% per year. None of the 404 had infective endocarditis. By multivariate analysis the only factors independently predictive of subsequent events were dilation of the left ventricle or left atrium and age older than 45 years at time of initial diagnosis.[4, 5]

Static or isometric exercises may worsen MR and thus have deleterious effects. In general, exercise produces no significant change or a mild decrease in MR because of reduced systemic vascular resistance. However, patients with elevation of heart rate or blood pressure with exercise may manifest increased MR and pulmonary capillary pressures. Hence, static exercise that increases arterial pressure is potentially deleterious. Ejection fraction usually does not change or decreases slightly with exercise, although the ejection fraction response may be completely normal in younger, asymptomatic subjects. These concerns may be more theoretical than documented, but result in recommendation for restricted static exercise in competitive athletes with significant MR due to any cause.[6] In the aeromedical environment, “pulling” Gs is a similar situation and thus reduced +Gz tolerance and +Gz-induced tachydysrhythmias would be concerns with severe MR. In the ACS MVP database review, 95 aviators had a monitored centrifuge assessment. Nonsustained supraventricular tachycardia and nonsustained ventricular tachycardia each occurred in one individual (1/95, 1%). G-loss of consciousness occurred in two individuals (2/95, 2%) without associated dysrhythmia in either case. These occurrences are less than that reported for apparently healthy centrifuge subjects or trainees.[7] A slight reduction in +Gz tolerance has previously been reported for MVP but was operationally nonsignificant.[8-11] Monitored centrifuge assessment is no longer required for MVP. Unrestricted waiver may be considered for MVP with associated moderate or less MR; waiver consideration for severe MR is limited to low performance aircraft.

Medications to reduce afterload, such as ACE inhibitors, have documented clinical benefit in acute MR and chronic aortic insufficiency, but no studies have shown such a clinical benefit for MVP with significant chronic MR. Although some studies have shown hemodynamic improvement and relief of symptoms, this has not been shown to delay the need for surgery or improve surgical outcome, as is the case for severe aortic insufficiency. Use of these medications in asymptomatic MR may or may not be beneficial, but is probably common clinical practice. Use in symptomatic MR is appropriate, but at that stage the aviator should be disqualified; aeromedical disposition should be secondary to consideration of proper timing of valve surgery. The use of approved ACE inhibitors is acceptable in aviators with MVP and moderate or asymptomatic severe MR.[1]

III. Waiver Considerations.

MVP is disqualifying for flying classes I/IA. II, and III. For FC IIU and ATC/GBC duties, it is disqualifying if the condition is symptomatic. SMOD personnel are covered under retention standards for symptomatic MVP requiring treatment. ACS review is required for waiver consideration. ACS evaluation may be required, depending on the flying class or for specific concerns in an individual case. Waiver considerations will usually be determined by the presence and severity of associated MR. MVP with mild or less MR is eligible for FC I/IA waiver. MVP with moderate or less MR is eligible for unrestricted FC II/III waiver. MVP with asymptomatic severe MR that does not yet meet published guidelines for surgery may be considered for waiver restricted to low performance aircraft.[12] MVP with symptomatic severe MR or with asymptomatic severe MR that meets published guidelines criteria for surgical repair or replacement is disqualifying without waiver recommendation.[2] ACS re-evaluations will be performed at 1-3 years intervals, depending on degree of MR and other related considerations, such as cardiac chamber dilation and left ventricular function. As discussed above, the use of approved ACE inhibitors for afterload reduction is acceptable in aviators with MVP and moderate or asymptomatic severe MR.[3] Waiver may be considered after surgery; please refer to the "Valve Surgery – Replacement or Repair" waiver guide. In summary:

Table 1. Summary of Associated Clinical Conditions and ACS Requirements for MVP

MVP and Associated Levels of Mitral Regurgitation (MR) Documented by Echocardiogram	Flying Class	Waiver Potential Waiver Authority	Required ACS Review and/or ACS Evaluation
MVP with mild or less MR	FC I /IA	Yes AETC	ACS evaluation
	FC II/III	Yes MAJCOM	ACS evaluation
	FC IIU, ATC/GBC, SMOD	No waiver required	N/A
MVP with moderate MR	FC I/IA	No AETC	ACS review
	FC II/III	Yes* MAJCOM	ACS evaluation
	FC IIU	Yes AFMSA	ACS evaluation
	ATC/GBC	Yes MAJCOM	ACS review
	SMOD	Yes AFSPC or GSC	ACS review
MVP with severe MR - asymptomatic and nonsurgical MR per guidelines	FC I/IA	No AETC	ACS review
	FC IIA only	Maybe* AFMOA	ACS evaluation
	FC III (low performance only)	Maybe* MAJCOM	ACS evaluation
	FC IIU	Maybe AFMSA	ACS evaluation ACS review
	ATC/GBC	Maybe MAJCOM	ACS review
	SMOD	Maybe AFSPC or GSC	

MVP with severe MR – symptomatic or surgical MR per guidelines	FC I/IA FC II/III FC IIU ATC/GBC SMOD	No AETC No MAJCOM No AFMSA Maybe MAJCOM Maybe AFSPC or GSC	ACS review ACS review ACS review ACS review ACS review
MVP: clinical (auscultation) only without a positive echo	FC I/IA/II/III/IIU ATC/GBC SMOD**	Yes MAJCOM	After 3 ACS evaluations/reviews without a positive echo, an indefinite waiver is recommended

* Waiver in untrained FC II and III individuals unlikely.
** SMOD waiver authority is AFSPC or GSC except for initial waivers which is AFSPC.

Additional considerations for waiver recommendation include but are not limited to: normal left ventricular and left atrial size, normal left ventricular function, no prior thromboembolic events, no associated tachydysrhythmias and no symptoms attributable to MVP. Associated tachydysrhythmias will be addressed per their appropriate waiver guide and on a case-by-case basis. Other specific concerns about an individual case may require ACS evaluation.

If the disease process appears mild and stable, waiver for all classes of flying duties will generally be valid for three years with ACS reevaluation/review at that time for waiver renewal. Each waiver recommendation will specify requirements and timing for waiver renewal.

Review of AIMWTS database through mid-Nov 2010 showed 214 cases of mitral valve prolapse with a total of 23 disqualifications. Of the total cases, 9 were FC I/IA (3 disqualifications), 126 were FC II (9 disqualifications), 76 FC were III (9 disqualifications), 2 were ATC (1 disqualification), and 1 was SMOD (1 disqualification). Of the 23 disqualified, three were due to MVP with mild MR (all FC I/IA {disqualifying at the time}), three were due to symptomatic mild MR, one was due to mod-severe MR, ten were due to MVP and other cardiac abnormalities (e.g. other valve disease, cardiomyopathy, atrial fibrillation, coronary artery disease, recurrent atrial tachycardia, annuplasty/chordae repair) and six were due to other medical conditions (e.g. dysthymia, syringomyelia, sleep apnea, head injury, albuterol inhaler use).

IV. Information Required for Waiver Submission.

ACS review/evaluation is required for MVP for all classes of flying duties. No additional studies are routinely required prior to ACS review/evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the

ACS for review. There is no minimum required nonflying observation period for waiver consideration for MVP, regardless of the presence or severity of MR.

For initial ACS evaluation the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
B. Report and complete tracings of the echo documenting MVP. (Notes 1 and 2)
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

For ACS follow-up evaluations (re-evaluations) the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD 9 code(s) for mitral valve prolapse	
394.9	Other and unspecified mitral valve disease
424.0	Mitral valve disorders

V. References.

1. Kruyer WB. Cardiology. In: Rayman RB, ed. *Clinical Aviation Medicine*, 4th ed. New York: Graduate Medical Publishing, LLC. 2006; 199-201.

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3. Wilson W, chair. Prevention of infective endocarditis: Guidelines from the American Heart Association. Circulation. 2007; 115: 1-19.

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5. Osswald SS, Gaffney FA, Hardy JC. Mitral Valve Prolapse in Military Members: Long-term Follow-up and Clinical Risk Analysis. J Am Coll Cardiol. 1997 Feb; 29(Suppl A): 506A.

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7. Whinnery JE. Dysrhythmia comparison in apparently healthy males during and after treadmill and acceleration stress testing. Am Heart J. 1983; 105: 732-737.

8. McKenzie I, Gillingham KK. Incidence of Cardiac Dysrhythmias Occurring During Centrifuge Training. Aviat Space Environ Med. 1993; 64: 687-91.

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10. Whinnery JE, Hickman JR. Acceleration Tolerance of Asymptomatic Aircrew with Mitral Valve Prolapse and Significant +Gz-induced Ventricular Dysrhythmias. Aviat Space Environ Med. 1988; 59: 711-7.

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WAIVER GUIDE
Updated: Feb 2011
Supersedes Waiver Guide of Nov 2007
By Lt Col Joseph Ouma (RAM XI) and Dr. Dan Van Syoc
Reviewed by Col (sel) Kent McDonald, chief of the ACS Neuropsychiatry branch

CONDITION:
Mood Disorders (Bipolar Disorder and Depression) (Feb 11)

I. Overview.

These disorders are characterized by a disturbance in mood as the predominant psychological feature. The mood disorders are divided into four categories: bipolar disorders, depressive disorders, mood disorders due to a general medical condition and substance-induced mood disorder. The depressive disorders (major depressive disorder, dysthymic disorder, and depressive disorder not otherwise specified) all include disturbances in emotion, ideation and/or somatic symptoms. The depressive disorders vary by length and severity. The bipolar disorders (bipolar I disorder, bipolar II disorder, cyclothymic disorder and bipolar disorder not otherwise specified) are distinguished from the depressive disorders by a history of a manic, hypomanic, or mixed episodes; none of which occurs in the depressive disorders.

DEPRESSIVE DISORDERS

The prevalence of major depressive disorders in the US is 5.4% to 8.9% and of bipolar disorder, 1.7% to 3.7%.[1, 2] Major depression affects 5 to 13% of medical outpatients, yet it is often undiagnosed and undertreated. Moreover, it is often undertreated when correctly diagnosed.[3, 4, 5] Among persons both with major depressive disorder and bipolar disorder, 75% to 85% have recurrent episodes.[6, 7] In addition, 10 to 30% of persons with a major depressive episode recover incompletely and have persistent residual depressive symptoms or dysthymia, a disorder with symptoms that are similar to those of major depression but last longer and are milder.[7,8] Peak onset is in the fourth decade of life but may occur at any age. In the general population the prevalence of major depression is 3-5% in males and 8-10% in females.[9] Diagnosis of major depression is based on standard clinical criteria published by the American psychiatric association using the DSM IV-TR criteria.[10]

Diagnostic Criteria for depressive episode[10]
A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either depressed mood or loss of interest or pleasure. (Do not include symptoms that are due to a general medication condition or mood- incongruent delusions of hallucinations).
1. Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful). **Note:** In children and adolescents, can be irritable mood.
2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others).
3. Significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. (in children, consider failure to make expected weight gains).

4. Insomnia or hypersomnia nearly every day.
5. Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down).
6. Fatigue or loss of energy nearly every day.
7. Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick).
8. Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).
9. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.
B. The symptoms do not meet criteria for a Mixed Episode.
C. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
D. The symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition (e.g. hypothyroidism).
E. The symptoms are not better accounted for by Bereavement, i.e., after the loss of a loved one, the symptoms persist for longer than 2 months or are characterized by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

First or early depressive episodes are often milder than are episodes of returning depression and an earlier age at onset generally predicts a more severe course.[11] Most episodes remit spontaneously or with treatment and last from several months to a year. The initial episode of major depression predisposes an individual to an increased probability of having another such episode sometime in their life.[12] Approximately 50% of individuals who experience a major depressive episode will have a recurrence within 5 years. A history of two episodes increases the probability of recurrence to approximately 70%, and after three episodes the probability of recurrence increases to approximately 90%.[10] Persistent major depression lasting more than 2 years occurs in 20% of those diagnosed with depression. In the general population 50% of moderate-to-severe episodes of depression will improve with antidepressants treatment.[13]

Treatment for depressive disorders requires a multimodal approach that includes pharmacotherapy, education and psychotherapy. The treatment plan should take into consideration of the individual's previous treatment outcomes, the mood disorder subtype, the severity of the current episode of depression, the risk of suicide, coexisting psychiatric and somatic conditions, non-psychiatric medications and psychological stressors.[13]

Classes of antidepressant agents are defined by their mechanism of actions. The several classes of drugs include SSRI's, norepinephrine–reuptake inhibitors, dual-action agents that inhibit uptake of serotonin and norepinephrine (NRIs), monoamine oxidase inhibitors (MAOIs) and tricyclic anti-depressants. The average duration of treatment for an episode is six months.

Depression may be the initial presentation of bipolar disorder. Bipolar disorder that manifests with initial depression is frequently under diagnosed. Patients presenting with depression should be specifically asked about symptoms of mania or hypomania:[14, 15]
1. Have you experienced sustained periods of feeling uncharacteristically energetic?
2. Have you had periods of not sleeping but not feeling tired?
3. Have you felt that your thoughts were racing but couldn't be slowed?

4. Have you had periods where you were excessive in sexual interest, spending money, religiosity, or taking unusual risks?

BIPOLAR DISORDERS

Bipolar disorder (also known as a manic depressive illness) is a complex genetic disorder in which the core feature is pathological disturbance in mood (affect) ranging from extreme elation, or mania, to severe depression usually accompanied by disturbances in thinking and behaviour which may include psychotic symptoms, such as delusions and hallucinations. The life time prevalence of bipolar disorder is in the region of 0.5-1.5% with similar rates in males and females and a mean onset around the age of 21 years.[16] Individuals with bipolar disorder are more likely to present during depressive phase than with hypomania or mania.[17] In all modern classification such as ICD 10 or DSM IV, the diagnosis of bipolar disorder requires that a person has suffered one or more episodes of mania with or without episodes of depression at other times during the life history.[10, 18] The occurrence of a manic episode at some time during the course of illness distinguishes bipolar disorder from the more common form of mood disorder in the population known as unipolar disorder or unipolar major depression in which subjects suffer one or more episodes of depression without ever experiencing episodes of pathologically raised mood. In DSM IV, bipolar disorder is sub-classified into bipolar I and bipolar II. Bipolar I individuals have manic episodes and often experience depressive episodes. It affects men and women equally. In bipolar II, individuals have a major depressive episode and at least one hypomanic episode. It is more common in women.[15]

Ninety percent of individuals experiencing a manic episode will have another within 5 years. There is a 5-10 % lifetime risk of bipolar disorder if it is diagnosed in a first degree relative and a 50-60% life time risk if both parents are diagnosed with bipolar disorder. No genetic markers or blood testing are available for bipolar disorders. The life expectancy of individuals with bipolar disorders is discouraging; 25 to 50% attempt suicide while 15% of patients eventually die by suicide.[19]

Diagnostic Criteria for mania[10]
A. A distinct period of abnormally and persistently elevated, expansive, or irritable mood, lasting at least one week (or any duration if hospitalization is necessary).
B. During the period of mood disturbance, three or more of the following symptoms have persisted (four if the mood is only irritable) and have been present to a significant degree: inflated self-esteem or grandiosity, decreased need for sleep (e.g. feels rested after only 3 hours of sleep), more talkative than usual or pressure to keep talking, flight of ideas or subjective feeling that thoughts are racing, distractibility (i.e., attention too easily drawn to unimportant or irrelevant external stimuli), increase in goal-directed activity (either socially, at work or school, or sexually), and excessive involvement in pleasurable activities that have a high potential for painful consequences (e.g. the person engages in unrestrained buying sprees, sexual indiscretion, or foolish business investments).
C. The symptoms do not meet criteria for a Mixed Episode (manic episode and a major depressive episode).
D. The mood disturbance is sufficiently severe to cause marked impairment in occupational functioning or in usual social activities or relationships with others, or to necessitate hospitalization to prevent harm to self or others, or there are psychotic features.
E. The symptoms are not due to the direct physiologic effects of a substance (e.g., a drug of abuse, a medication, or other treatment) or a general medical condition (e.g., hypothyroidism).

Hypomania involves milder, briefer manic symptoms (at least 4 days). There are no psychotic episodes or hospitalizations in hypomanic episodes. Functioning is only mildly impaired or may even be improved during the episode. Cyclothymic disorder has numerous periods with hypomanic symptoms and numerous periods with depressive symptoms that do not meet the criteria for major depressive disorder and symptoms are present at least two years. There may be a period free of symptoms but for no more than two months.

Treatment for bipolar disorders include pharmacologic (lithium, valproate and carbamazepine), psycho-education, and psychotherapy interventions. Compliance with medications by bipolar patients is a challenge because many patients discontinue their medications during their mood elevations with manic phase or due to many unpleasant side effects of these medications.[15]

MOOD DISORDERS DUE TO A GENERAL MEDICAL CONDITION

This disorder has a prominent and persistent disturbance of mood that is due to the direct physiological consequence of the specified medical condition. Common medical conditions causing this disorder include diseases of the central nervous system (stroke, traumatic brain injury, Parkinson's disease, Huntington's disease, multiple sclerosis, Alzheimer's disease), cardiovascular disorders, cancers and conditions involving the immune system. For such cases, please refer to the applicable waiver guide for that condition.

MOOD DISORDERS DUE TO SUBSTANCE ABUSE

This disorder has a prominent and persistent disturbance in mood (depressed mood, diminished interest or pleasure, expansive, or irritable mood) that is due to the direct physiological effects of a substance (i.e. drug abuse, medication [stimulants, steroids, L-dopa, anti-depressants], and other somatic treatment of depression [electroconvulsive therapy or light therapy], or toxin exposure). Generally, these cases will not be considered for a waiver unless it is abundantly clear that the substance abuse disorder has been resolved and the substance is alcohol. In such cases, also refer to the waiver guide on alcohol abuse.

II. Aeromedical Concerns.

Mood disorders can be associated with a variety of cognitive, emotional and behavioural anomalies including depressed mood, impaired judgement, slowed information processing speed, impaired memory and/or attention and concentration, inflated self-esteem or grandiosity, disturbances in energy and sleep, significant weight loss or gain, psychomotor agitation or retardation, fatigue, distractibility, flight of ideas, inappropriate guilt feelings, indecisiveness, suicidal ideation and excessive involvement in pleasurable activities that have a high potential for undesirable consequences (spending sprees, promiscuity, etc.). These cognitive, emotional and behavioural anomalies are incompatible with aviation safety and flying duties

Most aviators with a mood disorder are diagnosed with depression (e.g., depressive disorder NOS, major depressive disorder). Many emotional and behavioral manifestations of depression can impair an aviator's cognitive abilities (e.g. ability to focus, sustain attention and concentration, working and general memory, psychomotor coordination, reasoning, spatial judgement and reaction time). Some of the more severe symptoms of depression, (e.g., suicidal ideation, impaired reality

testing) may be acutely disabling. Furthermore, depression often co-exists with anxiety and psychosomatic complaints, as well as substance abuse especially alcohol.

There are aeromedical concerns with the use of psychotropic drugs for treatment as well. All psychotropic drugs have potentially undesirable of dangerous side effects. Common side effects of anti-depressants include nausea, diarrhea, cramping, vomiting, insomnia, jitteriness, agitation, restlessness, dizziness, headache, syncope, tremor, perspiration and sexual dysfunction.[20, 21]

In 2002 Aviation, Space, and Environmental Medicine published results from a Canadian clinical trial of bupropion SR. The clinical trial was designed to evaluate the effect of bupropion SR on psychomotor performance using three traditional psychomotor tasks (serial reaction time [SRT], logical reasoning [LR], and serial subtraction [SS]) and a recently developed multitask designed to simulate aviation-relevant performance The study found no impact by bupropion SR on traditional psychomotor tests nor on a complex battery simulating flying performance.[12] In addition, the FAA, Transport Canada, Australia and the US Army have policies allowing selected aviators to fly while on SSRI's.[22, 23, 24] Waivers are currently not being granted for FC II individuals on anti-depressants in the USAF. FC III personnel will be considered for waivers on the following medications and dosages: Wellbutrin SR or XL up to 450 mg/day, Celexa up to 40 mg/day, Lexapro up to 20 mg/day and Zoloft up to 200 mg/day. To be considered, the aviator needs to be on the medication with a stable dose and clinically asymptomatic for at least six months. The following FC III AFSCs will require ACS review prior to waiver consideration: 1A0X1 (Boom Operator); 1A1X1 (Flight Engineer); 1A2X1 (Loadmaster); 1A7X1 (Aerial Gunner); and 1C2X1 (Combat Control).

III. Waiver considerations.

Mood disorders are disqualifying for all flying classes to include FC IIU and ATC/GBC duties. SMOD personnel are disqualified only for more severe mood disorders that by Retention Standards demand a Medical Evaluation Board or in the opinion of the flight surgeon, can be expected to cause impairment in duty. SMOD personnel may be permitted to perform their duty while on certain psychotropic medications listed on the Approved space and Missile Operator Medications list, but a waiver is typically required. Any aviator with any of the bipolar disorders is permanently disqualified due to the risk of recurrence, the presenting symptoms of loss of insight, tenuous reality-testing, and the unlikelihood of self-referral, poor judgment and poor treatment compliance; in such cases a medical evaluation board (MEB) should be held to determine fitness for general duty and retention. A family history of a bipolar disorder in both parents is disqualifying for FCI/IA (but can be considered for a waiver after a very thorough mental health evaluation). If the diagnostic criteria for major depressive disorder, dysthymic disorder or depressive disorder not otherwise specified are met, the aviator is disqualified. Current USAF aeromedical policy states that any aircrew member diagnosed with major depressive disorder must be removed from flying status until such time as the individual has been appropriately treated and been asymptomatic and without medications for at least 6 months to be considered for a waiver (see statement in Section II regarding medications). Recurrent episodes of the depressive disorders are generally disqualifying and not waiverable because of the likely emerging pattern.

Table 1: Waiver potential for mood disorders

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Family history of bipolar disorder (both parents)	Maybe‡ AETC
	Bipolar disorders	No AETC
	Depressive disorders	Maybe† AETC
II/III*** ATC/GBC IIU#	Bipolar disorders	No MAJCOM
	Depression, single episode	Maybe*† MAJCOM
	Depression, recurrent episodes	No MAJCOM
	Dysthymic disorder	Maybe*† MAJCOM
SMOD	Bipolar disorders	No AFSPC or GSC
	Depression, recurrent episodes	Maybe** AFSPC or GSC

‡ Waiver may be considered after thorough psych evaluation of applicant
† For FC I/IA and untrained FC II and FC individuals waiver considered after depression is completely resolved and medications and psychotherapy have been discontinued for a minimum of 2 years.
* For trained personnel, a waiver is considered after depression is completely resolved and medications and psychotherapy have been discontinued for 6 months.
** Recurrent depression is not necessarily disqualifying for SMOD duties, but severe depression that is impairing may meet the disqualifying threshold.
*** Waiver can be considered for selected FC III career fields on approved antidepressant medication if on a stable dosage for at least six months.
# AFMSA is the waiver authority for FC IIU personnel except for initial certification which is AETC.

A review of AIMWTS in Nov 2010 revealed a total of 638 cases of depression. There were 36 FC I/IA cases (11 disqualifications), 156 FC II cases (86 disqualifications), 271 FC III cases (169 disqualifications), 2 FC IIU cases (1 disqualification), 116 ATC/GBC cases (79 disqualifications), and 57 SMOD cases (37 disqualifications). The vast majority of the disqualified cases were due to the diagnosis of depression. There were also 35 cases in the database with the diagnosis of bipolar disorder. Breakdown of cases was: 2 FC I/IA, 12 FC II, 14 FC III, 0 FC IIU, 4 ATC/GBC, and 3

SMOD. All but 2 were disqualified and those were both FC I/IA; one had a history of both parents with the diagnosis and the other had a questionable diagnosis several years prior to the waiver with no symptoms in quite a long time.

IV. Information Required for Waiver consideration

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for mood disorders should include:
A. History with special attention to symptoms, frequency, duration, treatment, precipitating factors, action taken to mitigate recurrence and any social, occupational, administrative or legal problems associated with the case.
B. Psychiatric/psychology evaluation and treatment summary (within 3 months of package submission).
C. List any medication usage, past or current, for the mood disorder.
D. Letters from aviator's squadron commander or operations officer supporting or refuting a return to flying status.
E. A copy of the MEB narrative if applicable.

The AMS for waiver renewal for mood disorders should include:
A. Intervening history with special attention to status of previously precipitating factors, any new stresses, coping skills and work performance should be addressed.
B. Psychiatric/psychology evaluation (within 3 months of package submission).

ICD 9 codes for mood disorders	
296.2	Major depressive disorder, first episode
296.3	Major depressive disorder, recurrent
300.4	Dysthymic disorder
301.13	Cyclothymic disorder
311	Depressive disorder not otherwise specified (NOS)
296.0, 296.4-7	Bipolar I disorder (and variants)
296.80	Bipolar disorder NOS
296.89	Bipolar II disorder
296.90	Mood disorder NOS

V. References

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WAIVER GUIDE
Updated: Apr 2010
Supersedes Waiver Guide of Nov 2006
By: Lt Col David Rogers (RAM-X) and Dr. Dan Van Syoc
Reviewed by Col Don Christensen, AF/SG Consultant in Aerospace Medicine and Col Don White, AF/SG Consultant in Aerospace Physiology

CONDITION:
Motion Sickness (Apr 10)

I. Overview.

Motion sickness is a common, even normal response to un-adapted or unfamiliar movement. The term 'motion sickness' includes airsickness, seasickness, car sickness, space motion sickness, and other related entities. It is not typically considered a medical disorder and can be induced in anyone with an intact vestibular system given the right type and duration of provocative stimuli. The effects of motion sickness range from subtle performance deficit and distraction all the way to incapacitation. Motion sickness is thought to occur as a result of conflicting inputs to the brain from visual, vestibular, proprioceptive, and rarely, auditory systems. The term motion sickness is somewhat a misnomer, since it is possible to experience characteristic symptoms in the absence of unfamiliar motion, as in the case of "simulator-sickness," "virtual-reality-sickness," or "visually induced motion sickness."[5] The terms 'airsickness' and 'motion sickness' will be used interchangeably during this discussion.

Signs and symptoms of motion sickness can include pallor, cold sweats, epigastric discomfort, nausea, vomiting, apprehension, hyperventilation, lightheadedness, drowsiness and apathy. Nausea is typically the cardinal symptom. Significant variability in susceptibility and adaptation exists in different individuals. The affected individual may become distracted by the symptoms, leading to decreased situational awareness and performance decrements. Some individuals experience significant amelioration after vomiting, while others may continue to experience symptoms for hours after the motion has stopped. Most often, the brain is able to adapt to these mismatched sensations, and symptoms tend to decline or disappear with adaptation. Most aviators become asymptomatic after repeated exposures to the flying environment.

Reportedly 0.6% of civilian airline passengers experience airsickness and more than 75% of troops on military air transports have become motion sick under extreme conditions. US Navy studies determined that 63% of student pilots were sick on their first flight while only 15-30% did not experience motion sickness at all during training. Non-pilot flight crews experienced symptoms on 14% of flights with vomiting occurring in 6%. Females are almost twice as likely to suffer motion sickness as males, and the incidence declines with increasing age. While most flyers accommodate to unusual attitudes, accelerations, etc., after repeated exposures, some will remain symptomatic.

In the U.S. Air Force, motion sickness is most commonly encountered among personnel in flight training. Airsickness occasionally occurs in more experienced aircrew as they switch aircraft types, particularly in higher physical stress aircraft (heat, low level, limited visibility, etc). Airsickness may also occur when a previously adapted individual returns to duty after a period of non-flying. The USAF has defined two types of airsickness, active and passive, though it is recognized the phenomenon occurs along a continuum. Active airsickness includes vomiting; passive airsickness

does not include vomiting, but because of discomfort or nausea, results in significant deviation in the lesson profile or the student's ability to complete tasks.

Prevention education and early intervention through the Airsickness Management Program (AMP) have proven to be effective in helping undergraduate pilot training (UPT) and undergraduate navigator training (UNT) students to overcome motion sickness (Table 1). Prevention education includes instructing students during initial physiological training prior to participation in flying about the causes of airsickness and strategies to prevent, manage, and treat symptoms. Prevention strategies include avoiding high-fat meals prior to flight, maintaining adequate hydration, limiting head motion during flight, watching the horizon, blowing cool air across the face, and performing slow diaphragmatic breathing.[5, 8] Ginseng has been shown to be of some benefit for decreasing motion sickness symptoms, though clinical evidence is lacking. In cases of intractable airsickness, desensitization training via progressive relaxation techniques coupled with incremental exposure to Coriolis stimulation (in a Barany chair or while flying) has been effective in up to 93% of affected individuals. Some UPT/UNT students find more benefit from early desensitization with the Barany chair while others prefer the medication protocol to improve adaptation to the flying environment.

The role for pharmacologic intervention is limited in flyers.[6, 7] Transdermal scopolamine or antihistamines such as promethazine and dimenhydrinate (Dramamine® and others) have been used to prevent/treat symptoms of airsickness. Unfortunately, these agents are prone to sedation, impaired cognition, and short-term memory loss at therapeutic dosages.[5, 7] Non-sedating antihistamines are unfortunately ineffective, probably due to their lack of central nervous system action.[5] Dextroamphetamine or ephedrine have been combined with either scopolamine or promethazine to limit side effects during USAF and USN military flight training but are authorized only for a total of three flights and only when the student is accompanied by a flight instructor. Modafinil was thought to reduce motion sickness symptoms until a recent study found no benefit when used alone.[6] Newer agents are being studied, such as betahistine, but thus far have not shown significant efficacy.[5]

Table 1 – Airsickness Management Program (AMP)[1, 2, 3]

Phase	Airsickness Episode	Evaluations	Required Actions
0	None	AP	Pre-flight prevention education
I	1	FS	Assess compliance with Phase 0; rule out medical cause; consider adjunctive pharmacologic therapy*
II	2	FS and consider AP or LSCC	Assess compliance with Phase I; Progressive relaxation training**
III	3+	FS and AP, consider LSSC	Assess compliance with Phase II; Physiologic adaptation training*** (Barany chair); Assess motivation to fly

Key: FS: Flight Surgeon. AP: Aerospace Physiology Personnel. LSSC: Life Skills Support Center.
Note: Pilots undergoing any phase of treatment for airsickness will not fly solo.
*Pharmacologic intervention options: transdermal scopolamine 0.5mg/ dextroamphetamine sulfate 5mg (Scop/Dex patch), given 1-2 hours prior to flight for 3 consecutive flights, 1 flight per day. Alternative: Scopolamine HBR 0.45mg in 15ml of elixir with dextroamphetamine sulfate 7.5mg, or other approved medication.
**Progressive relaxation techniques include diaphragmatic breathing, biofeedback, cognitive restructuring and imagery skills.
***Barany chair refresher spin recommended with any additional (>3) airsickness episodes.

II. Aeromedical Concerns.

The effects of motion sickness can range from distraction to near-incapacitation. The corresponding degradation of situational awareness and performance is incompatible with flying duties. Most affected aircrew will adapt with repeated exposures to the flying environment. Flying personnel who experience their first episode of airsickness should be evaluated by the flight surgeon to rule out organic or psychiatric etiology. If no such etiology is found, the affected individual should be enrolled in the AMP (see Table 1) prior to determining a final aeromedical disposition.

III. Waiver Considerations.

History of motion sickness experienced in aircraft, automobiles or watercraft after age 12 with any significant frequency in applicants for UPT and UNT (FC I/IA) requires a waiver. Those with a history only BEFORE age 12 do not specifically require a waiver, but any history of motion sickness does need to be explored (per AFI 48-123). Complete and thorough history of motion sickness should be submitted in the aeromedical summary.

Motion sickness in flying personnel is not cause for medical disqualification unless there is medical evidence of organic or psychiatric pathology. UPT (FC I) and UNT (FC IA) trainees who have intractable airsickness after completing AMP are usually handled administratively because they are unable to meet syllabus requirements; they demonstrated “lack of adaptability” to the flying environment. However, non-rated student fliers (FC III) enrolled in flying courses, who have intractable airsickness after completing the AMP, are usually medically disqualified and generally

are not eligible for waiver. Final determination of medical qualification in these cases is made by the MAJCOM/SG.

Rated aircrew (FC II) with intractable airsickness who do not become asymptomatic after repeated exposures to the flying environment and who fail desensitization training are dealt with administratively through a Flying Evaluation Board (FEB). Prior to convening a board, these cases are typically reviewed by the MAJCOM/SG to rule out an organic or psychiatric etiology. Many times these individuals are reassigned to their previous platform.

Airsickness requiring pharmacologic therapy beyond the AMP is disqualifying and not eligible for waiver.

Table 2: Waiver potential for Motion Sickness

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	History of Motion Sickness age <12 yrs History of Motion Sickness age >12 yrs Motion Sickness during UPT/UNT	Yes* AETC Maybe AETC Maybe AETC
II	Motion Sickness in trained aircrew	Maybe MAJCOM
IIU	N/A	N/A
III	Motion Sickness in trained aircrew	Maybe MAJCOM

*History of motion sickness only before age 12 does not specifically require a waiver, but if that history comes up during the evaluation, it needs to be addressed.

Of 365 USAF aircrew members who were previously referred to the Aeromedical Consultation Service (ACS) between 1955 and 2001 with a diagnosis of motion sickness (ICD code 994.6), 199 were recommended for return to flying status. Five cases with a diagnosis of motion sickness have been evaluated by the ACS since 2001, four of which were found medically disqualified (one granted waiver) and one found medically qualified.

Review of AIMWTS through February 2010, showed 158 cases of motion sickness; 17 were FC I/IA, 31 were FC II, 1 was FC IIU, and 109 were FC III. In the FC I/IA category,11 were deemed medically qualified and six were medically disqualified; for FC II 7 were returned (five with an associated diagnosis of esophageal reflux), 6 were medically disqualified, and 25 were found medically qualified and recommended for Flying Evaluation Board; and in the FC III category, 97 were medically disqualified. The one FC IIU individual was an aerial gunner who was having significant motion sickness symptoms and asked to cross-train into the UAS career field and received a waiver to do so.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver for motion sickness should include the following:
A. History to include childhood and adolescent history of any type of motion sickness, history of vestibular disorders, motion sickness risk factors, Air Force experience with motion sickness and treatments attempted with results (to include any and all medications used). How do symptoms affect mission and/or training?
B. Physical – focus on CNS and ENT exams.
C. Discussion and results from any AMP training.
D. Statement from aerospace physiologist regarding training and conditioning.

ICD 9 code for Motion Sickness	
994.6	Motion Sickness, Airsickness

V. References.

1. AETC Instruction 48-102, Chapter 11, 16 Nov 2009.

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WAIVER GUIDE
Updated: May 2012
Supersedes Waiver Guide of Dec 2008
By: LtCol Yvette Guzman (RAM 12) and Dr Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Multiple Sclerosis and Clinically Isolated Syndrome (May 12)

I. Overview.

Multiple Sclerosis (MS) is the most recurrent demyelinating disease of the central nervous system, with versatile manifestation, an unpredictable course, and prognosis ranging from minimal neurologic impairment to severely disabled. The pathologic hallmark of MS is focal demyelination within the brain and spinal cord. No cure for MS exists, and all currently available treatments are only partially affective in reducing MS symptoms and disability.[1] The most common form (85 to 90% at onset) of MS is relapsing-remitting MS (RRMS), an acute or subacute onset of clinical dysfunctions (relapses) with full recovery or with sequelae and residual deficit but no progression between relapses. Secondary progressive MS (SPMS) initially has a RRMS course that develops into progression with or without occasional relapses, minor remissions or plateaus. Primary progressive MS (PPMS) occurs in about 10% initially and is characterized by progression from onset with occasional plateaus and temporary minor improvements. Progressive relapsing MS (PRMS) is characterized by continuous progressive disease, with acute relapses additionally occurring, with or without full recovery.[2]

Clinically, MS is a disease of young adults, with onset ages 20-30, twice as common in women than in men. The peak age onset is about five years earlier for women than men.[3] MS is rarely diagnosed after the age of 65. The etiology is unknown, but it is believed that genetics, environmental, infectious factors, altered immune response and/or autoimmunity, genetic susceptibility, and neurodegenerative processes may all have some degree of relevance in the pathogenesis of MS. Growing evidence suggests that vitamin D insufficiency may account for the latitudinal gradient of MS. Many infectious etiologies have been suggested as triggers for MS, although proof of a causal association is missing.

MS predominately affects white matter, but there is also some gray matter involvement. Histopathological studies demonstrate more prominent extensive inflammatory reactions in focal white matter plaques during the earlier phases of MS while mild diffuse inflammatory reaction in normal-appearing white matter, widespread diffuse axonal injury, and cortical demyelination are prevalent in more advanced disease.[4] Three pathological processes (focal inflammatory demyelination in white matter; normal-appearing white matter damage; cortical demyelination) occur both in parallel and independently giving a combination of inflammation and neurodegeneration.

Clinical symptoms are unpredictable and variable, depending upon the specific area of CNS involvement, with symptoms progressing over hours to days. Common presenting symptoms of MS include sensory disturbances, unilateral optic neuritis (visual loss), limb weakness, diplopia, gait disturbance, balance problems, Lhermitte sign (trunk and limb paresthesias evoked by neck flexion), vertigo, bladder problems, limb ataxia, acute transverse myelopathy, and pain. Many

individuals describe fatigue that is worse in the afternoon and is accompanied by physiologic increases in body temperature.[2]

Cognitive impairment can occur early in the course of MS. Learning and memory, conceptual reasoning, speed of information processing, attention, and executive functioning are most frequently affected.[5] Although 65% of MS patients will have some degree of cognitive impairment at some point in their illness, a recent study detected some degree of neurocognitive impairment early in the course of the disease in 49% of the subjects, based on a brief battery of cognitive tests.[6] Since there were no significant correlations between cognitive scores and MRI measures of disease severity including total T2 lesion volume, the authors concluded that cognitive impairment may predate the appearance of gross structural abnormalities on MRI.

Because MS is a disseminated disease that afflicts multiple areas of the CNS during an affected individual's disease course, it is said to evolve over space and time.[7] Diagnosis is based on lesions disseminated in time and space with other potential explanations excluded. The McDonald criteria as revised in 2005 currently serves as the most commonly utilized standard for diagnosis.[8, 9] Demonstration of clinical events and lesions disseminated in time and space, utilizing a combination of clinical symptoms and signs and paraclinical tests, is necessary for a diagnosis of definite MS. The evolution of systems is usually within hours; however, there may be sudden episodes such as seizures. In those patients whose evaluation meets some but not all of the criteria, a diagnosis of possible Multiple Sclerosis may be made. The first demyelinating event suggestive of MS, called *clinically isolated syndrome (CIS),* places the patient at risk for further relapses. The risk of having a second attack after 14 years of follow-up is 88% if any lesions are present on the initial brain MRI and only 19% if the MRI is normal.[10] Two prospective studies examined the risk of developing MS following a CIS. The Optic Neuritis Treatment Trial (ONTT) revealed a ten-year risk for MS of 38%.[1] In this trial the diagnosis of MS was based on clinical symptoms with the median time to diagnosis being three years. The presence of a single MRI lesion increased the 10-year risk to 56% while the absence of any MRI abnormality decreased the 10-year risk to 22%. The ONTT 15-year report continues this trend with the risk of developing MS being 25% with no MRI lesions and 72% with one or more lesions.[11] The greatest risk of progression was in the first five years with only a single patient developing MS in the 10-year to 15-year epoch if the initial MRI was negative. The United Kingdom (UK) 10-year follow up study of untreated CIS patients demonstrated an overall 59% likelihood of developing clinically definite MS.[12] In this cohort, presenting symptoms included optic neuritis (49%), brain-stem syndrome (21%), and spinal cord syndrome (30%). Abnormalities on the initial MRI increased the likelihood to 83% while a normal initial MRI decreased the likelihood to 11%.

Although the diagnosis of MS relies on recognition of the clinical pattern of disease, several laboratory studies are useful in confirming the diagnosis. Examination of CSF for cell count, protein, glucose, IgG index, oligoclonal IgG bands, levels of myelin basic protein, and infectious markers is useful to assess for active inflammatory disease and exclude other confounding conditions. MRI is particularly helpful but the diagnosis of MS remains a clinical one, incorporating the history, physical examination, laboratory studies, imaging studies, and possibly electrophysiologic tests. The brain MRI is abnormal in 95% to 99% of cases of RRMS. Although sensitive, the brain MRI is not specific because several other disease states are associated with a similar pattern.[13] Typically multiple areas of abnormal signal intensity are present on T2-weighted brain MRI imaging (T2, proton density, and fluid-attenuation inversion recovery sequences) that often has a round or ovoid appearance and are located within the corpus callosum and the

periventricular and subcortical white matter.[14, 15] Other typically affected areas include the white matter of the brainstem and cerebellum. Less often, gray matter structures, such as the thalamus and basal ganglia, are affected.[16] Gadolinium contrast enhancement corresponds pathologically to early active areas of inflammation and blood-brain barrier dysfunction. Traditional fast spin-echo T2-weighed images remain the most specific for lesion identification in the posterior fossa, where FLAIR is subject to reduced contrast for lesions as well as artifacts.[17]

Control groups from immunomodulatory trials provide information on the natural history of MS. The interferon-beta 1a (Avonex®) Controlled High-Risk Subjects Avonex Multiple Sclerosis Prevention Study (CHAMPS) trial detected a 50% risk of developing definite MS in the control group within three years while the risk in the treatment arm was 35%, based on a second clinical event.[18] In the placebo group, although only 25% experienced a second clinical event by 12 months, 75% developed new T2-MRI lesions with a mean of four lesions. Similar results were obtained in the interferon-beta 1a (Rebif®) Prevention of Relapses and Disability by Interferon-β1a Subcutaneously in Multiple Sclerosis (PRISM) trial and in the interferon beta-1b (Betaseron®) trial.[19, 20] In the copolymer 1 (glatiramer acetate; Copaxone®) trial of patients with relapsing/remitting MS, the placebo group experienced a relapse rate of 1.68 over two-years.[21] Similarly the European/Canadian glatiramer acetate trial examined patients with a diagnosis of definite relapsing/remitting MS.[22] Over a nine-month period, 51% of control subjects experienced a clinical relapse, with a mean rate of 0.76 relapses/subject.

While all MS immunomodulatory therapies reduce the relapse rate, their impact on disease progression remains to be proven.[23] Immunomodulatory therapy will decrease the relapse rate by approximately 35 - 50% (reducing the clinical relapse rate from roughly 0.6 – 0.8 per year to roughly 0.35 – 0.5 relapses per year) with a similar reduction in clinically silent MRI lesions. These studies all demonstrate clinically silent MRI lesions occurring at five to ten times the rate of clinical events.

The American Academy of Neurology (AAN) 2002 practice guidelines recommend initiating immunomodulatory therapy in patients that are at high risk of developing definite MS or who already have a diagnosis of relapsing/remitting MS.[24] High-risk patients would be those with CIS and an abnormal MRI or cerebrospinal fluid (CSF) study.

II. Aeromedical Concerns.

The primary aeromedical concern is neurological impairment (motor, sensory, coordination, visual, cortical) that is unpredictable by either exam or imaging study and may go unrecognized by aircrew member with or without treatment. Symptoms can present over a period of hours. Cognitive deficits are common and unpredictable effecting approximately 40-60% of MS patients. The incidence of cognitive impairments does not correlate well with the degree of physical deficits, and may be present in all types of MS and at any stage of the disease.[24] Aeromedically validated neurocognitive testing could only be repeated at six month intervals. Even if this could be considered practical, unpredictable interim neurocognitive changes could pose a potential threat to self, crew safety, and mission completion. Cognitive function is influenced not only by the disease itself, but by factors such as fatigue and medications.[25]

Another concern is the potential of sleep disturbance resulting in daytime sleepiness, worsening fatigue, depression, and lowered pain threshold.[26] Of particular importance, fatigue is considered

the most frequent and often the most disabling symptom of MS reported by at least 75% of patients at some point during their disease course.[27-30] Given the profound effect that both MS and OSA can have on daytime functioning, it is important to identify MS patients at risk for OSA so as to institute earlier treatment in order to improve their overall health status and quality of life.

III. Waiver Consideration.

The diagnosis of multiple sclerosis, CIS, or optic neuritis is disqualifying for flying classes I/IA, II, III, and for ATC/GBC personnel. As it is disqualifying for retention purposes, SMOD personnel will also require a waiver for these conditions.

The formal diagnosis of multiple sclerosis is a disqualifying medical condition for continued military service IAW AFI 48-123. In these cases, prior to submission of a waiver request, an initial RILO (and MEB as directed) must be performed. The following general conditions associated with demyelinating disease possibly will interfere with military service and should be referred to the DAWG for initial RILO consideration:
IAW AFI 48-123 6.44.23.1.14. Probable evidence or history of degenerative or demyelinating processes such as multiple sclerosis, dementia, basal ganglia disease or Friedreich's ataxia.
6.45.16.7. Current or history of paralysis, weakness, lack of coordination, chronic pain or sensory disturbance, including but not limited to multiple sclerosis and Parkinson's Disease.

Table 1 - Waiver potential of multiple sclerosis in FC I/IA, II and III

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	CIS with normal CSF and MRI	No AETC	No
	CIS with positive MRI or CSF or multiple sclerosis	No AETC	No
II	CIS with normal initial MRI and CSF and normal repeated MRI at 3 months	Yes*† AFMOA	Yes
	CIS with positive MRI or CSF or definite multiple sclerosis	No AFMOA	No
III	CIS with normal initial MRI and CSF and normal repeat MRI at 3 months	Yes*† MAJCOM	Yes
	CIS with positive MRI or CSF or definite multiple sclerosis	No MAJCOM	No
ATC/GBC SMOD**	CIS with normal initial MRI and CSF and normal repeat MRI at 3 months	Yes*† MAJCOM	Yes
	CIS with positive MRI or CSF or definite multiple sclerosis	No MAJCOM	No

* In untrained FC II and III waiver unlikely; if episode occurred 10 years previously with normal CSF, current and past MRI normal, then ACS evaluation may be warranted.
† ACS evaluations in person are generally at initial (after 3 month MRI), at one year, and then every three years thereafter. ACS review of local MRI in the years not seen in person at ACS (2, 3, 5, 6, etc.) are required. Waiver authority may require ACS evaluation at any time at their discretion.
** Waiver authority for SMOD is AFSPC or GSC.

AIMWITS search in March 2012 revealed 51 cases diagnosed as MS, CIS, or as compatible with demyelinating disease. Breakout of the cases was: 0 FC I/IA cases; 27 FC II cases (25 disqualifications); 2 FC IIU cases (0 disqualifications); 13 FC III cases (13 disqualifications); 6

ATC/GBC cases (6 disqualifications); and 3 SMOD cases (0 disqualifications). One of the FC IIU cases was reviewed by the ACS and a waiver was not recommended.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for MS or CIS should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the demyelinating disorder.
C. Consultation from a Neurologist.
D. Ophthalmology consult if visual symptoms (e.g., optic neuritis). See Optic Neuritis waiver guide.
E. Imaging: Brain T1 and T2-weighted MRI with gadolinium and FLAIR at initial and 3 months.
F. Results of CSF studies including IgG index and oliogoclonal bands.
G. If clinically indicated, sleep study to assess for Sleep Disorder Breathing (SDB) or Obstructive Sleep Apnea (OSA).

The AMS for waiver renewal for MS or CIS should include the following:
A. History of interval symptoms.
B. Neurological exam.
C. Brain T1 and T2-weighted MRI with gadolinium and FLAIR sequences.
D. Results of any other interim diagnostic testing.

ICD 9 Codes for MS and CIS	
340	Multiple sclerosis
377.30	Optic neuritis, unspecified
341	Other demyelinating diseases of central nervous system

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WAIVER GUIDE
Updated Feb 09
By: *Maj Antonio Delgado (ACS staff internist), Dr William Kruyer (ACS chief cardiologist) and Dr Dan Van Syoc*

CONDITION:
Myocardial Infarction (Feb 09)

I. Overview.

In the military aircrew population myocardial infarction (MI) may present as an acute clinical event. MI may also be diagnosed after the event ("silent MI") as a result of cardiac testing performed for other indications, such as evaluation of an asymptomatic aircrew with new Q waves on ECG. Post-MI outcomes are similar in these two scenarios and depend primarily on residual left ventricular function, severity of coronary artery disease, and classic risk factors (CAD)[2].

There is little prior US Air Force experience with MI in aircrew as policy previously did not allow for a waiver, but an analysis of the Aeromedical Consultation Service (ACS) coronary angiography database provides outcome data in former US Air Force aircrew. Between 1971 and 1999, 1487 asymptomatic male military aviators had an occupational coronary angiogram, and were followed for the cardiac end-points of cardiac death, nonfatal MI and coronary artery revascularization. During the follow-up, 57/1487 aviators (3.8%) had an MI as their first cardiac event. Their MI date was defined as the index date, and post-MI events were calculated at one, two and five year intervals. The events considered were: cardiac death, non-fatal second MI or first revascularization. No cardiac deaths or second MIs occurred within the 5 years of follow-up; all events were revascularizations. The calculated event rates were 4.0% per year at one year, 2.3% per year at two years and 2.4% per year at five years[1].

The experience in the medical literature with MI in young populations is very protean, especially because of the high variability in selected groups in term of baseline medical conditions (diabetes, dyslipidemias, HTN) and different degrees of physical fitness. Despite these limitations, the rate of cardiac events is similar to the ACS experience. Batalla published a 2003 follow-up study of 229 male patients younger than 50 years old after their initial MI. The mortality at 3 years was 5% (annual rate of 1.6%) and for a repeat MI at 3 years was 4% (annual rate of 1.3%)[3].

Lopes published a 2008 study reporting on a cohort of 825 patients followed at a large medical center, comparing outcomes in patients with single vessel disease (SVD), two vessel disease (2VD) and three vessel disease (3VD). All patients had preserved left ventricular ejection fraction (LVEF) and optimal medical therapy (ASA, nitrates, β blockers, ACE inhibitors, statins and low fat/cholesterol diet). The patients with SVD, which are closer to the intended AF population, had a mortality of 1.2% per year and a new MI-rate of 1.3% per year[4].

In summary, the post-MI event rate in the medical literature is about 2-3% per year in aeromedically appropriate populations. Low risk outcomes are attained by patient selection: absence of pre-morbid conditions like diabetes, no significant myocardial scars with normal left ventricular systolic function and no significant dysrhythmias following MI, aggressive reduction of risk factors (HTN, lipids, complete smoking cessation, weight control, dietary changes and regular physical activity).

II. Aeromedical Concerns.

The aeromedical concern is recurrent myocardial ischemia presenting as sudden cardiac death, second myocardial infarction, angina or ventricular dysrhythmias, all of which may cause sudden incapacitation or seriously impact performance of flight duties. Detecting the asymptomatic progression of CAD reliably without frequent invasive testing or noninvasive monitoring is the aeromedical challenge.

III. Waiver Considerations.

Myocardial infarction is disqualifying for all classes of flying duty. ACS review and evaluation is required, in all cases, for waiver consideration. Waiver is restricted to low performance aircraft (defined as < 2.5 sustained +Gz) and may be considered for all trained aircrew; for pilots, the waiver is additionally restricted to flying with another qualified pilot. Waiver for trained aircrew, was approved by the Aerospace Medicine Corporate Board in 2008.

Criteria for waiver consideration include, normal left ventricular systolic function at rest and exercise (normal ejection fraction), adequate medical management (lipids, ASA use, HTN control, no diabetes), restricted to low performance aircraft (<2.5 Gz and with another qualified pilot), patent infarct-related artery, no noninvasive testing evidence of reversible ischemia off cardioactive medications at rest and at peak stress, and successful risk factor modification at initial ACS evaluation and at each re-evaluation. If revascularization has been performed, they must meet criteria for the coronary artery revascularization waiver policy. Initial minimum DNIF observation period is six months post-MI. ACS evaluation for initial waiver consideration will include complete noninvasive testing and coronary angiography. If waiver is recommended and granted, waiver will be valid for one year with annual ACS re-evaluation required for waiver renewal consideration. In addition, routine serial coronary *angiography is required at three year intervals*. Follow-up coronary angiography may be recommended sooner if indicated by symptoms, noninvasive test results or failure to control risk factors.

Table 1: Myocardial infarction and Waiver Potential

Flying Class	**Waiver Potential Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	NA
II	No	NA
IIA (flight surgeon, navigator)*	Yes AFMOA	Yes, Annual Visit
IIC (pilot)*	Yes AFMOA	Yes, Annual Visit
III*	Yes MAJCOM	Yes, Annual Visit

* Aircrew must meet following criteria for consideration: Nl LVEF, no wall motion abnormality-- Adequate medical mgmt: statin, ASA, SL NTG (PRN), ACE inhibitor and/or β blocker as clinically appropriate-- Low performance aircraft defined as <2.5 sustained G with another qualified pilot-- No altitude restriction in low performance aircraft-- Controlled hypertension -- No diabetes or other co-morbidities

AIMWTS review in December 2008 revealed 7 submitted cases with a history of myocardial infarction. There were 0 FC I cases, 4 FC II cases and 3 FCIII cases. Of the 4 FC II cases, 3 were disqualified, most due to the fact that their cases came under consideration before there was an opportunity for them to be waived due to policy at the time. In the FC III category, all 3 cases resulted in a disqualification.

IV. Information Required for Waiver Submission.

Submit the following to the ACS.

1. Aeromedical summary to include complete history of the event, emergency care rendered, testing done to include all results.
2. Copy of the cardiac catheterization report and copy of the images (CD, cineangiogram or videotape).
3. Additional local cardiac testing is not routinely required but may be requested in individual cases.
4. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, nuclear myocardial stress perfusion imaging).

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 Codes for coronary artery disease	
414.0	Coronary artery disease
410	Acute myocardial infarction

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WAIVER GUIDE
Updated: Jun 09
Supersedes Waiver Guide of Mar 99
By: Dr. Anthony Waldroup (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Non-Hodgkin's Lymphoma (Jun 09)

I. Overview.

Non-Hodgkin's Lymphoma (NHL) is a diverse group of lymphoid malignancies that are derived from lymphocytes and can range from aggressive to more indolent in behavior. NHL is the seventh most common cancer in the US[1]. Incidence estimates for 2008 projected 66,120 new cases with 19,160 expected deaths. There is a 2.2% and 1.9% lifetime risk for men and women, respectively, of developing NHL in the US; and the overall 5-year survival in the US has improved in past decades to approximately 64%[2]. The disease may occur in adults or children.

Clinically, more than 40% of individuals with NHL will present with constitutional symptoms ("B" symptoms) represented by fever higher than 38°C (104°F), unexplained weight loss greater than 10 pounds in the previous six months, and drenching night sweats. The presence of "B" symptoms is considered when staging the tumor and may indicate the aggressiveness of the malignancy present. Other symptoms may include fatigue, malaise, or skin itching. Peripheral lymphadenopathy is a common finding and will be present in more than 2/3 of individuals with NHL[3]. Bone pain, gastrointestinal, central nervous system, or other atypical NHL symptoms require evaluation for extra-nodal disease which will impact treatment and prognosis.

The physical examination of individuals with NHL should be directed at all lymphoid tissue sites including the oropharyngeal (tonsils, base of tongue, and nasopharynx), liver, spleen, and deep chest/abdominal lymph nodes. Examination of the skin should be performed to detect NHL with skin involvement (e.g. mycosis fungoides, Sezary syndrome). Skin lesions may include heterogeneous papules, patches, plaques, and generalized erythroderma[4].

Initial laboratory evaluation may include CBC, peripheral smear, serum electrolytes, creatinine, BUN, calcium, uric acid, LDH, albumin, AST, ALT, alkaline phosphatase, protein electrophoresis, hepatitis and HIV serology, beta-2 microglobulin and bone marrow aspirate and biopsy. CSF studies may also be indicated in the evaluation of CNS NHL.

Imaging may include chest x-ray and computed tomography of the chest, abdomen, and pelvis. MRI of the brain is indicated for evaluation of CNS NHL. Skeletal imaging may be indicated in the evaluation of extra-nodal NHL if symptoms warrant. Positron emission tomography (PET) scanning may be helpful in determining the location of NHL and for monitoring treatment response.

Initial evaluation should drive the establishment of histological type, extent of disease by location, presence of B-symptoms and functional state of the individual which impacts the staging, treatment, and prognosis[3].

Staging of NHL

Table 1. Cotswolds Modification of Ann Arbor Staging System[5]

Stage	Area of Involvement
I	Single lymph node group
II	Multiple lymph node groups on same side of diaphragm
III	Multiple lymph node groups on both sides of diaphragm
IV	Multiple extranodal sites or lymph nodes and extranodal disease
X	Bulk > 10cm
E	Extranodal extension or single isolated site of extranodal disease
A (not present)/B (present)	B symptoms: weight loss > 10%, fever, drenching night sweats

Table 2. Clinical Staging System for Mycosis Fungoides[6]

Stage	TNMB Classification	Nodes	Visceral Organs	Peripheral Blood
IA	T1 (<10% body surface coverage)	N0	M0	B0 or B1
IB	T2 (≥10% body surface coverage)	N0	M0	B0 or B1
IIA	T1 or T2	N1 or N2	M0	B0 or B1
IIB	T3 (one or more tumor ≥1cm diameter)	N0-N2	M0	B0 or B1
IIIA	T4 (>80% body surface coverage)	N0-N2	M0	B0
IIIB	T4	N0-N2	M0	B1
IVA_1	T1-T4	N0-N2	M0	B2
IVA_2	T1-T4	N3	M0	B0-B2
IVB	T1-T4	N0-N3	M1	B0-B2

Treatment of NHL ranges from conventional therapies to include surgery, radiation, and chemotherapy to novel modalities such as monoclonal antibodies directed at cell membrane receptors and radio-labeled monoclonal antibodies. Multiple factors to include cell histopathology, bulk, and staging will determine the modality(s) recommended for an individual requiring treatment for NHL. Treatment of indolent NHL in the general population is usually for the suppression of symptoms related to NHL and typically, radiation is the treatment of choice with the ten year survival reaching near 60-80%[7]. Aggressive NHL is usually treated with combined modality therapy which includes short course chemotherapy with radiation therapy for early stage disease and full course chemotherapy for more advanced disease. Chemotherapy for aggressive NHL is recommended to include the CHOP regimen which includes cyclophosphamide, Adriamycin, vincristine, and prednisone. Individuals with tumors that have CD20 antigen present are also recommended to have rituximab, a monoclonal antibody targeting the CD20 antigen, added to the regimen[8].

II. Aeromedical Concerns.

As with most malignancies, aeromedical concerns of NHL are based on the disease as well as the treatment regimen. With NHL, the risk for sudden incapacitation is minimal as disease involvement of the CNS or heart is rare. Although the most common presentation of NHL is peripheral lymphadenopathy, initial manifestations rarely may include neurologic symptoms from central nervous system involvement or spinal cord compression.

Degradation of mental and physical status due to NHL and/or treatment regimen are of concern and adverse effects to the cardiopulmonary, neurologic, endocrine, and reticuloendothelial systems may occur as a result of disease progression and/or radiotherapy/chemotherapy.

In the past, the use of bleomycin in aviators would have been permanently disqualifying due to perceived risk of delayed pulmonary toxicity when exposed to modest levels of oxygen. Recent unpublished data from the Duke Hyperbaric Unit has driven a change in waiver policy which allows aviators returning to non-high performance aircraft to be considered for waiver after bleomycin treatment assuming they had not developed bleomycin pneumonitis during therapy, and they have no restriction from altitude chamber or other sporadic oxygen exposure. For aviators returning to a high-performance cockpit (aircraft requiring routine wear of an aviator mask), and assuming that bleomycin pneumonitis had not occurred during their treatment protocol, an Aeromedical Consultation Service (ACS) evaluation is required and will include pulmonary function testing (spirometry, plethysmographic lung volumes, and diffusion capacity) and high-resolution CT scanning of the lungs. This evaluation will be repeated during the first two years on an annual basis after the initial waiver is granted. Currently, a one year grounding period after completion of a bleomycin treatment regimen is required before the baseline evaluation is undertaken. In most cases, this will coincide with the grounding period already recommended as a result of the disease/chemotherapeutic regimen (see Bleomycin SG Policy Letter)[9].

Aviators treated with anthracyclines are at risk of treatment induced cardiomyopathy. The aeromedical risk due to poor left ventricular function as a result of anthracycline containing treatment regimens requires demonstration of adequate cardiac function. An echocardiogram or Multi-Gated Acquisition (MUGA) scan may be required to demonstrate adequate cardiac function for consideration of returning an aviator to flying following treatment with anthracyclines.

III. Waiver Considerations.

History of Non-Hodgkin's lymphoma is disqualifying for all flying classes in the US Air Force.

Table 3. Waiver potential for Non- Hodgkin's Lymphoma

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	All stages	No AETC	No
II	All stages	Yes*#+ AFMOA	Yes†
IIU	All stages	Yes*#+ AFMSA	Only at the request of AFMSA
III	All stages	Yes*#+ MAJCOM	Yes†

* Untrained FC II, IIU, and FC III; waiver may be considered five years after completion of treatment if asymptomatic and in full remission.
# Trained FC II, IIU, and III individuals only; waiver may be considered one year after completion of treatment if asymptomatic and in full remission; stage IA while on UVB treatment only may be considered for a waiver.
+ No indefinite waivers will be granted.

† For high performance (routine use of aviator mask while flying) individuals treated with bleomycin, will require an ACS evaluation at baseline (one year after treatment) and one and two years after return to active flying (if waiver granted).

AIMWTS review in May 2009 revealed one FC I disqualification for Burkett's Tumor/Lymphoma and one FC II disqualification for aggressive NHL, stage IV. There are six aviators with active FC II/A/B/C waivers for NHL including follicular lymphoma and mycosis fungoides. There are three active FC III waivers for NHL.

IV. Information Required for Waiver Submission.

Waiver should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for NHL should include the following:
A. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
B. History – initial symptoms, pathology, stage, treatment, surveillance plan, and activity level. History should also emphasize past personal or family history of malignancy, radiotherapy, chemotherapy, connective tissue disease, or immune-suppression. Previous infection with HIV-I, HTLV-I, Epstein-Barr virus, hepatitis B virus, hepatitis C virus, *Helicobacter pylori*, or *Borrelia afzelii* should be ascertained as should exposures to pesticides.
C. Physical exam.
D. Hematology/oncology reports to include all follow-up studies.
E. Lab/Rad – AFIP confirmed histology, CBC, peripheral smear, serum creatinine, BUN, electrolytes, calcium, uric acid, LDH, hepatitis panel and HIV serology. Serum beta-2 microglobulin levels for individuals with indolent NHL and serum protein electrophoresis for individuals with small lymphocytic lymphoma. Submit bone marrow and CSF studies if clinically indicated and obtained. Chest x-ray and any other imaging studies to include CT, endoscopic photographs, and PET scans should be provided. Submit echocardiogram or MUGA scan studies if individual is treated with anthracyclines or anthracenedione containing regimens. Submit completed pulmonary function studies (any additional PFTs will be done in conjunction with the ACS evaluation).
F. All treatments consistent with current guidelines in National Cancer Comprehensive Network (NCCN)[5].
G. Tumor board report, military or civilian, if applicable.
H. Medical evaluation board results.

The aeromedical summary of waiver renewal of NHL should include the following:
A. History – brief summary of stage, treatment, frequency of surveillance with results, symptoms, and activity level.
B. Physical exam.
C. Hematology/oncology consult reports.
D. Lab/Rad – CBC, peripheral smear, serum creatinine, BUN, LDH, beta-2 microglobulin (indolent NHL only), and serum protein electrophoresis (small lymphocytic lymphoma only).
E. Evidence that the level of follow-up care is consistent with current NCCN standards.
F. All treatments consistent with current guidelines in National Cancer Comprehensive Network (NCCN)[5].

Table 4. ICD9 Codes for Non-Hodgkin's Lymphoma.

ICD9 Code	Type of Non-Hodgkin's Lymphoma
202.8	Lymphoma (malignant)
204.9	Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma (CSLL-1)
202.0	Follicular Lymphoma
200.3	Gastric MALT Lymphoma (MALT-1)
200.3	Non-gastric MALT Lymphoma (NGMLT-1)
200.3	Nodal Marginal Zone Lymphoma (NODE-1)
200.3	Splenic Marginal Zone Lymphoma (SPLN-1)
200.4	Mantle Cell Lymphoma (MANT-1)
200.7	Diffuse Large B-Cell Lymphoma (BCEL-1)
200.2	Burkitt's Lymphoma (BURK-1)
200.1	Lymphoblastic Lymphoma (BLAST-1)
202.7	Peripheral T-Cell Lymphoma (TCEL-1)
202.1/202.2	Mycosis Fungoides/Sezary Syndrome (MFSS-1)
200.5	Primary CNS Lymphoma

Reviewed by Lt Col Erika J. Struble, AF/SG Consultant for Hematology and Oncology.

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WAIVER GUIDE
Updated: Apr 09
By: LtCol Joann Richardson (RAM 09B), Lt Col Rich Rubin (ACS Ophthalmology staff), and Dr Dan Van Syoc

CONDITION:
Ocular Histoplasmosis Syndrome (Apr 09)

I. Overview.

Ocular histoplasmosis is an inflammatory intraocular condition associated with systemic infection by the dimorphic fungus, *Histoplasma capsulatum*. Three types of ocular involvement have been described: histoplasmic endophthalmitis, solitary histoplasmic granuloma, and ocular histoplasmosis syndrome.

Histoplasmic endophthalmitis and solitary histoplasmic granuloma are conditions primarily seen in immunocompromised individuals. Histoplasmic endophthalmitis results from dissemination of active pulmonary or systemic infection. In solitary histoplasmic granuloma, primary histoplasmic infection may not be readily identifiable. If the granuloma appears to be growing, systemic administration of amphotericin B should be considered. In cases of histoplasmic endophthalmitis, prompt treatment with systemic amphotericin B or itraconazole is recommended.

Ocular histoplasmosis syndrome (OHS) is the most common form of ocular disease caused by *H. capsulatum*. In the United States, OHS is an important cause of loss of central visual acuity among adults less than 60 years of age. Most patients are diagnosed between 20 and 50 years of age with median age of 36. The highest prevalence occurs along the Ohio and Mississippi River valleys, but small endemic foci are also found in South America, Africa and Asia. Within endemic areas of the United States, approximately 200,000 – 500,000 new infections occur annually[1]. Approximately 60% of patients with OHS have a positive histoplasmin skin test and 5% of those infected with histoplasmosis had OHS.

Unlike histoplasmic endophthalmitis, positive cultures are not appreciated. Although the organism has been visualized in some pathologic samples, it is the exception rather than the rule[2]. DNA from *H. capsulatum*, however, has been isolated from enucleated eyes from patients with OHS. Therefore, pathogenesis of disease appears to be an exuberant cellular immune reaction to residual inert fungal antigens remaining within the eye[3]. This reaction leads to disruption of Bruch's membrane and increased potential for choroid neovascularization (CNV) from newly budding vascular tissue from the choriocapillaris. As a result, the mechanism of OHS is non-infectious and does not respond to antifungal therapy. Interestingly, genetic factors may be important in patients with macular or peripapillary hemorrhagic lesions. In these patients, a significantly higher prevalence of human lymphocyte antigen B-7 (HLA-B7) has been noted as compared to the population at large. In patients whose disease is limited to peripheral atrophic spots, the expression of HLA-B7 was found to be no different than the general population.

The diagnosis of OHS is clinical and made via fundoscopic examination. Skin testing with *H. capsulatum* is not recommended due to the high prevalence of positive results in endemic areas. In addition, concerns have been raised that the skin test may actually cause activation of otherwise quiescent atrophic chorioretinal scars.

OHS is characterized by peripapillary chorioretinal atrophy and scarring, peripheral "punched-out" chorioretinal scars, hemorrhagic macular lesions secondary to choroidal neovascularization, and the absence of anterior segment and vitreous inflammation. Typical lesions appear as small atrophic, "punched-out" chorioretinal scars or "histo spots" in the mid-periphery and posterior pole of the eye. They range from 0.2 to 0.7 disk diameters in size and can vary from 1 to 70 in a single eye. Development of choroidal neovascularization (CNV) can result in macular hemorrhage and scarring that can progress to vision loss in up to 60% of affected patients.

Over 99% of histoplasmic infections are benign, and up to 2% of adults in the Midwest have "histo spots" in the fundus. These spots are more frequent in left than right eyes, but they are bilateral in 67% of patients. Many patients remain asymptomatic. However, patients are more likely to present with symptomatic disease if the macula is involved. Patients typically complain of metamorphopsia or distorted vision and loss of central vision. Up to 60% of these patients become legally blind. The risk of developing CNV in the other eye depends on the presence of macular lesions in that eye. In the absence of macular lesions, the risk of developing CNV in that eye is approximately 9%. If macular lesions are present, the patient is 3 times more likely to develop macular CNV.

Patients with known, asymptomatic disease should be instructed to perform frequent Amsler grid testing for early detection of CNV. In those who have symptoms of metamorphopsia and central scotoma, fluorescein angiography may demonstrate hyperfluorescence and late leakage from a complex of lacy, small blood vessels, consistent with the diagnosis of CNV.

OHS with neovascular membranes beyond 200 microns of the fovea have approximately a 34% risk of symptomatic vision loss within two years. This risk is significantly reduced by laser photocoagulation of the lesions. Untreated eyes have a 3-6 times greater risk of losing six or more lines of visual acuity than do treated eyes. Recurrent neovascularization may occur in up to 26% of treated eyes within 5 years after initial laser therapy[2].

Treatment of subfoveal lesions however, is less delineated. Patients with subfoveal lesions and good visual acuity should not undergo laser photocoagulation as central scotoma may result. In some patients, periocular depot injections of triamcinolone or dexamethasone or a short course of oral corticosteroids for 3-4 weeks may limit subfoveal CNV progression. Recent promising therapeutic options have included subfoveal surgery, photodynamic therapy using verteprofin and intravitreal bevacizumab. Subfoveal surgery to remove CNV membranes is complex and requires pars plana vitrectomy. Risks of surgery include intraocular hemorrhage, suprachoroidal hemorrhage, endophthalmitis, retinal detachment and cataract. In addition, up to 44% of post-op cases may redevelop CNV within 13 months of surgery with approximately 66% of these lesions reoccurring in the subfoveal region. Photodynamic therapy (PDT) using verteprofin, a lipophilic-amphiphilic photosensitizer, has demonstrated promising results. Verteprofin is preferentially absorbed by the abnormal vasculature in CNV allowing more targeted therapy over a wider area. A recent study completed by the Verteprofin in Ocular Histoplasmosis (VOH) study group showed 56% of treated patients improved 7 or more ETDRS letters of visual acuity from baseline. Treatment with intravitreal bevacizumab, a monoclonal antibody against m-RNA for vascular endothelial growth factor (VEGF) has been successful in treating some patients with macular degeneration[4]. VEGF has been found to be an important mediator in angiogenesis. A recent study

using intravitreal bevacizumab in OHS showed improved or stabilized visual acuity in up to 71% of treated eyes.

The differential diagnoses for OHS include myopic degeneration, age-related macular degeneration, toxoplasmosis, angioid streaks, and idiopathic multifocal choroiditis with panuveititis.

II. Aeromedical Concerns.

Primary aeromedical concern in OHS is its potential to affect central and peripheral vision. Patients with peripheral inactive disease without evidence of macular involvement will maintain excellent visual acuity and have a good visual prognosis. Some of these patients may have residual visual field defects but most are minor and do not have substantial effects on peripheral vision. For those patients who develop macular disease, the prognosis is more guarded. Progression of disease with loss of vision depends upon size and location of the lesion, development of CNV and subsequent scaring. After 3 years, more than 75% of patients with subfoveal CNV will have a corrected visual acuity of 20/100 at best. If the patient is less than 30 years of age and has a small subfoveal CNV lesion with no visual loss secondary to OHS in the other eye, a visual acuity of 20/40 or better may be retained in up to 14% of eyes[2]. Currently available treatment may preserve vision, although treating the macular area will inherently degrade visual acuity. If lesions are present in the area of the disc, the risk of symptomatic attack in the next 3 years is 20%. If no lesions are present in this area, the risk drops to 2%. Reactivation of inactive disease is quite rare and if present may be indicative of an underlying immunodeficiency.

III. Waiver Consideration.

Patients who have active OHS lesions are disqualified for all flying class duties. In these cases, waivers will not be considered until the disease has resolved or the active lesions have been adequately treated. If an active lesion is treated by laser photocoagulation or PDT, patients should have at least one follow-up evaluation completed by the treating ophthalmologist 3-4 weeks post therapy prior to waiver submission. Follow-up examination must indicate extent of CNV eradiation and if residual disease is present requiring further therapy. Inactive lesions meeting vision standards will be waived on a case by case basis. Local ophthalmology evaluation to include visual acuity, Amsler grid testing, Humphrey 10-2 visual fields, stereopsis and fundoscopic evaluation are required. Submit any ophthalmologic imaging obtained including optical coherence tomography (OCT) and fluorescein angiography. All cases will need to be reviewed/seen by ACS Ophthalmology.

Table 1: Waiver potential for ocular histoplasmosis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	OHS - inactive+*	Yes! AETC	Yes
	OHS – history of CNV#	No AETC	
II	OHS - inactive*	Yes! MAJCOM	Yes
	OHS – history of CNV#	Maybe! MAJCOM	If waiver considered
III	OHS – inactive*	Yes! MAJCOM	Yes
	OHS – history of CNV#	Maybe! MAJCOM	If waiver considered

+ History of macular disease will not be waived.
* Must meet vision standards; Must not be expected to progress or recur; no active or reactivated disease waiverable.
! No indefinite waivers
#No waiver for untrained assets for OHS with a history of CNV

Review of AIMWITS in March 2009 identified 11 cases of OHS submitted for waivers. Of the 11 waivers, 7 were for FCII duties, 3 for FCIII and 1 for FCI in an ROTC cadet. The ROTC cadet was disqualified (DQ) for both a FCI and FCIII due to ocular involvement in a high risk region. Of the 7 FCII waivers, 6 were found medically qualified and 1 was DQ due to profound visual loss in OS despite treatment with Verteprofin. The FCII waivers returned as medically qualified all had inactive disease and met vision standards. Of the 3 FCIII submitted for waiver, 2 were medically qualified and 1 was DQ due to failure to meet vision standards.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Information required for a waiver for ocular histoplasmosis syndrome should include:
A. Complete history of all vision-related issues; all related medical records need to be submitted
B. List and fully discuss all clinical diagnoses and diagnoses requiring a waiver.
C. Eye exam to include visual acuity, visual fields (10-2 testing for a more thorough evaluation of the macula), and stereopsis tests.
D. Ophthalmology consultation report to include all follow-up reports.
E. If active lesions are part of the history and they were treated by laser photocoagulation or PDT, patients should have at least one follow-up evaluation completed by the treating ophthalmologist prior to waiver submission. The first follow-up typically occurs 3-4 weeks post therapy.

F. Ophthalmologic imaging test results, including fluorescein angiography.

ICD 9 codes for Ocular Histoplasmosis	
115.02	Ocular histoplasmosis syndrome
115.9	Histoplasmosis unspecified without manifestation
115.92	Histoplasmosis retinitis, unspecified
115.99	Histoplasmosis unspecified with other manifestation

Reviewed by Col (sel) John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Jan 2007
By: Lt Col Joseph Lopez (RAM 11) and Dr. Dan Van Syoc
Reviewed by Col John Gooch, chief of the ACS Ophthalmology branch

CONDITION:
Optic Nerve Cupping (Enlarged), Ocular Hypertension, And Glaucoma (Jan 11)

I. Overview.

Aeromedically, ocular hypertension (OHT) is defined as: (1) intraocular pressure (IOP) by applanation greater than 21 mmHg but less than 30 mmHg on two or more determinations, or (2) 4 mmHg or more difference between the eyes performed by applanation tonometry. Adjustment of applanation IOP either up or down based on cornea thickness is not aeromedically approved to establish a different applanation IOP than what was originally obtained. In addition, the eye examination should assess for the following indicators of optic nerve damage: optic nerve cup enlargement greater than 0.4, cup-to-disc asymmetry greater than 0.2, progressive optic nerve cupping changes, nerve fiber layer loss, optic nerve hemorrhage, visual field defects, acquired color vision defects and relative afferent pupillary defect. Aeromedically, glaucoma is defined as IOP of 30 mmHg or greater by applanation, or any evidence of the secondary changes associated with optic nerve damage as stated above. Pressure-related optic nerve damage can occur at any level, i.e. low tension glaucoma; however, glaucoma usually occurs among individuals with IOP spikes of 22 mmHg or greater. Statistically, the higher the pressure spike, the greater the risk for optic nerve damage. Medical treatment to lower IOP is almost always indicated in individuals with IOP measured at 30 mmHg or greater by applanation even when no current glaucomatous damage exists. Medical treatment to lower IOP is indicated for anyone diagnosed with "glaucoma," including individuals diagnosed with normal or low tension glaucoma. The term "glaucoma suspect" or "pre-glaucoma," is often used when enlarged optic nerve cupping and/or ocular hypertension exists indicating close monitoring is required. These terms both imply no definitive glaucomatous visual field defects, nerve fiber layer defects, acquired color vision defects, or progressive optic nerve cup enlargement exists.[1]

The etiology and differential diagnosis of OHT/glaucoma is diverse. The glaucomas are divided into open angle (primary, secondary, normal tension) and closed-angle types. Primary open angle glaucoma is the most common primary glaucoma and has a strong inheritable pattern. Pigmentary glaucoma is the most common secondary glaucoma and is caused by elevated IOP resulting from pigment dispersion syndrome. In pigment dispersion syndrome, pigment granules are liberated from the posterior iris surface which may transiently block aqueous humor outflow from the anterior chamber through the trabecular meshwork, resulting in elevated IOP. Pigment dispersion syndrome alone is not disqualifying. However, if either ocular hypertension or glaucomatous optic nerve damage are present along with pigment dispersion syndrome, the condition is disqualifying. Angle closure glaucoma is uncommon in the aircrew population because this condition typically affects individuals of more advanced age. However, narrow angle configuration of the anterior chamber may be diagnosed among aircrew, especially those with higher levels of hyperopia, which may place the aircrew member at risk for pupillary block and resultant angle closure. A thorough history and ophthalmologic exam are essential in determining the etiology and risk for progression.

Typically, risk of glaucomatous progression increases with age. Additional risk factors for primary open angle glaucoma include positive family history in a first degree relative, race (African-American), ocular hypertension, and relatively thin central corneas as measured by ultrasound pachymetry.[2]

In the general population, 1 of every 10 individuals will develop glaucomatous damage within 5 years of diagnosis of OHT.[3] Essentially, the same risk occurs in aircrew--10% of aircrew with ocular hypertension will develop glaucoma during the span of a normal Air Force aviation career. Ocular hypertension treatment decisions should be based on the constellation of risk factors present, including central corneal thickness measurement (pachymetry). However, the relationship between corneal thickness, ocular hypertension and glaucomatous vision loss is currently undefined in the age group of our aircrew population. In addition, no single standardized nomogram currently exists to adjust for elevated IOP (adjustment factors currently being used vary widely). Therefore, applanation IOP adjustment based on corneal thickness is prohibited in determining whether an individual meets aircrew standards.

Therapy for glaucoma depends upon the specific cause. In general, the initial management is pharmacologic. Other therapeutic modalities include laser therapy and surgical therapy, e.g. filtration surgery, placement of setons, goniotomy, trabeculotomy, trabeculectomy, trabeculoplasty and cycloablative procedures.

II. Aeromedical Concerns.

Enlarged optic nerve cupping and OHT may be indicators of early glaucoma. Elevated IOP may result in difficulty with night vision secondary to the appearance of halos and flares around lights, and decreased contrast sensitivity. Left undiagnosed or inadequately treated, glaucoma can cause acquired changes in color vision, loss of central or peripheral visual fields, loss of visual acuity, and blindness. All of these visual disturbances have the potential to impair the aviator's visual performance and present a significant safety hazard or adversely impact mission effectiveness. Glaucoma associated visual degradation occurs insidiously without subjective complaints which makes the screening program even more vital.

III. Waiver Considerations.

OHT is a disqualifying condition for FC I/IA, II, IIU, III, and ATC/GBC. OHT is <u>not</u> waiverable for FC I/IA, initial II/IIU, and initial III. OHT waiver criteria for trained aircrew include: acceptable visual performance on ophthalmologic examination, stabilized intraocular pressures and <u>no</u> evidence of optic nerve damage (as defined above).

Glaucoma is disqualifying for all flying classes to include ATC/GBC personnel. Glaucoma is <u>not</u> waiverable for FC I, IA, initial II/IIU, and initial III. SMOD personnel are disqualified for glaucoma per retention standards in AFI 48-123. Glaucoma waiver criteria for FC II or III include: stable glaucoma controlled by waiverable medications or laser treatment modalities, no aeromedically significant visual field defect within the central 30 degrees of either eye, a full binocular visual field, and no visual or systemic medication side effects.

When pharmacological intervention is required to control IOP, the current waiverable topical medications include beta blockers and latanoprost (Xalatan®). The degree of beta blockade

resulting from ophthalmic timolol is proportionately much less than oral, with perhaps a 20-30% reduction in reflex cardiovascular responses at the plasma levels achieved with such therapy. This degree of blockade is unlikely to result in any real impairment. On the other hand, latanoprost appears to be more effective at reducing intraocular pressure, and has no known effect on cardiovascular homeostasis. Thus, Xalatan® appears to be the first-line choice for high-performance aviators requiring treatment. Should the local effects of latanoprost prove to be a problem, or should it prove necessary to add a beta blocker to control intraocular pressure, Timoptic-XE® is associated with lower systemic levels and improved patient compliance, and would be the preferred preparation.[4] Furthermore, punctual occlusion during administration of eye drops will decrease the systemic absorption of medication and should be encouraged during the use of β-blockers. Pilocarpine and related medications are not waiverable, neither are alpha agonists nor carbonic anhydrase inhibitors, i.e. acetazolamide (oral) or dorzolamide (topical).

Laser surgical procedures such as argon laser trabeculoplasty (ALT), selective laser trabeculoplasty (SLT), peripheral iridotomy (PI), or iridoplasty may be performed on aviators with demonstrated uncontrolled OHT or progressive glaucoma. Waiver request for these procedures should be submitted following successful laser treatment once the treated eye/s have stabilized (usually at least one month), IOP is controlled and topical post-op steroids have been discontinued. An ACS Ophthalmology evaluation is required for waiver processing.

Table 1 summarizes waiverability of increased cup-to-disc ratio, ocular hypertension, and glaucoma, as well as when ACS review or evaluation is required. Physiologic enlargement or asymmetry of the optic nerve cup is no longer disqualifying once ocular hypertension and glaucomatous visual field defects have been ruled out.

Table 1: Waiver criteria for increased cup-to-disc ratio, ocular hypertension, and glaucoma.

Flying Class	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Enlarged optic nerve cupping or asymmetry†	Medically qualified N/A	No
	Ocular hypertension	No AETC	No
	Glaucoma	No AETC	No
II/III	Enlarged optic nerve cupping or asymmetry†	Medically qualified N/A	No
	Ocular hypertension‡	Yes* MAJCOM	Yes
	Glaucoma‡	Yes* MAJCOM	Yes
IIU**	Enlarged optic nerve cupping or asymmetry†	Medically qualified N/A	No
	Ocular hypertension‡	Yes* AFMSA	Yes
	Glaucoma‡	Yes AFMSA	Yes
SMOD	Enlarged optic nerve cupping or asymmetry†	Medically qualified N/A	No
	Ocular hypertension‡	N/A	Yes
	Glaucoma‡	Yes AFSPC	Yes
ATC/GBC**	Enlarged optic nerve cupping or asymmetry†	Medically qualified N/A	No
	Ocular hypertension‡	Yes* MAJCOM	Yes
	Glaucoma‡	Yes* MAJCOM	Yes

† If no evidence of glaucoma or ocular hypertension on Humphrey visual fields and diurnal ocular pressure, then medically qualified, no waiver required.
* Waiver not allowed in untrained FC II and FC III individuals
** AETC is the certification authority for initial IIU and ATC/GBC

‡ Beta blockers (Betaxolol®, Timoptic®, Timoptic XE®) and latanoprost (Xalatan®)are aeromedically approved.

Review of AIMWTS through October 2010 revealed 670 cases of increased cup-to-disc ratio, ocular hypertension or glaucoma submitted for waiver consideration. Of these, 80 (12%) were disqualified: 23 FC I/IA, 9 FC II, 1 IIU, 42 FC II, and 5 ATC/GBC. Of the 80 disqualified, 59 were for ocular hypertension or glaucoma on initial flight physical or uncontrolled glaucoma and the other 21 were disqualified for other concurrent medical conditions (e.g. diabetes mellitus, coronary artery disease, failed color vision, transient ischemic attack, cardiac arrhythmias, or depression).

IV. Information Required for Waiver Submission.

For initial waiver request for OHT and glaucoma, the following information is required:
A. Aeromedical summary with a thorough review of past medical history and family history. Past ocular history should include a review of eye injuries, surgery, previous infectious or inflammatory eye disease, intraocular pressure history, previous visual field findings and presence or absence of associated risk factors including family history of glaucoma.
B. Complete ophthalmologic examination to include: refraction to best visual acuity, Humphrey visual field testing (preferably 30-2), applanation tonometry with diurnal measurements (at least three measurements at different times of the day), dilated funduscopic exam. For OHT and glaucoma, examination should also include central corneal thickness and optic disc photographs if available.

Waiver request and Aeromedical Consultation Service (ACS) case review is not required for symmetric or asymmetric physiologic (normal variant) enlargement of the optic nerve cup. However, when enlarged or asymmetric optic nerve cupping is detected on examination, local evaluation to rule-out ocular hypertension and visual field loss is required. Diurnal intraocular pressure readings and Humphrey visual field testing (preferably 30-2) should be accomplished. Physiologic optic nerve cupping and asymmetry should be monitored on an annual basis. In cases of suspicious optic nerve appearance or suspicious visual field abnormalities, waiver request and ACS evaluation should be initiated.

ACS evaluation is required, all flying classes, for initial waiver of OHT and glaucoma as part of the Ocular Hypertension/Glaucoma Management Group. A Medical Evaluation Board (MEB) is required for glaucoma if there are changes in the optic disc, visual field defects, or the condition is not amenable to treatment. An MEB is not required for ocular hypertension.

For a waiver renewal of OHT and glaucoma, an ophthalmology consult is required. The evaluation should include quarterly measurements of intraocular pressure, unless the ophthalmologist specifies less frequent assessment, and bilateral Humphrey visual field exams. ACS evaluation is required for all flying classes for waiver renewal as part of the Ocular Hypertension/Glaucoma Management Group.

ICD 9 codes for optic nerve cupping, intraocular hypertension, and glaucoma	
743.57	Specified anomalies of optic disc (increased cup-to-disc ratio)
365.04	Ocular Hypertension
365	Glaucoma

V. References

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Nov 2007
By: Capt J. Ryan Brewer, ACS Ophthalmology branch, and Dr. Dan Van Syoc
Reviewed by Col John Gooch, chief of ACS Ophthalmology branch

CONDITION:
Optic Disc (Nerve Head) Drusen (Mar 11)

I. Overview

Optic disc drusen (ODD) are congenital and developmental anomalies of the optic nerve head commonly seen as an incidental finding during routine eye exams and are depositions of acellular, often calcified, hyaline material within the optic nerve thought to be the result of mitochondrial calcification within axons.[1] These hyaline bodies tend to lie beneath the surface of the optic nerve head but may become visible later in life as yellow-white, refractile bodies always superficial to the lamina cribrosa.[1-2] Drusen may imitate the appearance papilledema with elevation and blurring of disc margins, but can be differentiated clinically by eliciting symptoms of increased intracranial pressure such as headache, especially increased upon awakening or after recumbency, and/or a pulsatile swishing sound heard by the patient with each pulse (pulsatile tinnitus). Symptoms of increased intracranial pressure are not expected with disc drusen and should initiate urgent neuro-imaging and possible lumbar puncture (after mass lesion has been excluded). The pathogenesis of ODD is unproven but likely stems from small optic disc size and mechanical obstruction to axonal transport.[1-2] It's theorized that impaired ganglion cell transport mechanisms lead to abnormal axonal metabolism and mitochondrial damage, ultimately causing axonal deterioration and extrusion of calcified bodies.[2-3] ODD may be associated with retinitis pigmentosa and psuedoxanthoma elasticum.[1] Other conditions that share a similar name, e.g. macular drusen associated with age-related macular degeneration, are not pathologically related to optic disc drusen.

ODD follows an autosomal dominant inheritance pattern and has a prevalence of 0.4 to 2 per 100 in the general population with a ten-fold increase in prevalence in family members of patients with drusen.[2] Men and women are affected equally with an average age at diagnosis of 22 years[2]. Bilaterality occurs in 67-85% of cases.[2] Most patients with ODD remain asymptomatic with normal visual acuity, although transient visual obscurations secondary to disc ischemia have been reported in 8.6% of study patients.[1-2,4] Visual field defects with surface optic disc drusen are a common finding, occurring in 71 to 87% of cases but may be less common with buried drusen.[1-2,4] Visual field defects are slowly progressive and often manifest as enlarged blind spots (60%) and arcuate defects (59%), typically sparing central vision.[1,2,6] Potential complications related to ODD are ischemic optic neuropathy, central retinal artery occlusion, and retinal vein occlusion.[2] Unfortunately, there is no effective treatment established for optic disc drusen and visual field defects attributed to nerve fiber loss are permanent.

Diagnostic tests used to help identify optic disc drusen include.[1-2]

1. Direct ophthalmoscopy

- blurred or scalloped disc margins, translucent drusen when visible at surface.
- the major retinal vessels are often anomalous (increased in number, branching and tortuosity)

2. Ophthalmic B-scan ultrasound

- Preferred diagnostic test, non-invasive without radiation

3. Computed tomography of the orbit (recommend 3 mm cuts or thinner)

- shows calcification of drusen at optic nerve head

4. Fluorescein angiography

- can show late-hyperfluorescent staining of drusen bodies and leakage of juxtapapillary choroidal neovascular membranes
- Buried and surface drusen display autofluorescence when photographed with the fluorescein filter in place pre-injection.

5. Scanning laser ophthalmoscopy and optical coherence tomography

- may help detect buried drusen not visualized at the surface

Diagnostic tests used to help monitor effects of optic disc drusen include.

1. Refraction to best Snellen visual acuity
2. Color vision
3. Amsler grid
4. Afferent pupillary responses
5. Direct and/or stereo biomicroscopic ophthalmoscopy for disc and nerve fiber layer evaluation
6. Automated perimetry visual field testing (Humphery 30-2)
7. Contrast sensitivity
8. Color vision testing with anomaloscopy
9. Visual evoked potentials
10. Optical coherence tomography or scanning laser polarimetry


Photograph typical of an optic nerve with ODD and scalloped border.[7] (reproduced with permission from NOVEL)

II. Aeromedical Concerns.

Clinically and aeromedically, the main concern with optic disc drusen is their propensity to induce slowly progressive loss of visual field. As high as 87% of individuals with optic nerve head drusen can expect to have visual field abnormalities. Furthermore, transient disturbances in central acuity and visual field may occur in association with optic nerve head drusen. Color vision defects have also been described in 41% of USAF aviators with ODD in preliminary data collected at the Aeromedical Consultation Service. Less commonly, the association of drusen with spontaneous hemorrhages in and around the optic disc may also result in acute changes in visual function.

Once the diagnosis of drusen is established, careful evaluation of optic nerve function is imperative. This should include visual acuity, visual field testing, Amsler grid, and color vision testing. Visual field loss has the most potential for aeromedical grounding and as such visual field testing should be performed on a regular basis to ensure visual fields remain adequate and consistent with mission effectiveness and flying safety. Optic disc photodocumentation should be obtained for comparison during future monitoring. It is also important for patients to self-monitor their vision periodically with Amsler Grid testing. Periodic surveillance to assess visual function in aircrew with optic nerve head drusen is appropriate, since drusen-related optic nerve problems are often asymptomatic. Routine cases should be monitored every six to twelve months.

III. Waiver Considerations.

Optic nerve head drusen is a disqualifying condition for flying classes I/IA, II, IIU, or III. It is not listed as a disqualifying diagnosis for ATC/GBC or SMOD personnel, but for ATC/GBC personnel, it would be disqualifying if it results in a visual field defect. Aeromedical Consultation Service

(ACS) evaluation is required for initial waiver of optic nerve head drusen for cases eligible for waiver. FC I/IA with optic nerve head drusen is not eligible for waiver. Optic nerve head drusen in untrained FC II and FC III are typically not eligible for waiver. ACS review is required for waiver renewal; depending on the results of local work-up, an ACS evaluation may be required. Waiver criteria for trained aircrew with optic nerve head drusen include acceptable visual performance on ophthalmologic examination including visual acuity, color vision and stereopsis, absence of transient visual loss, no aeromedically significant visual field deficit within the central 30 degrees of either eye, and a full binocular visual field.

Table I – Waiver criteria for aviators with optic nerve drusen

Flying Class (FC)	**Waiver Potential Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	No†
II IIU	Yes* MAJCOM**	Yes
III	Yes* MAJCOM	Yes
ATC/GBC	Waiver not required#	N/A
SMOD	Waiver not required#	N'A

* Waiver for untrained flying class II and III is unlikely.
** Waiver authority for FC IIU cases is AFMSA.
† ACS evaluation only required if diagnosis is in question.
# Waiver will be required if the condition includes visual field or color vision defects.

A review of AIMWTS through Jan 2011 showed 98 cases of optic nerve head drusen. There were 17 FC I/IA cases (16 disqualifications), 44 FC II cases (0 disqualifications), 35 FC III cases (10 disqualifications – all initial FC III cases), and 2 ATC/GBC cases (0 disqualifications). All 26 of the DQ cases were disqualified for the diagnosis of optic nerve drusen.

IV. Information Required for Waiver Submission.

For optic nerve head drusen, the aeromedical summary for <u>initial waiver</u> or <u>waiver renewal</u> should include the following items:
A. Complete aeromedical history to include pertinent positives and negatives (e.g. headaches, pulsatile tinnitus, hypertension, diabetes, family history of drusen, etc.)
B. Presence or absence of visual symptoms and their operational impact (e.g. transient visual obscurations, perceived scotomas or metamorphopsia)
C. Results of complete optometric or ophthalmologic eye examinations, to include, refraction to best Snellen visual acuity, color vision, Amsler grid, Humphrey threshold visual field testing (preferably central 30-2) – recent and previous, and stereoscopic optic disc evaluation.
D. Diagnostic tests supporting diagnosis (e.g. ophthalmic B-scan ultrasound, computed tomography of the orbit, etc.)

ICD-9-CM Codes for Optic Nerve Head Drusen	
377.21	Drusen of optic disc

V. References.

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WAIVER GUIDE
Updated: Nov 2011
Supersedes Waiver Guide of Dec 2008
By: LtCol Laura Brodhag (RAM 12) and Dr Dan Van Syoc
Reviewed by Col John Gooch, chief ACS Ophthalmology branch and Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Optic Neuritis (Nov 11)

I. Overview.

Optic neuritis is a demyelinating disorder of the optic nerve that typically presents as acute, painful, monocular vision loss.[1] Common visual deficits include visual field defects, color vision deficits, and reduced visual acuity. Onset generally occurs between 18 and 49 years of age.[2, 3] It has an incidence up to 5 per 100,000, and is most common in northern latitudes (the United States and Northern Europe).[4] Diagnosis occurs more often in Caucasian-Americans than African-Americans and may occur more often in women than men.[1] In 15% to 20% of patients subsequently diagnosed with multiple sclerosis (MS), optic neuritis is the presenting symptom and occurs in one-half to two-thirds of MS patients during the course of their illness.[4]

Because optic neuritis typically manifests during the span that makes up the most active years of aircrew members' tour of duty and increases the risk of developing multiple sclerosis, the diagnosis can have profound implications on future career performance and longevity. In a study of thirty-one military aircrew who developed optic neuritis between 1963 and 1994, with follow-up ranging from 7 to 30 years, 39% went on to subsequently develop MS.[5] In the multicenter Optic Neuritis Treatment Trial (ONTT), thirty-eight percent of patients who had optic neuritis developed MS within 10 years of their initial presentation, and this increased to fifty percent 15 years after initial presentation.[1, 6]

The demyelination of the optic nerve in optic neuritis is believed to be an autoimmune phenomenon characterized by systemic T-cell activation.[7] Inflammatory cytokines are thought to be involved. Also, B-cell activation against myelin basic protein may be present in the cerebrospinal fluid. The inflammatory response results in edema and breakdown of the myelin sheaths and perivascular cuffing of the retinal vasculature. Genetic susceptibility for optic neuritis is suspected because of higher incidences of certain HLA types in those affected.[7]

Optic neuritis is a clinical diagnosis based on history and physical examination findings. The ONTT reviewed visual symptoms and performed detailed visual assessments on 448 patients who had optic neuritis.[8, 9] Eye pain accompanied vision loss in 92% of patients. Vision loss was typically monocular and progressed rapidly over a period of hours to days. Even patients who had 20/20 vision at presentation had defects in their ability to perceive color and contrast; patients often described their vision as ''blurry'' or felt the color had been ''washed out." Loss of color vision occurred in 88% of involved eyes in the ONTT study.[9] Occasionally, there may be altered perception of moving objects (Pulfrich phenomenon).[10] Another interesting phenomenon, called Uhthoff's sign, is due to the fact that demyelinated lesions function worse with increased body temperature.[5] In cases of optic neuritis, this may manifest as transiently decreased vision after exercising or after a hot shower.

Although physical examination findings may vary in optic neuritis, pain with eye movements initially and an afferent pupillary defect are almost universally found. Even in those patients who have normal visual acuity, mild optic nerve dysfunction causes an asymmetry in the pupillary reflex that can be elicited by the swinging flashlight test. Visual acuity in the affected eye can range from 20/20 to no light perception. Although central scotoma is the classic visual deficit, a wide variety of visual field cuts may occur.[11, 12] Two thirds of patients have a normal funduscopic examination with retrobulbar optic neuritis. One third of patients have optic disc swelling, blurring of disk margins, and swollen peripapillary veins caused by optic nerve head inflammation.[1] Abnormalities in visual evoked potentials may help demonstrate optic nerve dysfunction. Optical coherence tomography may be used to identify decreases in the retinal nerve fiber layer; a finding which is suspicious for axonal loss.[13-15] There has been some evidence to suggest that normal results on multifocal visual evoked response testing (mfVEP) may predict a better prognosis of less likelihood for progression to future MS.[16]

Although the diagnosis of optic neuritis is often made on clinical grounds, gadolinium-enhanced MRI is obtained to help confirm the diagnosis and to risk-stratify patients who are likely to develop MS.[17,18] Optic nerve inflammation can be demonstrated in 95% of patients who have optic neuritis on gadolinium-enhanced fat-suppressed MRI of the orbits. In addition, assessing the longitudinal extent of optic never involvement by MRI may help determine prognosis.[19] The imaging may also demonstrate oval-shaped lesions in the periventricular white matter that suggest MS. In one study, the risk for MS 10 years after the first episode of optic neuritis was 56% with one or more lesions versus 22% in those who did not have lesions, and by 15 years it was 72% versus 25%.[6]

Laboratory evaluation of antinuclear antibodies, angiotensin converting enzyme, syphilis serology, and chest x-ray are not necessary in typical cases of optic neuritis, but should be considered in atypical presentations, such as African-American race, age < 16 years old, age > 45 years old, bilateral simultaneous optic neuritis, lack of ocular pain, lack of improvement within 4 to 6 weeks from symptom onset, progressive loss of visual function beyond 2 weeks after onset of symptoms, or the presence of retinal hemorrhages, cotton-wool spots or macular exudates that occur with neuro-retinitis.[1] Lumbar puncture may also be considered for atypical presentations. The absence or presence of CSF oligoclonal bands does not appear to add any additional information in predicting the development of MS in the setting of an abnormal MRI, but may be helpful if the baseline brain MRI is normal.[1]

The discovery of the neuromyelitis optic (NMO) antibody in 2004 has enabled classification of some cases of optic neuritis not associated with multiple sclerosis.[20] NMO and the Asian optico-spinal form of multiple sclerosis have been linked with a specific serum auto-antibody to aquaporin-4 water channels, which can be detected by an indirect immunofluorescence assay or a quantitative radioimmunoprecipitation assay. The importance is that the visual prognosis in NMO is worse and management of optic neuritis in NMO requires long-term immunosuppression to prevent relapses.[21]

Visual acuity in typical optic neuritis generally improves without treatment over the course of several weeks. 90% of patients have 20/40 or better vision at one year.[9] However, prognosis is poorer for those who present with lower visual acuity.[22] This is especially the case if vision loss persist beyond 1 month.[23, 9] Treatment is focused on hastening the return of vision, preventing recurrences, and reducing the incidence of MS. In the ONTT study that randomized affected patients to either high-dose intravenous methylprednisolone or standard dose 1 mg/kg oral

prednisone (or placebo), those who were given the methylprednisolone demonstrated a more rapid return to normal vision and a lower risk for recurrent optic neuritis.[24, 25] The differences in visual acuity were not significant at 2 years follow-up, however. Standard dose oral prednisone (1 mg/kg) was associated with an increased risk for recurrent demyelinating events compared with placebo. Oral prednisone at this dose has not been shown to be of benefit in acute monosymptomatic optic neuritis and therefore is not recommended.[25] High dose methylprednisolone (1 gm IV daily for 3 days followed by oral steroid taper over 11 days) delayed the onset of MS compared with placebo at 2 years, but this advantage did not persist beyond this time frame. According to the American Academy of Neurology, although corticosteroids may hasten the return of vision in severe cases after initial presentation, there is no compelling evidence for long-term benefit for patients who have optic neuritis.[25, 26]

Several randomized trials (such as CHAMPS, PRISM, ETOMS, and BENEFIT studies) have demonstrated that disease modifying agents such as copaxone, interferon beta 1a and interferon beta 1b may reduce the development of MS in patients who have optic neuritis with an abnormal brain MRI.[1, 27, 28] Although this is typically started at the onset of symptoms, the initiation of this therapy should be done in conjunction with an involved neurology consultant.

Recent studies are also indicating that anti-tumor-necrosis factor monoclonal antibody therapies, such as infliximab or adalimumab, or TNF circulating receptor fusion protein therapies, used for conditions such as Crohn's disease, rheumatoid arthritis, ankylosing spondylitis, and psoriatic arthritis, may cause an increased incidence of multiple sclerosis relapses, including optic neuritis, and other demyelinating disorders such as transverse myelitis and Guillain-Barré syndrome.[29,30] Therefore, these should be used with caution in patients with known multiple sclerosis.

II. Aeromedical Concerns.

The primary aeromedical concerns with clinically-isolated optic neuritis (without radiologic or clinical criteria for MS) are variable decreases in visual performance, that are unpredictable by either exam or imaging study and may go unrecognized by aircrew member with or without treatment. These visual changes include decreased visual acuity, degradation in color vision, visual field defects, and photopsias.[3, 9, 31, 32] Symptoms can present over a period of hours and may increase under physiologic stresses such as dehydration, hypoxia, fatigue or increases in body temperature. Additionally, Uhthoff's phenomenon was a common observation amongst USAF aircrew with optic neuritis. Military operational extremes characterized by increased heat exposure, such as in desert operations and in hot closed cockpits/crew stations, may place military personnel at an increased risk for Uhthoff related functional impairments.

The risk of relapse from typical clinically-isolated optic neuritis (CION) with normal brain CSF and MRI findings is low, as evidenced by the ONTT, enough that disease modifying immunomodulatory treatment is not recommended, and waiver is allowed.[33] Treatment with high dose intravenous methylprednisolone may be considered to hasten visual return in severe cases and possible earlier return to duty with clinically-isolated optic neuritis, but this must be balanced with the risks of such therapy, since long term visual performance is not changed. When optic neuritis is not clinically-isolated, the risk of relapse is very high. Unfortunately, the reduction in relapses seen with treatment is insufficient for aviation purposes and immunomodulatory therapy for MS is not currently approved for waiver. Thus, the issue of treatment is largely irrelevant for aeromedical purposes.

III. Waiver Consideration.

Optic neuritis is disqualifying for flying classes I/IA, II, IIU, and III. It is not specifically listed as disqualifying for ATC/GBC and SMOD duties, but multiple sclerosis is for all classes. If the optic neuritis is visually symptomatic, it would then be disqualifying for ATC/GBC and SMOD duties.

Table 1: Waiver potential for optic neuritis

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**
I/IA	CION with normal CSF and MRI CION with positive MRI or CSF or multiple sclerosis	No AETC No AETC
II/IIU**/III	CION with normal initial MRI and CSF and normal repeated MRI at 3 months CION with positive MRI or CSF or definite multiple sclerosis	Yes*# MAJCOM No MAJCOM
ATC/GBC	CION with normal initial MRI and CSF and normal repeat MRI at 3 months CION with positive MRI or CSF or definite multiple sclerosis	Yes*# MAJCOM No MAJCOM
SMOD	CION with normal initial MRI and CSF and normal repeat MRI at 3 months CION with positive MRI or CSF or definite multiple sclerosis	Yes*# AFSPC/GSC No AFSPC/GSC

* In untrained FC II and III waiver is unlikely; if episode occurred 10 years previously with normal CSF, current and past MRI normal, then an ACS evaluation may be warranted.
** Waiver authority for all FC IIU cases is AFMSA.
# All waivers are recommended to be valid for only one year. ACS evaluations should be "in person" at a minimum of at initial (after 3 month MRI), at one year, and every three years thereafter. An ACS review of local MRI is required in the years the aviator is not seen "in person" at ACS (i.e. 2, 3, 5, 6, 8, 9…etc).

AIMWITS search in August 2011 revealed a total of 37 cases with the diagnosis of optic neuritis. There were 0 FC I/IA, 16 FC II cases with 8 disqualifications (all disqualified due to ultimate development of multiple sclerosis), 19 FC III cases with 6 disqualifications (all disqualified due to

development of multiple sclerosis), 1 SMOD case with no disqualification (although the AMS stated the member had MS), and 1 ATC case (disqualified due to development of multiple sclerosis).

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for optic neuritis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of optic neuritis.
C. Consultation from Ophthalmology and Neurology.
D. Threshold Visual Field Studies at initial diagnosis and 3 months later.
E. Labs: If LP clinically indicated by a neurologist, submit the results of CNS fluid including oligoclonal bands and myelin basic protein
F. Imaging:
--Brain T1 and T2-weighted MRI with gadolinium and FLAIR at initial presentation and 3 months later.
--Optical Coherence Tomography

The aeromedical summary for waiver renewal for optic neuritis should include the following:
A. Interval history
B. All applicable labs and imaging tests as in the initial aeromedical summary:
-- Repeat Brain T1 and T2 weighted MRI with gadolinium and FLAIR
-- Repeat Optical Coherence Tomography
-- LP only if clinically indicated
C. Follow-up consultations from Ophthalmology and Neurology
D. Interval Threshold Visual Field Studies

ICD 9 code for Optic Neuritis	
377.30	Optic neuritis, unspecified

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WAIVER GUIDE
Updated: Mar 09
By: Dr. Dan Van Syoc

CONDITION:
Osteoarthritis (Mar 09)

I. Overview.

Osteoarthritis (OA) is the most common articular disease worldwide, affecting an estimated 20 million Americans alone. It is generally a disease of older individuals with an estimated prevalence of 70% to 90% in folks greater than age 75. Men and women are equally affected, but often symptoms appear earlier and can be more severe in women. There is no known cure for the disease and current therapeutic strategies are directed at pain reduction and improvement of joint function[1, 2]. It is a leading cause of disability in the workplace, particularly in citizens older than age 55.

The exact etiology of the disease is unknown, but it is characterized clinically by pain and functional limitations, radiographically by osteophytes and joint space narrowing, and histopathologically by alterations in cartilage and subchondral bone integrity. Modifiable risk factors for OA are increased weight, high-impact repetitive activities, smoking and osteoporosis. Increased weight is the most significant independent predictor of both incidence and progression of OA in weight-bearing joints. Studies have demonstrated that weight reduction can reduce the development and progression of OA of the knee[3]. Maintaining an appropriate body weight may be the most important factor in preventing OA from occurring in weight-bearing joints.

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is a validated instrument for the assessment of pain, stiffness, and physical function in patients with OA of the knee or hip. It assesses patients using 24 parameters and is particularly useful to monitor the course of the disease or to determine the effectiveness of therapeutic modalities[4]. At this time, it is used more in the research arena, but is a very useful tool for evaluating the status of OA patients.

For our population of aviators, the major joints of concern with OA are the knees, hips, spine and hands. Risk factors for OA of the knee include obesity, knee injury, previous knee surgery, and occupational bending and lifting[5]. For OA of the hip, the risk factors include older age, high bone mass, genetic predisposition, increased BMI, participation in weight-bearing sports, and occupations that require prolonged standing, lifting, or moving of heavy objects[4].

The diagnosis of OA is mainly clinical. The main symptoms that suggest the diagnosis are pain, stiffness, reduced movement, swelling, crepitus, age greater than 40, and the absence of systemic features such as fever[2]. Joint involvement is usually symmetric and morning joint stiffness that resolves within 30 minutes or occurs with mild-to-moderate activity is also common. With disease progression, more prolonged joint stiffness and joint enlargement becomes evident. Crepitus in the joint is a late manifestation of disease. Radiographic findings consistent with OA include presence of joint space narrowing, osteophyte formation, pseudocyst in subchondral bone, and increased density of subchondral bone. The absence of radiographic changes does not exclude the diagnosis of OA[1].

Treatment modalities include nonpharmacologic, pharmacologic and surgery. The latter will not be covered in this waiver guide. The major nonpharmacologic entities include weight loss, rest, physical therapy, and exercise. Obesity and weight reduction are important and were covered earlier in this report. Resting of the affected joint often alleviates pain, but prolonged rest may lead to muscle atrophy and decreased joint mobility. The current recommendation is for short periods of rest, typically 12 to 24 hours for acute pain[6]. Physical therapy can improve flexibility and strengthen muscles supporting affected joints and this often improves functional outcome and pain scores. In addition, there has been much discussion concerning orthoses, particularly for patients with OA of the knee. Research has suggested that neutral or laterally wedged shoe orthoses may be beneficial in the management of medial knee OA when used with walking shoes[7]. Lastly, most recent studies support an appropriate exercise program as an integral part of the management of OA. Exercise goals are to reduce pain and functional impairment, protect involved and at-risk joints, and to prevent disability related to a more inactive lifestyle. Ultimately, any type of exercise program that is done regularly and monitored by health professionals can improve pain and physical function, but it needs to be stressed that there is no clear evidence that exercise has any effect on the overall progression of the disease[8].

The pharmacologic modalities can be analgesics, anti-inflammatory agents, intra-articular agents and the use of glucosamine. With most OA patients, acetaminophen is the drug of choice; it can be used safely in doses up to 4 g/day in patients not using other liver-metabolized medications or alcohol. Occasionally, the pain may be severe, and in those cases, the use of opioid analgesics such as codeine can be used, but should be avoided for long-term use. Non-steroidal anti-inflammatory agents (NSAIDs), such as ibuprofen, are commonly used. There is no convincing evidence that any of the available NSAIDs is more effective than any other for OA of the hip or knee[9]. In comparing acetaminophen with NSAIDs, there is evidence that NSAIDs are superior to acetaminophen in terms of pain reduction and improvements in patient and physician global assessments and functional status. The relative superiority of NSAIDs over acetaminophen is most marked in those with moderate to severe levels of pain. The benefits of NSAIDs over acetaminophen are relatively modest, and therefore, additional factors are still important to consider in the decision to use these drugs[10].

Intra-articular corticosteroids can be very useful in OA patients who have pain despite appropriate dosing of an NSAID. Repeated injections over a period of up to two years appear to be safe and can be very effective[9]. There has been considerable discussion over the past several years concerning the use of glucosamine, a naturally occurring substance, for the treatment of OA. It has been touted to relieve symptoms and stop the disease progression, but data to date has failed to prove convincingly that it works, how it works, or whether it is even safe to take long-term[11]. In addition, hyaluronic acid injections have been used with some degree of success. Randomized trials have shown success in OA of the ankles, shoulders, and hips. Multiple injections are required with approximately five injections necessary for adequate treatment; one injection weekly for five weeks. The exact mechanism of action is unknown, but there is felt to be a combination of an anti-inflammatory effect, a local lubricant effect, and an analgesic effect by direct buffering of synovial nerve endings[12]. With any intra-articular injection, the aviator needs to be placed in a DNIF status until the treatments are completed and the disease symptoms have improved.

II. Aeromedical Concerns.

The major concerns with aviators with OA are distracting pain and joint limitations that may interfere with normal flight duties and potentially with emergency egress activities. The chronic use of medications is of concern as it indicates ongoing pain and the particular agents may create aeromedical concern. Acetaminophen and NSAIDs can be waived to use on a regular basis, but use of opioid analgesics is not approved for aviation duties. If the aviator is using chronic NSAIDs, there must be regular follow-up with a CBC, LFTs, and chemical profile every 4-6 months.

III. Waiver Consideration.

Arthritis of any type of more than minimal degree, which interferes with the ability to follow a physically active lifestyle, or may reasonably be expected to preclude the satisfactory performance of flying duties is disqualifying for all classes of flying. If the pain can be controlled with acetaminophen or an aeromedically approved nonsteroidal, the aviator can remain on these medications and be considered for a waiver. A waiver request that includes the use of a NSAID should include, at a minimum, a CBC and a comprehensive metabolic profile to monitor for adverse effects of the treatment.

Aviators with significant pain or limitations will need to be grounded until these issues are satisfactorily addressed. If pain and/or limitations persist in spite of maximal medical therapy, then disqualification from flying duties may need to be considered. If joint replacement is deemed appropriate, then follow the information in the Retained Orthopedic Hardware and Joint Replacement waiver guide for guidance. OA of the spine that has required medical therapy and close observation is not waiverable for ejection seat aircraft.

Table 2: Waiver potential for Osteoarthritis

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority
I/IA	Stable OA on no meds+	Maybe AETC
	Symptoms controlled with meds	No AETC
	Symptoms not controlled with meds	No AETC
II	Stable OA on no meds+	Yes MAJCOM
	Symptoms controlled with meds#+	Yes MAJCOM
	Symptoms not controlled with meds*+	Maybe MAJCOM
III	Stable OA on no meds+	Yes MAJCOM
	Symptoms controlled with meds#+	Yes MAJCOM
	Symptoms not controlled with meds*+	Maybe MAJCOM

*Symptomatic patients who go on to joint replacement may be eligible for a waiver – see Retained Hardware and Joint Replacement Waiver Guide
#Medications used to control OA must be on the approved medication list; see note at end of Aeromedical Concerns for appropriate f/u if on chronic NSAIDs
+No indefinite waivers; waiver should be renewed approximately every three years if stable.

Review of AIMWTS data in Feb 2009 revealed a total of seventeen cases with the diagnosis osteoarthritis. There were no FC I cases in the database. For FC II, there were eight cases and two were disqualified; one for significant liver disease and the other for obstructive sleep apnea. There were nine FC III cases with four disqualifications, all for significant disease not well controlled medically. Interestingly, three of the FC II cases progressed to hip replacement, one of which was bilateral, and all three were doing very well and back to full duty.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver for osteoarthritis should include the following:
A. History of symptoms, limitations secondary to disease, summary of all treatments to date, present level of activity, medications, and limitations.
B. Physical - addressing range of motion, muscle strength.
C. Labs: CBC and metabolic profile if on NSAIDs for three or months continually; at three months and then every six months if WNL.
D. Orthopedic or rheumatology consult - range of motion, muscle strength, activity level, limitations.
E. Operative reports, if applicable.
F. X-rays documenting disease process.
G. Medical evaluation board (MEB) results (if applicable).

The aeromedical summary for waiver renewal for osteoarthritis should include the following:
A. Interim history and physical – focus on any changes since most recent waiver, present level of activity, medications, and limitations.
B. Applicable consult(s).
C. X-rays and lab results, if applicable.
D. RILO (if applicable)

ICD 9 code for osteoarthritis	
715	Osteoarthritis

Reviewed by AF/SG Consultant for Rheumatology, Col William Venanzi

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WAIVER GUIDE
Updated: Feb 2012
Supersedes Waiver Guide of Feb 2007
By: Dr Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology

CONDITION:
Osteoporosis/Osteopenia (Feb 12)

I. Overview.

Osteoporosis is the most prevalent disease of bone, affecting an estimated 10 million Americans.[1, 2] It is a disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and an increase in fracture risk, and is a major public health problem world-wide.[3, 4] Osteoporosis is caused by a combination of increased bone resorption and inadequate bone formation which result in deterioration of trabeculae.[5, 6] Although it may be of clinical significance in men, osteoporosis is four times as common in women and is especially active in the first ten post-menopausal years.[7, 8] Osteopenia is defined as low bone mass, but does not meet the diagnostic criteria of osteoporosis. These individuals are considered at an increased risk of developing osteoporosis in the future.[9] In the US, approximately 56% of all postmenopausal women have decreased bone mineral density (BMD), as measured at the hip, and 16% actually have osteoporosis.[10] Hip fractures, most of which are secondary to osteoporosis, cause an excess mortality of 10 to 20 percent at 12 months, and up to 25 percent of hip fracture patients require long-term nursing care.[11] Osteoporosis is estimated to impact around 14 million adults over the age of 50 in the US by the year 2020.[4]

The initial clinical presentation of osteoporosis typically is a fracture which may be symptomatic or occult. In the latter case, the typical finding is one or more spinal compression fractures on radiographs taken for other reasons. Fractures (especially hip, forearm, and spine fractures) also account for most of the morbidity of the disease, which is further complicated in many cases by subsequent poor healing.[6] It is important to perform a diagnostic evaluation and to develop a prevention plan for these patients because a second hip fracture or a fragility fracture at another site is likely to occur. Consequently, patients may have chronic pain, postural/skeletal deformities, and in advanced cases restricted respiratory function from thoracic deformities. In the elderly population, osteoporotic fracture of the hip is frequently a pre-terminal event.[4] With occasional exceptions, most of these problems will occur after a normal flying career has ended, but the rapidity of bone loss immediately after menopause in women predisposed to osteoporosis means that prophylaxis concerns will routinely arise during a flying career.

Table 1. Clinical risk factors for osteoporosis[12]

Advancing age
Previous fracture
Glucocorticoid therapy
Parental history of hip fracture
Low body weight
Current cigarette smoking
Excessive alcohol consumption
Rheumatoid arthritis
Secondary osteoporosis (e.g., hypogonadism or premature menopause, malabsorption, chronic liver disease, and inflammatory bowel disease)

The commonest form of osteoporosis appears to be caused by low estrogen state (e.g., postmenopausal, bilateral oophorectomy); additional risk factors which increase the likelihood or severity are listed in Table 1. Osteoporosis may also be secondary to a variety of other medical conditions. Certain diseases like hyperthyroidism, hyperparathyroidism, hypogonadism, and Paget's disease, any of which might reasonably be encountered in an aviator, can cause or mimic osteoporosis. A number of other diseases are in the broader differential diagnosis, including acromegaly, Cushing's syndrome, osteomalacia, and malignancies such as lymphoma and multiple myeloma. Furthermore, the use of certain medications such as heparin, glucocorticoids, vitamin A, and chemotherapeutic agents may occasionally be complicated by bone loss.[12]

To identify osteoporosis before fractures occur, screening for this disease is important. Current guidelines from the National Osteoporosis Foundation, the American Association of Clinical Endocrinologists, the National Institutes of Health, the U.S. Preventive Services Task Force and others agree that women greater than 65 years old, women with a history of postmenopausal fracture, or any adult with a fracture occurring in the absence of sufficient trauma should be screened for osteoporosis.[9] Recently revised guidelines also recommend that postmenopausal women with risk factors for fracture be considered candidates for screening.

In the USAF aviator population, one is most likely to encounter perimenopausal women with concerns driven by a family history of postmenopausal osteoporosis. Consensus on how to proceed in this population has not been reached.[12] However, a 43-year-old, Caucasian female weighing 120 pounds with irregular menstrual cycle and a family history of osteoporosis may benefit from screening and, if appropriate, treatment. The health care provider must exercise clinical judgment on individual assessments.

Dual-energy x-ray absorptiometry (DEXA or DXA Scan) is the most popular method of densitometry and is readily available in most medical communities for osteoporosis screening. DEXA scan results have been well-correlated with fracture risk. The results of a DEXA scan are reported using T-scores and Z-scores. T-scores are standard deviations from a normal young healthy population mean. Z-scores are standard deviations from an age-matched, sex-matched, and sometimes race-matched population mean. Women with a T-score of -2.5 or lower (i.e., a larger negative number) are said to have osteoporosis, and those with a T-score between -1.0 and -2.5 are said to have osteopenia. Osteopenia should not be thought of as a separate disease, but an early

form of osteoporosis, with the significant caveat that some women in the osteopenic range may not progress to osteoporosis.[13]

In addition to bone densitometry, laboratory screening for underlying causes of osteopenia and osteoporosis has also been widely supported, although a precise algorithm has not been uniformly endorsed. The utility of a workup depends on the clinical scenario. A reasonable approach would be to evaluate individuals initially diagnosed with osteoporosis with a complete blood count, serum chemistries (electrolytes, blood urea nitrogen, creatinine, calcium, phosphorous, total protein, albumin, liver transaminases and alkaline phosphatase), 25-hydroxyvitamin D levels, urinalysis, and 24-hour urine for calcium excretion and creatinine. Additional studies should be driven by history and clinical exam and may include thyroid function tests, parathyroid hormone, serum testosterone (men), serum estradiol, urine free cortisol, or others. For individuals who fail to respond to alendronate therapy, biochemical markers of bone metabolism (e.g., urinary N-telopeptide crosslinks) can be evaluated.[6]

Current strategies in osteoporosis treatment are increasingly focusing on preventing and mitigating the loss of bone in the post-menopausal women, and therapy is generally tailored to the bone density as determined by DEXA scan. All women can probably benefit from a healthy diet high in calcium, supplementation with calcium and with vitamin D, smoking cessation (when applicable), moderation of alcohol (if consumed), and regular weight-bearing exercise of any intensity.[5]

The American Association of Clinical Endocrinologist (AACE) has endorsed the National Osteoporosis Foundation Clinician's Guide to Prevention and Treatment of Osteoporosis.[14] Pharmacologic treatment for postmenopausal women is recommended for the following:

- A hip or spine fracture (either clinical spine fracture or radiographic fracture).
- A T-score of -2.5 or below at the spine, femoral neck, or total hip.
- A T-score between -1.0 and -2.5 at high 10-year risk of fracture with use of the US-adapted FRAX tool provided by the World Health Organization at www.shef.ac.uk/FRAX, where treatment is considered cost-effective if the 10-year risk is 3% or more for hip fracture or 20% or more for 'major' osteoporosis-related fracture (humerus, forearm, hip, or clinical vertebral fracture)."[9]

Both hormone replacement therapy (HRT), with estrogen alone or combined with a progestin, and bisphosphonates have been considered first-line therapies for the management and treatment of osteoporosis. However, recent results from the Women's Health Initiative have raised concerns about breast cancer and cardiovascular risks due to HRT. For this reason, bisphosphonate therapy is the preferred first-line therapy in most cases.[9, 15]

Alendronate is a bisphosphonate approved by the US Food and Drug Administration (FDA) for the prevention and treatment of osteoporosis in postmenopausal women and is on the Official Air Force Approved Aircrew Medication List. Common side effects of alendronate for which aircrew should be monitored when using this medication include thoracic and abdominal pain (due to esophageal or gastric ulcerations), nonspecific gastrointestinal symptoms (nausea, vomiting, diarrhea, constipation), melena, hematochezia, musculoskeletal pain, headache, and allergic reaction. These risks are minimized by technique of administration, which is outlined below.[16] Teriparatide (Forteo®), a recombinant parathyroid hormone, is also available; unlike bisphosphonate therapy, this agent consistently induces regrowth of bone. Major disadvantages of parathyroid hormone, besides expense and the necessity for refrigeration, include consistent elevations of serum calcium

(with excursions into the abnormal range about 11% of the time), and the risk of inducing osteosarcoma. This agent is usually reserved for those with progressive failure of bisphosphonates, and for those with extreme levels of osteoporosis, and as such is rarely indicated. Therapy with teriparatide is not waiverable. Calcitonin therapy is very rarely employed; the usual indication is pain control in the face of recurrent fragility fractures, and thus neither the condition nor the therapy would be waiverable.[17]

Monitoring the efficacy of osteoporosis treatment is medically and aeromedically important, though there is some disagreement on how to monitor appropriately. The commonly accepted method to monitor sufficiency of treatment is to repeat bone densitometry at two year intervals.[9] Some patients will experience an increase in bone density on bisphosphonate therapy, but in general treatment is considered satisfactory if it results in arrest of bone loss. DEXA scanning should include the lumbar spine and bilateral hips. While bone density measurement of the left hip can be acceptable for making the diagnosis of osteoporosis, assessment of therapy requires serial measurement of lumbar spine and total hip scores. The lumbar spine value is based on AP lumbar spine, not the lateral. (The same is true for initial diagnosis; unlike the left hip T-score, the lateral spine T-score is not useful for diagnosis either.) Absolute BMD, rather than T-score, is assessed for response to therapy; a loss of 4% of hip density, and/or 5% of spine density, is considered significant. If this happens despite alendronate therapy, work-up should address poor absorption of the drug, and include re-evaluation of vitamin D levels. Finally, some investigators have advocated for the use of biochemical markers of bone turnover to monitor effectiveness of medical therapy. Currently there is controversy on which marker to use and if they truly give useful information to guide therapy.[18]

II. Aeromedical Concerns.

While certain aviation career fields, such as loadmaster or aeromedical evacuation crewmembers, routinely involve weight bearing labor, any aircrew member may be called upon for physical exertion. All aircrew have the potential need to quickly egress their aircraft. In many cases the egress route may involve climbing up or down, with drops or falls of several feet, and may necessitate the rapid movement of heavy objects or assistance to other crew members. These conditions would further increase the likelihood of pathologic fractures in an osteoporotic aviator. Furthermore, a fracture while egressing emergently would pose an additional threat to the safety of the injured aviator and other aircrew by delaying evacuation.

In high-performance aircraft, aviators have a known, increased risk of cervical and lumbar injury due to the large forces experience in high “G” maneuvers. No body of data exists regarding the response of osteopenic/osteoporotic aviators in this environment due to a paucity of affected individuals who have been exposed, although anecdotal cases have certainly occurred (e.g., symptomatic vertebral fracture during initial centrifuge training in an osteoporotic male). It is almost certain that acceleration stresses on bone tissue weakened by osteoporosis would result in a higher incidence of these types of injuries. A fragility fracture occurring under high-G conditions could even result in a catastrophic mishap.

Alendronate is a reasonably effective drug, and the risk of side effects is minor as long as proper technique of administration is followed. It should be taken on a fasting stomach with water only, and no other food or beverage should be consumed for an hour after medicating to prevent inactivation of the drug. To avoid esophageal damage, an upright posture needs to be maintained

for at least an hour after ingestion. (The drug's inactivation by food can be useful; to further avoid the risk of esophageal ulceration, and the need to continue remaining upright, individuals are typically advised to eat a snack or meal an hour after taking the drug.) In high-performance aircraft some concern exists about the risk of inducing regurgitation of gastric contents due to G-suit abdominal compression, negative Gz forces, and reclined seating. In order to minimize this risk, it is recommended that high-performance aviators dose alendronate on a day when no flying is planned. If conflict with the flying schedule is unavoidable, the aviator should medicate at least 30-60 minutes prior to flying, and should eat a snack just before taking off, which will effectively neutralize any remaining drug.[16]

III. Waiver Consideration.

Osteoporosis is disqualifying for FC I/IA, II, and III. It is not listed as disqualifying for ATC/GBC or SMOD, and is also not listed as disqualifying for retention purposes. For FC I/IA or FC II, if an underlying cause for osteoporosis was identified, the underlying disease must be eligible for waiver, and must be treated effectively enough that the osteoporotic process is reversed. For FC II, the finding of osteopenia or osteoporosis, whether or not of a degree that requires prophylaxis, would not require airframe restriction, but the occurrence of a fragility fracture would require restriction from high-performance and ejection seat aircraft. For FC III, the variety of duties requires individual consideration; for instance, severe osteoporosis or the occurrence of a fragility fracture would contraindicate parachute duty.

Table 2: Waiver potential for osteoporosis and osteopenia

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA	Treated disease on approved medication	Maybe AETC
II/IIU/III	Treated disease on approved medication	Yes MAJCOM*
ATC/GBC	Osteoporosis**	N/A
SMOD	Osteoporosis**	N/A

*Waiver authority for FC IIU personnel is AFMSA
**Osteoporosis is not disqualifying for ATC/GBC and SMOD personnel

AIMWITS search in Nov 2011 revealed 31 cases with a diagnosis of osteoporosis or osteopenia. Of that total, 10 were disqualified. Breakdown was: 1 FC I case (disqualified); 15 FC II cases (4 disqualified); 14 FC III cases (5 disqualified); and 1 ATC case (0 disqualifications). Almost all cases were disqualified in part due to the diagnosis of osteoporosis or osteopenia. Over 80% of the cases were on medication for the condition, the most common being Fosamax®.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for osteoporosis or osteopenia should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of the condition to include any falls, possible secondary causes, or any other metabolic conditions.
C. Labs: Chemistry profile (electrolytes, blood urea nitrogen, creatinine, calcium, phosphorus, total protein, albumin, liver transaminases, and alkaline phosphatase), complete blood count, vitamin D level, and a 24-hour urine calcium
D. Imaging: Bone density measurement (total hip and lumbar spine).

The AMS for waiver renewal for osteoporosis or osteopenia should include the following:
A. Interval history since last waiver
B. Chemistry profile (electrolytes, blood urea nitrogen, creatinine, calcium, phosphorus, total protein, albumin, liver transaminases, and alkaline phosphatase) and a 24-hour urine calcium
C. Imaging: Bone density measurement (total hip and lumbar spine).

ICD 9 codes for osteoporosis and osteopenia	
733.00	Osteoporosis
733.90	Osteopenia

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WAIVER GUIDE
Updated: Nov 09
Supersedes Waiver Guide of Feb 00
By: Dr Dan Van Syoc

CONDITION:
Otosclerosis/Stapedectomy (Nov 09)

I. Overview.

Otosclerosis is characterized by an abnormal deposition of bone at the footplate of the stapes. It is a disease of unknown etiology and appears to affect genetically predisposed individuals[1]. This bony deposition leads to fixation of the stapes at the oval window preventing normal transmission of sound. It is the leading cause of conductive hearing loss in adults who do not have a middle ear effusion[2]. Stapes fixation was first described by Valsalva in 1704 during an autopsy on a deaf patient, and in 1860 Toynbee first described the condition causing a hearing loss by fixation of the stapes. In 1894 Politzer first referred to the fixation of the stapes as otosclerosis. Successful surgery for this condition dates back to Holmgren who fathered the practice of fenestration surgery in 1923[3, 4]. Although the major concern with otosclerosis is conductive hearing loss, it can also cause a sensorineural hearing loss when it invades the otic capsule. Additionally an estimated 10-30% of patients will also present with vestibular symptoms or demonstrate abnormalities on vestibular testing[5].

The overall prevalence of histologic otosclerosis is about 10%. Around 10% of these are affected clinically making the overall prevalence of noticeable hearing loss secondary to otosclerosis approximately 1% in the US population. This disease is more common in Caucasians than in other races. Women more commonly seek medical attention for hearing loss secondary to otosclerosis; however, studies looking at histologic prevalence of otosclerosis show no difference in men versus women. However, pregnancy seems to hasten presentation[6]. The incidence of otosclerosis also increases with age. The most common age group presenting with hearing loss from otosclerosis is 15-45 years; however, it has been reported to manifest as early as 7 years and as late as the mid 50s[3]. Approximately 80% of patients will develop bilateral otosclerosis, though the progression of each ear may be different. Diagnosis is based on history and clinical exam. Clinical exam may show a reddish blush on the promontory mucosa (Schwartze's sign—associated with active disease). Screening with 512-Hz and 256-Hz forks will often show a reverse Rinne test[6]. Audiometric screening includes air conduction, bone conduction, acoustic reflexes and speech audiometry[4]. Typically depending on how advanced the disease is, the audiogram will show varying degrees of conductive hearing loss. As mentioned above some advanced forms may cause a sensorineural hearing loss. Acoustic reflexes are absent due to stapes fixation. In recent years, imaging studies have played a greater role with high-resolution CT (HRCT) being the radiologic method of choice in the assessment of the labyrinthine windows and otic capsule. Recent estimates demonstrate the sensitivity of CT for the diagnosis of otosclerosis to be at least 90%[1]. The differential diagnosis for conductive hearing loss in patients without discernable ear pathology includes the following: congenital malleus/incus fixation, congenital stapes fixation, other congenital ossicular abnormalities (1st or 2nd arch syndromes), post-inflammatory ossicular fixation, ossicular discontinuity, osteogenesis imperfecta tarda, Paget's disease, and osteopetrosis.

For many people with otosclerosis, no treatment is indicated initially. As the hearing loss progresses, the patient may opt to try hearing aids. Use of hearing aids in the cockpit environment may be a handicap as the aviator will be unable to tune out unwanted sounds and transmissions. In fact the phenomenon of "Paracusis of Willis" allows patients with otosclerosis to hear better in a noisy environment than in a quiet locations. Hearing aids work by essentially amplifying all sound transmitted to the ear, and even distorting the sound at times[7]. However, modern hearing aids can offer a variety of noise filters for different listening environments. The currently popular surgical treatment for otosclerosis is stapedectomy, first performed by John Shea in 1956. This procedure is still commonly performed, with some modifications, by many ENT surgeons throughout the world. With increasing availability of good surgical care and of adequate screening tests, the average age of presenting patients has declined over the past fifty years (52 to 50) as has the number of years with noticeable hearing loss (18 to 11)[8].

There are actually three surgical options for otosclerosis: total stapedectomy, partial stapedectomy, and stapedotomy. The different designations correspond to the amount of footplate removed. Partial stapedectomy involves removal of the posterior third of the footplate while stapedotomy involves drilling or lasering a hole in the stapes footplate, inserting a prosthesis through the hole to the oval window and anchoring it to the incus. The technique chosen depends on the degree of sclerosis and surgeon preference; most perform a stapedotomy. In experienced hands, the success rate of these procedures is in excess of 90% as measured by return of hearing to normal or near normal[3, 9]. Over time, a small percentage of patients have a return of hearing loss symptoms or develop complications such as dizziness, sensori-neural hearing loss, distortion of sound or tympanic membrane complications. Depending on the cause, a revision procedure is often accomplished. Expected outcomes for these patients are not as good as with the primary procedure; successful hearing results range from 16% to 80% with a mean of 53%, with the variability in results due to the indication for the revision[10].

II. Aeromedical Concerns.

Loss of normal hearing capability is a concern in aircrew. Otosclerosis may progress to the point of hearing loss or more rarely vestibular symptoms significant enough to compromise flight safety. Most aircrew delay surgical intervention because of the Paracusis of Willis phenomenon. However, when the hearing begins to compromise communications, they will present for surgical or audiometric remediation. Surgery offers freedom from having to use amplification. Fortunately complications following surgery are rare, but may be significant. These include the following: acute otitis media, suppurative labyrinthitis and meningitis, vertigo, reparative granuloma, perilymph fistula, facial paralysis, fluctuating conductive hearing loss, persistent perforation of the tympanic membrane, taste disturbance and dry mouth, postoperative fibrosis, incus necrosis, and delayed sudden deafness[11]. Vertigo may occur immediately after stapedectomy, or its onset may be delayed by weeks or years. Vertigo that is not resolved with treatment is incompatible with flying duties. Perilymph fistula postoperative risk is 0.34—9.0%, with symptoms similar to those of endolymphatic hydrops (hearing loss, vertigo, ear fullness, and tinnitus) and may be incompatible with flying duty if definitive treatment is not achieved. Facial nerve paralysis may cause dry eye which may present significant problems for aviators flying in dry cockpit conditions, or facial droop which may interfere with wear of aviator masks. Persistent perforation of one tympanic membrane could lead to alternobaric vertigo and is not compatible with flying duties.

Return to aviation duties following stapedectomy or stapedotomy has been controversial within the aeromedical community for the past forty years. In the 1960s and 1970s, concern with barometric pressure changes causing a perilymph fistula led to Air Force policy that prevented return to flying duties for aviators after these procedures[12]. As more and more affected individuals had this procedure for a return to flying duties, pressure mounted on medical authorities to develop a more reasonable policy. Dr. Rayman's proposed criteria in his 1972 paper led the way to a consistent and reasonable approach to these airmen[13]. Revising policy has been a long process, but results so far have been very encouraging with the dreaded complication of a perilymph fistula being very rare in the carefully selected group of aviators[14-16].

III. Waiver Consideration.

Otosclerosis and stapedectomy are not specifically mentioned in AFI 48-123, but it is noted that a history of surgery involving the middle ear is disqualifying. Also, hearing defects are well described as are conditions that interfere with auditory or vestibular functions.

If the otosclerosis results in hearing loss and/or vertigo, then waiver guidelines for those diagnoses should be followed as well. If the aviator undergoes successful surgical treatment, an evaluation at the USAF Aeromedical Consultation Service (ACS) is required for single seat high performance aircrew and FC I/IA candidates, and may be scheduled no earlier than 12 weeks postoperatively. Evaluation at the ACS will include evaluation by an otolaryngologist with review of all medical records, pre and post-operative testing, and surgical report. Diagnostic audiology including air conduction threshold measurement; bone conduction threshold measurement (if indicated); speech reception threshold; speech discrimination testing; acoustic impedance testing and ENG will be accomplished if indicated. An altitude chamber flight with a flight surgeon is required only for those who have had the traditional stapedectomy surgery, to test for perilymph fistula**.** For those who have undergone the newer stapedotomy surgery, an altitude chamber evaluation is not required. If a chamber flight is performed, it should include a rapid descent (5000 feet/min) from 10,000 feet. A rapid decompression is also required. Additional tests are done as clinically or aeromedically indicated. If ACS evaluation reveals no post-op sequelae, the aviator may be recommended for an unrestricted waiver.

Table 1: Waiver potential for otosclerosis

Flying Class (FC)	**Waiver Potential Waiver Authority**	**ACS Review/Evaluation**
I/IA	Yes[#] AETC	ACS evaluation necessary if stapes surgery performed[*]
II	Yes[#] MAJCOM	ACS evaluation necessary if stapes surgery performed[*&]
IIU	Yes[#] MAJCOM	No
III	Yes[#] MAJCOM	No

*those seen at the ACS need to have hearing within aviation standards or with waiverable hearing loss and be without any vestibular symptoms.
&single seat high performance aircrew only
no indefinite waivers

An August 2009 review of AIMWTS revealed a total of 29 cases submitted for a waiver with the diagnosis of otosclerosis. This total included 1 FC I case, 19 FC II cases, and 9 FC III cases, all receiving a waiver. In 10 of the cases, the airman had surgery, which was a stapedectomy in each case and there were 4 cases where it was stated the airman was wearing a hearing aid. There were a total of 6 females in the database.

IV. Information Required for Waiver Submission.

Information required for an initial waiver for otosclerosis should include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history to include all hearing and vertiginous symptoms and impact on activities of daily living and aviation duties. Discuss all attempted treatments such as hearing aids.
C. Exam: complete audiologic exam to include air conduction threshold measurement; bone conduction threshold measurement (if indicated); speech reception threshold; speech discrimination testing; acoustic impedance testing and ENG if clinically indicated. Also complete report of ENT exam.
D. Consult: ENT surgeon and audiologist.
E. All surgical reports to include details of technique used, type of prosthesis and type of graft used.

The following information will be required for waiver renewal every three years (if any abnormalities surface in the interim, they will need to be addressed appropriately):
A. Interim history to include any change in hearing, any side effects such as vertiginous symptoms, and any operational problems.
B. Exam: ENT and audiology evaluations.

ICD 9 codes for Otosclerosis and Stapedectomy	
387	Otosclerosis
387.9	Otosclerosis, unspecified
19.1	Stapedectomy
19.19	Other stapedectomy
19.9	Stapedotomy

Waiver guide reviewed by Col David Schall (RAM 83/Otolaryngologist and Neuro-Otologist)

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WAIVER GUIDE
Updated: Jan 10
Supersedes Waiver Guide of Mar 06
By: Lt Col Kathryn Hughes (RAM 10) and Dr. Dan Van Syoc

CONDITION:
Pancreatitis (Jan 10)

I. Overview.

Pancreatitis is a condition in which digestive enzymes are activated within the pancreas instead of the small intestine, causing organ injury with a significant and damaging inflammatory response in the pancreas[1]. The disease can present as either an acute or chronic condition.

Acute pancreatitis has an incidence of 70-80 per 100,000 people in the United States[2]. Symptoms typically include an abrupt onset of constant, dull, posteriorly radiating abdominal pain due to the retroperitoneal location of the pancreas, nausea and vomiting[1]. The physical exam will generally reveal an anxious patient in some distress with tachycardia, low-grade fever, hypotension and reluctance to lay supine since that position stretches the pancreas and increases pain. The abdomen may be diffusely tender and rigid with diminished bowel sounds. Lab abnormalities may include leukocytosis, elevated amylase and lipase (over 3 times normal), hyperglycemia, hypocalcemia, elevated liver function tests, elevated C-reactive protein, hypertriglyceridemia (in cases where elevated triglycerides are the cause of the problem), hemoconcentration and hypoxia[3]. Imaging tests include chest and/or abdominal x-ray, ultrasound and CT scan which can be used to not only diagnosis pancreatitis but also to assess the severity and predict complications of acute pancreatitis[4]. Fortunately, the disease resolves spontaneously in 85-90% of patients. Approximately 20% of acute pancreatitis cases are severe with organ failure and local complications such as pancreatic necrosis, or by the formation of a pancreatic pseudocyst. Death, if it occurs, is due to metabolic derangement, renal failure, infection, hemorrhage, or multi-organ failure[1].

Acute pancreatitis can be due to a number of causes, but 40% of cases result from cholelithiasis (or microlithiasis with stones <5 mm in size) and 35% from heavy alcohol use. Of note, pancreatitis due to alcohol abuse develops after about four to seven years of drinking and can have a more gradual onset of abdominal pain than the abrupt pain associated with cholelithiasis-induced pancreatitis[2]. Pancreatitis can also be caused by trauma (especially abdominal) or can present as a postoperative complication. Metabolic causes include acute fatty liver of pregnancy, hypertriglyceridemia (2% of pancreatitis cases), and hypercalcemia. If hypercalcemia is present, consider the diagnosis of hyperparathyroidism. Rare metabolic causes include apolipoprotein CII deficiency. Neoplasms such as pancreatic cancer can also cause pancreatitis. Infectious causes include mumps, viral hepatitis, ascariasis, mycoplasma, campylobacter, M. avium complex, and a variety of viruses, such as coxsackievirus, echovirus and cytomegalovirus. A variety of medications are also known to cause pancreatitis. These include sulfonamides, oral contraceptive pills and other estrogens, tetracycline, thiazide diuretics, azathioprine, furosemide, valproic acid, acetaminophen, nitrofurantoin, erythromycin, salicylates, metronidazole, NSAIDs, ACE inhibitors, and methyldopa. Connective tissue disorders that cause vasculitis can also cause pancreatitis. These include systemic lupus erythematosus, necrotizing angiitis and thrombotic thrombocytopenic purpura. Pancreatitis can be a complication of a penetrating peptic or duodenal ulcer. Any condition that obstructs the ampulla of Vater can cause pancreatitis, such as a duodenal

diverticulum or regional enteritis. Pancreatitis can also be hereditary, caused by carrying the cystic fibrosis gene or by a mutation in the trypsinogen gene, and can be caused by congenital malformation of the pancreas. Finally, pancreatitis is idiopathic in approximately 20% of cases. If pancreatitis is recurrent and no obvious cause is found, consider occult biliary disease, neoplasm, cystic fibrosis, hypertriglyceridemia, sphincter of Oddi dysfunction, or pancreas divisum.

Chronic pancreatitis results from recurring, progressive pancreatic inflammation leading to permanent organ damage, and loss of endocrine and exocrine function[5]. It has an incidence of about 3-10 per 100,000. The most common cause is alcohol abuse. CT findings show parenchymal loss and calcifications within the pancreas. Cystic fibrosis can cause chronic pancreatitis, as can hypertriglyceridemia, hemochromatosis, severe malnutrition, gastric surgery or pancreatic resection, neoplasm of the pancreas or duodenum, gastrinoma, and abdominal radiation therapy. Chronic pancreatitis can also be idiopathic or hereditary. A rare cause is alpha-1 antitrypsin deficiency. Chronic pancreatitis may present with chronic pain, malabsorption with malnutrition, weight loss, steatorrhea, or gastroparesis. Complications may include narcotic addiction, diabetes mellitus, pancreatic cancer, and permanent pancreatic insufficiency[2].

Treatment of acute pancreatitis is generally supportive and includes pain control, aggressive IV fluid replacement, and GI rest[6]. If the etiology of acute pancreatitis is cholelithiasis then laparoscopic cholecystectomy may be indicated. Chronic pancreatitis may require pancreatic enzyme replacement as well as pain control and management of its complications. Occasionally, chronic pancreatitis can be relieved by endoscopy or surgery to open the sphincter of Oddi or by removing part of the pancreas[5].

II. Aeromedical Concerns.

Acute pancreatitis can be sudden and devastating in its onset, and as such, it poses a danger to flight and to mission completion. The complications of chronic pancreatitis such as chronic pain, diabetes, pancreatic cancer, and the drugs required to treat those complications, likewise endanger flying safety and mission completion. Furthermore, the underlying cause of the pancreatitis (such as alcohol abuse) may pose a serious danger to the safety of flight.

The flight surgeon must determine if the underlying cause of the pancreatitis is waiverable in its own right (refer to AFI 48-123 and AF Waiver Guide). For example, alcohol abuse complicated by pancreatitis is generally not waiverable; cholelithiasis corrected by surgery is waiverable. If the cause was a medication, the aviator must be switched to a drug that is waiverable (and the pancreatitis must resolve without sequelae). It is important to caution the patient to NEVER use the offending drug in the future. If the underlying cause requires a Medical Evaluation Board, that must be accomplished prior to requesting a waiver. Waivers for pancreatitis caused by cholelithiasis will not be considered unless the gallbladder has been removed and the operating surgeon is convinced there is no retained common duct stone, after which an indefinite waiver is possible. Waivers for hereditary pancreatitis or pancreatitis due to uncorrectable factors will generally not be considered. If the pancreatitis was caused by binge drinking, the flyer must have undergone an ADAPT evaluation demonstrating that he or she is not an alcoholic and that he or she has gone through alcohol counseling and education.

III. Waiver Consideration.

Pancreatitis, regardless of the etiology, is disqualifying for all classes of flying in the USAF.

Table 1 – Waiver Potential for Pancreatitis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation or Review
I/IA	Acute	Yes* AETC	If requested by AETC
	Chronic	No AETC	No
II	Acute	Yes* MAJCOM	If requested by MAJCOM
	Chronic	Yes*+# MAJCOM	Yes
IIU	Acute	Yes* AFMSA	If requested by AFMSA
	Chronic	Yes*+# AFMSA	If requested by AFMSA
III	Acute	Yes* MAJCOM	If requested by MAJCOM
	Chronic	Yes*+# MAJCOM	Yes

* Waiver possible with resolution of the acute phase and no sequelae from chronic state.
+ MEB required prior to waiver consideration.
# No indefinite waiver.

A review of AIMWTS records disclosed 40 waiver requests for pancreatitis, 38 acute and 2 chronic. There were 3 FC I/IA cases, 25 FC II cases, 0 FC IIU cases, and 13 FC III cases. Four were disqualified, two (one FC 1A and one FC II) due to other medical conditions, one (FC III) due to the etiology of alcohol-induced acute pancreatitis with continued alcohol dependence, and the last one (FC III) for substance abuse. The two FC I waivers granted were indefinite, both of which were cases of acute pancreatitis with idiopathic etiology. Of the 36 waivers granted, nine were indefinite and 22 cases were granted three-year waivers due the need for follow-up of other medical conditions.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Acute pancreatitis (All flying classes):
The aeromedical summary for acute pancreatitis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history and etiology of the condition and how it was treated.
C. A statement that the aviator is completely recovered from the illness, that he/she has not suffered any complications, and that he/she is tolerating a regular diet, having normal bowel movements and is capable of normal activities.
D. Consultation report by a gastroenterologist specifically addressing the likelihood of recurrence.
E. Documentation:

- Reports: Operative reports, consultation reports, hospital discharge summary.
- Imaging studies: Post-recovery abdominal CT scan (demonstrating a healthy pancreas without pseudocyst or calcifications), and an ultrasound or other study demonstrating the absence of gallstones or sludge
- Lab studies: CBC, glucose, calcium, amylase, lipase, trypsin (if available), fasting lipid panel, and liver function tests.

Chronic pancreatitis:
Active chronic pancreatitis is not waiverable. If the chronic pancreatitis has been cured by a surgical procedure or the resolution of the underlying condition, the flight surgeon should proceed as outlined for acute pancreatitis. An MEB will be required for all cases of chronic pancreatitis.

Waiver Renewal: For a time limited waiver, a renewal aeromedical summary is needed. It should include all interim history and medical information necessary to update the case.

ICD 9 Codes for Pancreatitis	
577.0	Acute pancreatitis
577.1	Chronic pancreatitis
072.3	Mumps pancreatitis

Waiver Guide reviewed by Col Timothy D. Cassidy, AF/SG consultant in Gastroenterology and by Col Patrick Storms, AF RAM and gastroenterologist.

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WAIVER GUIDE
Updated: Jun 2012
Supersedes Waiver Guide of Dec 2008
By: Maj William A Hayes (RAM 12) and Dr. Dan Van Syoc
Reviewed by Col Timothy Cassidy, AF/SG Consultant for Gastroenterology

CONDITION:
Peptic Ulcer Disease (Jun 12)

I. Overview.

Peptic ulcer disease (PUD) is a problem of the gastrointestinal tract characterized by mucosal damage secondary to pepsin and gastric acid secretion. It usually occurs in the stomach and proximal duodenum. Less commonly, it occurs in the lower esophagus, the distal duodenum, or the jejunum, as in unopposed hypersecretory states such as Zollinger-Ellison syndrome, in hiatal hernias (Cameron ulcers), or in ectopic gastric mucosa (e.g., in Meckel's diverticulum).[1] Approximately 500,000 persons develop PUD in the United States each year, and in 70 percent of patients, it occurs between the ages of 25 and 64.[2, 3] The incidence of peptic ulcers is declining, possibly as a result of the increasing use of proton pump inhibitors and decreasing rates of *Helicobacter pylori* infection.[4, 5]

H. pylori infection and the use of nonsteroidal anti-inflammatory drugs (NSAIDs) are the predominant causes of peptic ulcer disease in the United States, and along with smoking, account for 89 to 95 percent of PUD and related serious upper GI events.[6] A variety of other infections and comorbidities are associated with a greater risk of peptic ulcer disease (e.g., cytomegalovirus, tuberculosis, Crohn's disease, hepatic cirrhosis, chronic renal failure, sarcoidosis, myeloproliferative disorder). Critical illness, surgery, or hypovolemia leading to splanchnic hypoperfusion may result in gastroduodenal erosions or ulcers (stress ulcers); these may be silent or manifest with bleeding or perforation. Smoking also increases the risk of ulcer recurrence and slows healing.[7] Among those not using NSAIDs, the incidence increases with age and is approximately two times more common in men.[8]

Although *H. pylori* is present in the gastroduodenal mucosa in most patients with duodenal ulcers, the majority of patients with *H. pylori* infection do not develop peptic ulcer disease.[9] *H. pylori* bacteria in the gastric tract will adhere to the gastric mucosa. The presence of an outer inflammatory protein and a functional cytotoxin-associated gene island in the bacterial chromosome increases virulence and probably ulcerogenic potential.[10] Patients with *H. pylori* infection have increased resting and meal-stimulated gastrin levels and decreased gastric mucus production and duodenal mucosal bicarbonate secretion, all of which favor ulcer formation. Ulcer recurrence has been shown to be much less common in those patients who are *H. Pylori*-cured (6%) vs. non-cured (67%) in patients with duodenal ulcers and in patients with gastric ulcers, cured (4%) vs. uncured (59%).[11]

Topical effects of NSAIDs cause submucosal erosions. In addition, by inhibiting cyclo-oxygenase, NSAIDs inhibit the formation of prostaglandins and their protective cyclo-oxygenase- 2–mediated effects (i.e., enhancing gastric mucosal protection by stimulating mucus and bicarbonate secretion and epithelial cell proliferation and increasing mucosal blood flow). Coexisting *H. pylori* infection increases the likelihood and intensity of NSAID-induced damage.[12] The annual risk of a life-

threatening ulcer-related complication is 1 to 4 percent in patients who use NSAIDs long-term, with older patients at the highest risk.[13] NSAID use is responsible for approximately one half of perforated ulcers, which occur most commonly in older patients using aspirin or other NSAIDs for cardiovascular disease or arthropathy.[14, 15] Proton pump inhibitors and misoprostol (Cytotec) minimize the ulcerogenic potential of NSAIDs and reduce NSAID-related ulcer recurrence.[1]

Typical symptoms of peptic ulcer disease include episodic gnawing or burning epigastric pain; pain occurring two to five hours after meals or on an empty stomach; and nocturnal pain relieved by food intake, antacids, or antisecretory agents. A history of episodic or epigastric pain, relief of pain after food intake, and nighttime awakening because of pain with relief following food intake are the most specific findings for peptic ulcer and help rule in the diagnosis. Less common features include indigestion, vomiting, loss of appetite, intolerance of fatty foods, heartburn, and a positive family history.[16] The physical examination is less reliable—in one study, tenderness to deep palpation reduced the likelihood of ulcer. The natural history and clinical presentation of peptic ulcer disease differ in individual populations.[17] Abdominal pain is absent in at least 30 percent of older patients with peptic ulcers.[18] Postprandial epigastric pain is more likely to be relieved by food or antacids in patients with duodenal ulcers than in those with gastric ulcers. Weight loss precipitated by fear of food intake is characteristic of gastric ulcers. About 25 percent of patients with peptic ulcer disease have a serious complication such as hemorrhage, perforation, or gastric outlet obstruction. Silent ulcers and complications are more common in older patients and in patients taking NSAIDs.[18, 19] The incidence of serious upper gastrointestinal complications among persons in the general population who do not take NSAIDs is extremely low (less than one per 1,000 person-years).[20]

If the initial clinical presentation suggests the diagnosis of peptic ulcer disease, the patient should be evaluated for alarm symptoms. Anemia, hematemesis, melena, or heme-positive stool suggests bleeding; vomiting suggests obstruction; anorexia or weight loss suggests cancer; persisting upper abdominal pain radiating to the back suggests penetration; and severe, spreading upper abdominal pain suggests perforation. Patients older than 55 years and those with alarm symptoms should be referred for prompt upper endoscopy.[1] Esophagogastroduodenoscopy (EGD) is more sensitive and specific for peptic ulcer disease than upper gastrointestinal barium studies and allows biopsy of gastric lesions.[21] Patients younger than 55 years with no alarm symptoms should be tested for *H. pylori* infection and advised to discontinue the use of NSAIDs, smoking, alcohol, and illicit drug use. Presence of *H. pylori* can be confirmed with a serum enzyme-linked immunosorbent assay (ELISA), urea breath test, stool antigen test, or endoscopic biopsy. Serum ELISA is often used, but has low performance issues in low-prevalence populations. The stool antigen test is less convenient but is highly accurate (greater than 90% sensitivity and specificity) and can also be used to confirm *H. pylori* eradication, as can the urea breath test.[21] If test results are positive for *H. pylori*, the infection should be eradicated and antisecretory therapy, preferably with a proton pump inhibitor (PPI) and antibiotics. Further management is based on the endoscopic or radiologic diagnosis. Patients with persistent symptoms should be referred for endoscopy to rule out refractory ulcer and malignancy. Patients without alarm symptoms who respond well to therapy without relapse do not necessarily need to be referred for endoscopy or radiographic studies.

Treatment of peptic ulcer disease should include eradication of *H. pylori* if the patient tests positive. Over the past 20 years, *H. pylori* eradication therapies have mainly consisted of antimicrobial agents combined with antisecretory drugs. Treatment of active ulcers always necessitates the use of a PPI as they have been shown to heal peptic ulcers more rapidly than H_2-blockers or any other drug.[20] The most common first-line treatment is usually a triple therapy with a PPI twice daily plus

clarithromycin 500 mg twice daily and either amoxicillin 1 g twice daily (PPI-CA) or metronidazole 500 mg twice daily (PPI-CM) for 7–14 days.[22] Standard triple therapy composed of PPI, clarithromycin and amoxicillin/or metronidazole is more successful if extended to more than seven days. Increased resistance to antibiotics used in the PPI triple therapy needs to be considered in the selection of treatment. Recently, sequential treatment consisting of five days of a PPI plus amoxicillin followed by five additional days of a PPI plus clarithromycin plus tinidazole has been shown to be better than the combination of a PPI plus amoxicillin and clarithromycin for seven days.[22] Currently approved PPI medications include esomeprazole (Nexium®), lansoprazole (Prevacid®), omeprazole (Prilosec®), pantoprazole (Protonix®) and rabeprazole (Aciphex®), as well as the histamine-2 blocker ranitidine (Zantac®).

Eradicating *H. pylori* is often sufficient in patients with small duodenal ulcers. Repeated EGD with biopsy is recommended to confirm healing of gastric ulcers and to rule out malignancy. A recent systematic review of randomized controlled trials showed that proton pump inhibitors healed duodenal ulcers in more than 95 percent of patients at four weeks and gastric ulcers in 80 to 90 percent of patients at eight weeks.[23] Therefore, there is little reason to prescribe proton pump inhibitors for longer than four weeks for duodenal ulcers unless the ulcers are large, fibrosed, or unresponsive to initial treatment. Maintenance therapy with H_2 blockers or proton pump inhibitors prevents recurrence in high-risk patients (e.g., those with a history of complications, frequent recurrences, ulcers testing negative for *H. pylori*, refractory giant ulcers, or severely fibrosed ulcers), but it is not generally recommended for patients in whom *H. pylori* has been eradicated and who are not taking NSAIDs long-term.

II. Aeromedical Concerns.

Sudden incapacitation due to perforation or hemorrhage is of primary concern. Chronic blood loss from PUD may lead to anemia. Ulcer pain may be distracting and interfere with performance during critical phases of flight.

III. Waiver Consideration.

Peptic ulcer disease is disqualifying for all flying classes and for ATC/GBC personnel. It is also disqualifying for retention which indicates that SMOD personnel will also require a waiver to continue in that career field.

Table 1 – Waiver Potential for PUD for FC I/IA, FC II and FC III

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA Initial II or III	Peptic ulcer disease, active or refractory Peptic ulcer complicated by hemorrhage, obstruction or perforation.	No AETC Maybe*+ AETC	No Yes
II/III	Peptic ulcer disease, active or refractory Peptic ulcer complicated by hemorrhage, obstruction or perforation.	Maybe*+# MAJCOM Maybe*+# MAJCOM	Yes Yes
ATC/GBC	Peptic ulcer disease, active or refractory Peptic ulcer complicated by hemorrhage, obstruction or perforation.	Maybe*+MAJCOM Maybe*+MAJCOM	At MAJCOM request At MAJCOM request
SMOD	Peptic ulcer disease, active or refractory Peptic ulcer complicated by hemorrhage, obstruction or perforation.	Maybe*+ AFSPC or GSC Maybe*+ AFSPC or GSC	No No

* Waiver possible with documentation of treatment and resolution of symptoms or documentation of adequate control measures.
+ MEB required first if individual experiences repeated incapacitations or absences from duty because of recurrence of symptoms despite good medical management which is supported by laboratory and/or X-ray evidence of activity or severe deformity.
# AFMSA is waiver authority if limitation code C from MEB in place (for FC IIC not worldwide qualified)

Review of AIMWTS in February 2012 showed 54 cases of peptic ulcer disease; 1 FC I, 1 FC 1A, 24 FC II, 1 FC IIA, 1 FC IIB, 1 FC IIC, 22 FC III, 0 SMOD, 1 GBC/UAS, and 2 ATC. Of the 54 cases, three (5.4%) were disqualified; one disqualified for another medical condition (IBS); two disqualified by complex medical histories (multiple disqualifying conditions).

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for *H. Pylori* positive and/or NSAID-associated peptic ulcer must include the following:
A. History and physical with note of presence or absence of ulcer complications (obstruction, perforation, or bleeding), and NSAID, tobacco and alcohol use
B. Documentation of *H. Pylori* status, treatment and eradication (as applicable)
C. Documentation of cessation of NSAID use (as applicable)
D. Documentation of ulcer healing by confirmatory endoscopy
E. Report of current (returned to baseline) hemoglobin and hematocrit result
F. Documentation that the aviator has been counseled about the warning symptoms of ulcer recurrence and complications (pain, melena, BRBPR, hematemesis, nausea and vomiting, lightheadedness, dyspnea on exertion)
G. Documentation that the aviator is asymptomatic without acid-suppressing medication (waiver may be considered on a case-by-case basis with chronic acid suppression therapy)

Recurrence risk of peptic ulcers without clear etiology is unknown. Waiver may be considered on a case-by-case basis.

ICD 9 Codes for Peptic Ulcer Disease	
533	Peptic Ulcer, Site Unspecified
533.0	Acute Peptic Ulcer of Unspecified Site with Hemorrhage
533.00	Acute Peptic Ulcer of Unspecified Site with Hemorrhage, without Mention of Obstruction
533.1	Acute Peptic Ulcer of Unspecified Site with Perforation
533.3	Acute peptic ulcer of unspecified site without mention of hemorrhage and perforation
533.4	Acute Peptic Ulcer of Unspecified Site with Hemorrhage
533.9	Peptic Ulcer of Unspecified Site Unspecified as Acute or Chronic, Without Mention of Hemorrhage or Perforation

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WAIVER GUIDE
Updated: May 2010
Supersedes waiver guide of Jul 2007
By: Dr. Dan Van Syoc
Reviewed by Dr. William Kruyer, ASC Chief Cardiologist

CONDITION:
Pericardial Disorders including Myopericarditis (May 10)

I. Overview.

The pericardium is a fibrous structure surrounding the heart composed of visceral and parietal layers separated by a pericardial cavity, which normally contains about 15-50 mil of straw-colored fluid.[1, 2] Pericardial disorders include any abnormality involving the pericardium. Acute pericarditis most commonly arises either from idiopathic causes or a precipitating viral illness such as an upper respiratory infection (URI). Acute disease is common and must be considered in the differential diagnosis of chest pain in adults.[3] The incidence of acute pericarditis is unknown, but it does account for approximately 5 percent of patients presenting with nonischemic chest pain to emergency departments. Interestingly, patients with congenital or surgical absence of the pericardium show few, if any, clinical problems.[2, 4, 5]

Other less frequent causes of acute pericarditis include other infectious etiologies (such as tuberculosis), cancer, rheumatic disease, metabolic conditions (hypothyroidism, uremia), drug-related, radiation-induced and post acute myocardial infarction (MI). Post-traumatic pericarditis may also occur, including post-surgical.[6] Most cases of idiopathic or viral-related acute pericarditis are self-limited disorders and resolve either spontaneously or with conservative treatment. Pericarditis may occasionally be complicated by the presence of a pericardial effusion or by pericardial thickening. Only rarely do acute pericarditis-associated effusions result in clinically significant situations such as pericardial tamponade. Inflammatory-associated pericardial thickening may rarely progress to constrictive pericarditis.[5]

Other conditions involving the pericardium are rarer. Myopericarditis is a condition in which the inflammation of the pericardium spreads to the underlying myocardium itself. This is marked by the presence of positive cardiac enzymes in routine blood work, and can be complicated by myocardial wall-motion abnormalities, although overall left ventricular systolic function is usually normal. Myopericarditis typically resolves with usual anti-inflammatory therapy. This should be differentiated from primary myocarditis without associated pericarditis, typically associated with either global hypokinesis and/or a reduction in overall left ventricular ejection fraction.[2] This usually portends a much poorer prognosis (see cardiomyopathy waiver guide). Additional unusual pericardial diseases include pericardial cysts and congenital absence of the pericardium.

Acute pericarditis is typically diagnosed by a triad of historical symptoms, clinical signs, and routine testing (e.g. ECG). The usual pain is a pleuritic-type pain which is often worse when lying supine and relieved by sitting upright. It may or may not have a respiratory component. The classic three-phase friction rub is highly specific, but sensitivity varies as the rub is variably present on physical examination. The typical ECG pattern of diffuse ST-segment elevation may or may not be present.[3, 7] Most cases of acute pericarditis resolve after a few days to weeks of anti-inflammatory drug therapy such as aspirin and nonsteroidal anti-inflammatory drug (NSAID). Aspirin (2 to 4

grams), indomethacin (75 to 225 mg daily), and ibuprofen (1600 to 3200 mg daily) are prescribed most often, with ibuprofen preferred, since it has a lower incidence of adverse effects than the others.[1]

The literature state that 10% to 30% of all cases of acute pericarditis will go on to recurrent disease.[3, 8] Recurrence of symptoms following an acute uncomplicated case of pericarditis are usually related to premature discontinuation of anti-inflammatory treatment.[9] The underlying inflammatory process usually lasts 6-8 weeks, although symptoms typically resolve within just a few days of initiating anti-inflammatory treatment. The tendency to suspend treatment (often done after about two weeks if the patient is asymptomatic) with resolution of symptoms should therefore be avoided, and a 6-8 week course of treatment is recommended to avoid symptom recurrence. If recurrence does occur then NSAID and colchicine are the preferred treatment, with glucocorticoids reserved for treatment failure.[7] Another encouraging fact is that the vast majority of patients with recurrent pericarditis have an excellent overall life prognosis with a very small incidence rate of cardiac tamponade and no reported cases of restrictive pericarditis.[10]

II. Aeromedical Concerns.

Aeromedical concerns surrounding uncomplicated, acute pericarditis revolve around the potential for sudden complications, the ability to perform flight duties while the active inflammatory state is underway, recurrence of symptoms, and medical treatment. Arrhythmias are very rare occurrences in individuals with idiopathic or viral pericarditis, and as such the risk for sudden incapacitation is rare.[11] Treatment regimens for acute, uncomplicated pericarditis typically are limited to NSAIDs or glucocorticoids. NSAIDs (ibuprofen, aspirin and naproxen) are waiverable medications once symptoms have resolved. Glucocorticoids and colchicine are not waiverable, as side-effects are not compatible with aircrew duties.

Aviators with a history of completely treated (6-8 weeks anti-inflammatory drug) idiopathic or viral pericarditis are very unlikely to develop recurrent episodes of pericarditis. In aviators with pericarditis complicated by significant pericardial effusion or myocardial inflammation, the aeromedical risks increase as effects on myocardial cellular function and overall hemodynamics are potentially increased. Complicated cardiac arrhythmias may occur, and regional wall motion abnormalities may compromise cardiac responses to physiologic stress. Furthermore, myopericarditis may require an extended period of treatment for complete resolution of any underlying wall motion abnormalities or resolution of associated pericardial effusion.

III. Waiver Considerations.

Pericardial disorders including myopericarditis are disqualifying for all classes of flying duties. For FC IIU personnel, pericarditis is not mentioned specifically in 48-123, but any abnormal or borderline ECG is disqualifying. As most cases of acute pericarditis do exhibit abnormal ECG findings, active pericarditis is also disqualifying for FC IIU personnel. ACS review and evaluation is required in all cases for waiver consideration.

Table 1: Waiver potential for pericardial disorders.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Uncomplicated idiopathic/viral pericarditis, off all medications and ≥6 months since episode	Yes AETC	Yes
	Complicated pericarditis including pericarditis with effusion and myopericarditis, off all medications and ≥1 year since episode	Maybe AETC	Yes
	Other pericardial disorders	Maybe AETC	Yes
II/III	Uncomplicated idiopathic/viral pericarditis*	Yes MAJCOM	Yes
	Complicated pericarditis including pericarditis with effusion and myopericarditis†	Maybe MAJCOM	Yes
	Other pericardial disorders	Maybe MAJCOM	Yes
IIU	Uncomplicated idiopathic/viral pericarditis*	Yes AFMSA	At the discretion of AFMSA
	Complicated pericarditis including pericarditis with effusion and myopericarditis†	Maybe AFMSA	At the discretion of AFMSA
	Other pericardial disorders	Maybe AFMSA	At the discretion of AFMSA
GBC/ATC	N/A-not disqualifying	AETC-untrained MAJCOM-trained	No
SMOD	N/A-not disqualifying	AFSPC	No

* Waiver for pericarditis and the use of NSAID (total of 6-8 weeks of treatment) may be submitted one month after complete resolution of symptoms.
† Waiver may be submitted three months after complete resolution of clinical illness.

A review of AIMWTS through March 2010 demonstrated 60 cases of pericarditis or myopericarditis; of this total, there were 6 FC I cases, 34 FC II cases, 0 FC IIU cases, and 20 FC III cases. Of the 60 cases, 4 were disqualified, all for other medical conditions (one was for coronary artery disease).

IV. Information Required for Waiver Submission.

Prior to waiver submission for uncomplicated pericarditis there is a minimum nonflying observation period of one month after symptom resolution (6 months for FC I/IA). The aviator may be on an approved NSAID at the time of waiver submission, in order to complete above recommended 6-8 weeks of anti-inflammatory therapy. For aviators with complicated pericardial disorders (e.g. pericarditis with effusion or myopericarditis), there is a minimum nonflying observation period of three months (12 months for FC I/IA). The minimum three month observation period should start at the resolution of the clinical illness (e.g. echo-proven resolution of associated effusions or wall-motion abnormalities).

After the above specified observation period, submit an aeromedical summary with the following information:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level. Pertinent negatives should include absence of disorders known to affect the pericardium (e.g. uremia, tuberculosis, recent MI, prior trauma).
B. Electrocardiogram (ECG).
C. Chest x-ray report.
D. Copy of all local echocardiogram reports. Send videotape/CD copy of the echocardiographic images to the ACS. (Notes 1 and 2)
E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)
F. Results of medical evaluation board (MEB) if required (worldwide duty evaluation for ARC members).
G. Additional local cardiac testing is not routinely required but may be requested in individual cases.

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 codes for Pericarditis and Myopericarditis	
420	Acute pericarditis
420.9	Other and unspecified pericarditis

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WAIVER GUIDE
Updated: Jun 09
Supersedes Waiver Guide of Feb 02
By: Dr Dan Van Syoc

CONDITION:
Personality Disorders (Jun 09)

I. Overview.

Personality *traits* are enduring patterns of perceiving, relating to, and thinking about the environment and are exhibited in a wide range of contexts. When these traits are inflexible, maladaptive and cause significant functional impairment, the individual is then identified as having a personality *disorder*[1]. By definition, the symptoms of personality disorders cannot be caused by a major psychiatric disorder as diagnosed in DSM-IV[2]. But it is not uncommon for patients with a personality disorder to have another psychiatric condition and it may be the other diagnosis that brings the case to the attention of mental health professionals and drives a psychiatric evaluation. DSM-IV places personality disorders on a separate axis (Axis II) from the more circumscribed and episodic Axis I disorders such as major depression and schizophrenia to emphasize that the personality disorders may coexist with and even complicate treatment of these other mental disorders[1, 3].

Personality disorders are common in US society; the prevalence is reported to be 4% to 13% in the general population. The rates increase dramatically in select populations – it is estimated that more than 28% of patients with alcohol disorders and 47% of patients with drug use disorders also have a personality disorder[4]. Although these conditions are chronic, they often will improve over time. The prognosis for many with personality disorders is better than for most serious Axis I disorders[5]. This improvement in personality psychopathology may be associated with a real reduction in ongoing personal and social burdens according to a 2008 review of four large-scale studies[6]. Current classifications of personality disorders in DSM-IV have no measure of severity. Patients with more severe forms do not have stronger manifestations of one single disorder, but instead their personality disturbance extends almost ripple-like across all domains of their personality, so that there remains almost no satisfactory personality function in any area[7].

Personality disorders are divided into three major areas called clusters and there are further breakdowns within each of the clusters. Cluster A is identified as odd or eccentric. Within Cluster A are the subtypes of paranoid, schizoid, and schizotypal. The second cluster, Cluster B is identified as dramatic, emotional or erratic. Subtypes in this cluster are antisocial, borderline, histrionic, and narcissistic. The last cluster, Cluster C is identified as anxious or fearful and its subtypes are avoidant, dependent, and obsessive-compulsive[2]. A particular patient may have traits from different clusters and may meet criteria from more than one personality disorder. Despite the specific classification, these patients often come to the attention of the medical community because they make the provider feel uncomfortable in some fashion[8].

The most common personality disorder in clinical setting is borderline personality disorder. The essential feature of borderline personality is a pervasive pattern of instability of interpersonal relationships, affects, self-image, and a marked impulsivity. It causes marked distress and impairment in numerous settings and is associated with high rates of self-destructive bahavior[9].

Management of these patients is directed primarily toward the particular cluster they belong to or in which they have the more predominant symptom characteristics. Initially, efforts are focused on maintaining and supporting the patient-physician relationship and establishing a working alliance. The treating physician needs to have a good understanding of the personality characteristics of these patients and work to adapt his or her style in order to optimize communication and the ultimate clinical outcome. Psychotropic medications are not a front-line approach to the care of most of these patients. If a particular case lends itself to treatment with medications, it should not be attempted by a non-mental health professional.

II. Aeromedical Concerns.

For all flying classes the question of "suitability" is important. Personality disorders and traits may impact performance of military duty, including aviation duty and flight safety, because of associated social, occupational, administrative, and legal ramifications. As a general rule, successful treatment requires long-term, time intensive psychotherapy that can render the service member unavailable for full duty performance for a prolonged period of time. When a personality disorder diagnosis is confirmed by mental health consultation, administrative separation due to psychological unsuitability for military service is often pursued. This administrative action requires evidence of negative impact on duty performance due to the disorder, in addition to the diagnosis of the disorder itself. Typically, other potentially medically disqualifying disorders are considered and ruled out before taking this action.

Unfortunately, many persons with personality disorders spend a long time between initial referral for evaluation and final diagnosis and disposition decision making. Care is needed to avoid hasty over-diagnosis of personality disorders in personnel with idiosyncratic personality traits presenting for evaluation. Thus, in questions of possible administrative separation action by command, consultation with a mental health provider should be considered by the flight surgeon early on in the process. The flight surgeon and mental health provider may assist the commander in the decision-making process through explanation of personality disorder manifestations and discussion of the associated prognosis.

People with personality disorders often have difficulty working closely with others under stressful conditions, in adhering to discipline, and in responding appropriately to authority, all of which can threaten flight safety and mission completion. They can be rigid, unwilling to compromise and often express anger explosively or indirectly, thereby creating interpersonal tension that can be disruptive to the good order and discipline of a unit. Behavior rooted in personality disorders, e.g., temper outbursts, unreliability, chronic non-adherence to unit or flight discipline, and passive-aggressive behavior can lead to command-directed mental health evaluations. It is appropriate to DNIF such a flyer pending mental health evaluation. It is also paramount that supervisors document all negative behavior as the diagnosis is made by examining behavior patterns over time. These disorders are considered to be inherent to the individual and a permanent part of their personality. These behaviors can be a real threat to flight safety[10].

III. Waiver Consideration.

Personality disorder that is severe enough to repeatedly manifest itself by significant interference with safety of flight, crew coordination, or mission completion is disqualifying for all flying classes.

In addition, unsatisfactory duty performance due to personality disorder may cause the member to be technically unsuitable as opposed to unfit and subject to administrative separation. This is a place where the Flight Surgeon and Commander may wish to utilize the ARMA unsat option. All cases that are being considered for a waiver MUST be seen at the ACS. If the member has personality traits but does not meet the criteria for personality disorder, he or she still may be deemed ARMA unsat.

Table 1: Waiver potential for Personality Disorders

Flying Class (FC)	**Waiver Potential+ Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AETC	Only if requested by AETC
II	Yes*# MAJCOM	Yes
III	Yes*# MAJCOM	Yes

*Waiver not recommended for any initial flying class for individuals with a history of personality disorder.
#No indefinite waivers.
+All cases considered for waiver must be considered psychologically stable and manifestations no longer interferes with duty

AIMWTS review in late March 2009 produced a total of 28 cases with the diagnosis of personality disorder. Of this total, 1 was for FC I/IA, 8 were for FC II and 19 were for FC III. All but 2 of the total of 28 cases resulted in a disqualification; the two approved waivers were both FC III cases. Most of the total had at least one other psychiatric diagnosis in addition to the diagnosis of personality disorder.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for <u>initial waiver</u> for personality disorders should include the following:
A. History – symptoms, good time-line of events; how symptoms affect job, home life, finances, legal issues and relationships. Discuss all other psychiatric conditions. Include drinking and drug use history, if applicable.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. Treatment – medications and therapy used for all psychiatric conditions.
D. Psychiatry/psychology consultation report(s).
E. Report of all psychological testing, if performed.
F. Letters of support from squadron commander
G. Medical evaluation board results, if applicable.

The aeromedical summary for waiver renewal for personality disorders should include the following:
A. History – interim history since last waiver submission to include reports of any legal or job-related problems.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s).

ICD 9 codes Personality Disorders	
301	Personality Disorders

This waiver guide was reviewed by Col Timothy Sowin, ACS chief of Neuropsychiatry.

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WAIVER GUIDE
Updated: May 2012
Supersedes Waiver Guide of Sep 2008
By: Dr Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG consultant for Endocrinology

CONDITION:
Pituitary Tumors (May 12)

I. Overview.

Pituitary tumors represent 15% of all primary intracranial tumors and are derived from hormone-secreting adenohypophyseal cells.[1] Primary pituitary tumors are either adenomas or carcinomas. Fortunately, pituitary carcinomas are exceedingly rare with an incidence of less than 0.5% of symptomatic lesions.[2, 3] Pituitary adenomas are benign anterior pituitary lobe neoplasms that comprise over 90% of pituitary tumors. The annual incidence of pituitary adenoma is approximately 1 in 10,000.[4] However, the prevalence of pituitary adenomas was 16.7% on a recent meta-analysis of autopsy (14.4%) and radiological (22.5%) data.[5]

Pituitary adenomas are the most common cause of sellar masses from the third decade on, accounting for up to 10 percent of all intracranial neoplasms.[6] They are classified by their size and hormone secreted. Microadenomas are less than 10 mm and macroadenomas are 10 mm or greater.[7] The five types based on hormone secretion are lactotroph (prolactin [PRL]), gonadotroph (nonfunctioning), somatotroph (growth hormone [GH]), corticotroph (adrenocorticotropic hormone [ACTH]), and thyrotroph (thyroid-stimulating hormone [TSH]). Some pituitary adenomas have multiple hormones released, such as PRL/GH and LH/FSH/TSH.[1] Approximate frequency of adenomas are PRL (35%), nonfunctioning (30%), GH (20%), PRL/GH (7%), ACTH (7%), and LH/FSH/TSH (1%), and TSH (<1%).[8, 9]

Prolactinoma (lactotroph adenoma), the most common category causes hyperprolactinemia. Common signs and symptoms are amenorrhea/oligomenorrhea with anovulation, galactorrhea, and infertility in females and impotence, infertility, and diminished libido in men.[10, 11] Gonadotrophs, nonfunctioning adenomas, are the most common macroadenomas due to the late presentation of symptoms secondary to local mass effects.[12] Typical findings would include headache, visual field defects (classically bitemporal hemianopsia from optic chiasm compression), diplopia, hypopituitarism, and hypogonadism.[4] Although all types of adenomas can present with mass effect findings, primary secretory hormone types usually will present with their hormonal based symptoms earlier. Somatotroph produces hypersecretion of GH and insulin-like growth factor-1 (IGF-1), which leads to acromegaly in adults. Physical findings include coarse facial features, acral enlargement, prognathism, hirsutism, and osteoarthritis.[13] Corticotrophs produce ACTH and lead to hypercortisolemia, which leads to Cushing's disease. Most are diagnosed as microadenomas secondary to relatively early clinical findings of truncal obesity, facial plethora, acne, hirsutism, striae, hypertension, osteopenia and muscle weakness.[4] Thyrotrophs produce TSH and cause hyperthyroidism. The clinical findings are goiter, visual impairment, and thyrotoxicosis.[9]

The evaluation of pituitary adenomas involves endocrinological, neurological, ophthalmological, and radiological considerations. The evaluation is driven by clinical findings discussed previously

and appropriate screening tests looking for hyposecretion or hypersecretion of related hormones to support clinical findings. These screening tests are summarized in Table 1.[1, 9]

Table 1. Screening tests for functional pituitary adenomas.

Condition	Test	Comments
Acromegaly	IGF-I.	Interpret IGF-I relative to age- and gender-matched controls.
Prolactinoma	Serum PRL level	Exclude medications. Magnetic resonance imaging (MRI) of the sella should be ordered if PRL levels elevated.
Cushing's disease	24-hr urinary free cortisol.	Ensure urine collection is total and accurate.
	Dexamethasone (1 mg) at 11 pm and fasting plasma cortisol measured at 8 am.	Normal subjects suppress to <5 μg/dL.
	Salivary cortisol test.[14]	Normal subjects should be < 1.8 μg/dl.
Hyperthyroidism	Serum TSH and free thyroxine (T4) levels.	Normal to elevated TSH and elevated free T4 levels.

For radiological evaluation of the pituitary, high resolution T-1 weighted MRI in coronal and sagittal planes with and without gadolinium is the gold standard.[1] However, the increasing resolution and availability of MRI and CT in brain imaging has spawned more incidental findings of pituitary tumors (incidentalomas) with these asymptomatic lesions present in 10% of the general population.[15] The majority of these lesions are microadenoma; in two years of follow-up only two percent showed enlargement as compared to about a third of macroadenomas.[16] In asymptomatic patients, a single assay for PRL is sufficient for hormonal evaluation of an incidentally found microadenoma.[4] For microadenomas greater than 4 mm, annual MRI for the first two years with increasing intervals for stable lesions is appropriate.[16]

The primary goals of treatment are to normalize excess pituitary secretion, alleviate signs and symptoms, shrink or eliminate compression of vital structures, and preserve or restore normal pituitary function.[10] These goals are approached by medical therapy, surgery, irradiation, or a combination.

Prolactinomas, the most common of pituitary adenomas, are primarily treated with pharmacotherapy or observation. Observation is a viable option in asymptomatic microprolactinomas because 95% of tumors do not enlarge in four to six years of observation.[17] Dopamine agonists such as bromocriptine (Parlodel®) and cabergoline (Dostinex®)are the mainstay of therapy. Bromocriptine is taken two to three times daily compared with the longer acting cabergoline, which is taken twice weekly.[18, 19] Both drugs are effective in decreasing PRL levels and tumor size reduction in over 90% of patients, with cabergoline demonstrating slightly greater efficacy.[17] Withdrawal of dopamine agonists after 1-3 years have shown no recurrence of hyperprolactinemia in 25.8 – 69%; the ideal candidate is one with a very low serum prolactin concentrations and small or no visible tumor on MRI when the dopamine agonists level is very

low.[17] The principal side effects of dopamine agonists are nausea, vomiting, postural hypotension, mental fogginess, and infrequently nasal stuffiness, psychosis, depression, hallucinations, nightmares, insomnia, vertigo, and Raynaud's phenomenon.[10, 17] Many of the adverse symptoms can be managed clinically with reduction in dose.[10, 17, 20] Nonetheless, the adverse effects are highly significant from an aeromedical standpoint.

If pharmacotherapy does not control the symptoms of hyperprolactinemia, or shrink a prolactinoma that is exerting mass effect, then surgery is an option.[21] For all other pituitary tumors, surgery is the primary treatment modality.[1] Endoscopic pituitary surgery has emerged as the first-line surgical treatment of choice with the exception of prolactinomas.[22] Postoperative remission for pituitary adenomas range from 73-96% (lowest GH secreting, highest nonfunctional), recurrence over 10 years is 8-13%. In adenomas which have resulted in visual deficits, visual recovery rates range from 88-92%.[4] All individuals should have extensive neuro-ophthalmological examination to include visual fields and acuity as well as fundoscopic exam prior to and following surgery.

For nonprolactinomas, other pharmacologic agents may be used as adjuncts to surgery. Acromegaly is treated primarily with octreotide (Sandostatin®) and lanreotide (Somatuline®), somatostatin analogs which have been shown to shrink GH-secreting adenomas by 19.4%.[23] Somatostatin analogs are limited by side effects to include gallstones and biliary sludging, nausea, cramps, and steatorrhea.[24] Somatostatin analogs have shown good efficacy in TSH-secreting adenomas as well.[10] Ketoconazole, which inhibits steroid biosynthesis is used as adjuvant therapy in Cushing's disease, both prior to surgery and afterwards if resection fails to result in complete control. Liver enzyme elevations, gynecomastia in men, gastrointestinal upset, and edema are common side effects and ketoconazole is notorious for a wide range of serious drug interactions.[10]

Pituitary radiation is indicated for surgical failure, residual mass effects, persistent hormone hypersecretion, or when surgery is contraindicated. Concerns with pituitary radiation are hypopituitarism (80% within 10 years), other primary brain tumors (< 5% gliomas/meningiomas), optic nerve damage (2%), and brain necrosis (potential cognitive dysfunction, especially memory loss).[1] The introduction of more precise techniques, such as gamma-knife and linear accelerator, should decrease the amount of radiation and collateral impact mentioned previously. Follow up after surgery or radiation should include serial clinical, endocrinologic, ophthalmologic, and radiologic studies. A postoperative MRI should be performed within three months of surgery or treatment and annual evaluations for tumor recurrence or residual.[4] A summary of the management and control of pituitary adenomas is summarized in Table 2.[10]

Table 2. Management and control of hormone hypersecretion in pituitary adenomas.

Approach	*Prolactin-Secreting Tumors*	*Growth Hormone-Secreting Tumors*	*ACTH-Secreting Tumors*	*TSH-Secreting Tumors*	*Nonfunctioning Tumors*
Primary Approach	**DA: microadenomas, 80% to 90% response; macroadenomas, 60% to 75% response**	**Surgery: microadenomas, 70% response; macroadenomas, 50% response**	**Surgery: microadenoma, 80% to 90% response; macroadenoma, 50% response**	**Surgery plus irradiation, 67% response**	**Surgery: improved vision, 70% response**
Secondary Approach	**Surgery: microadenomas, 55% response; macroadenomas, 20% response**	**Somatostatin analogues, 60% response; DA, 20% response; irradiation, 50% response (by 12 years)**	**Irradiation plus cortisol-decreasing drugs**	**Somatostatin analogues, 75% response**	**Irradiation**
Novel medical developments	**Depot long-acting DA, somatostatin receptor subtype-selective analogues**	**Long-acting somatostatins, somatostatin receptor subtype-selective analogues, growth hormone receptor or GHRH antagonist**		**Long-acting somatostatins**	**Gonadotropin-releasing hormone antagonists**

ACTH – adrenocorticotropin hormone; DA – dopamine agonists; GHRH – growth hormone releasing hormone; TSH – thyroid-stimulating hormone; Response refers to normalization of hormone secretion or ablation of tumor mass

Long-term monitoring of these conditions is variable, related to the condition and the response of the condition to the medical treatment. In general, normalization of abnormal hormone secretion and prevention of clinical signs and symptoms is the goal. The monitoring of serum markers will be more frequent (every 4-6 weeks) initially until stability is achieved. Pituitary MRI should show stability for 1-2 years before the interval is extended.[22]

II. Aeromedical Concerns.

Pituitary apoplexy, a hemorrhage into the pituitary tumor, is likely to cause sudden incapacitation but is exceedingly rare. The main concerns for the pituitary tumors are related to hormone hypersecretion, the medications used to treat them, and mass-effect. For prolactinomas the primary concern is the side effects of the centrally-acting dopamine agonists used to treat some of these tumors, such as bromocriptine and cabergoline. These agents commonly cause headache and dizziness, as well as hypotension, syncope, drowsiness, fatigue, and vertigo. Dopamine agonists are

frequently sedating, and reports of sleep attacks, which initially were described in Parkinson's patients, have now been described in other conditions with these agents.[25] (Whether these drugs are excitatory or sedating is dependent on dose, time, and individual variance.) Psychosis, predominantly mania, occurs at unpredictable intervals; in one study, the average delay was 13.5 months (range 4-52 months) after inception of therapy.[8] Given the role of dopamine antagonism in the mechanism of action of antipsychotic drugs, the occasional occurrence of psychosis with dopamine agonism is not surprising. In addition, therapy with bromocriptine and cabergoline has been clearly associated with impulse control disorders, such as pathologic gambling, hypersexuality, and other behaviors.[26, 27]

These medications are not compatible with flying. GH-secreting adenomas, which cause acromegaly, are primarily treated with surgery, but somatostatin analogs are used for tumor shrinkage and suppression of GH prior to surgery. Common somatostatin analogs are octreotide and lanreotide and may be used continuously if individual is not a surgical candidate. These agents have common side effects to include biliary dysfunction, hypo/hyperglycemia, hypothyroidism and arrhythmias. The drug preparation requires refrigeration for storage since it is stable for only two weeks at 25°C. These considerations are clearly not compatible with either the flying or the deployed environment. Cushing's disease usually presents with hypersecretion symptoms that are adverse for flying such as hypertension, truncal obesity, hyperglycemia, and bruising.[4] Surgery is the preferred method of treatment secondary to poor medical response to treatment. These patients typically have a fair response to surgery, but need steroid replacement for up to 12 months after surgery.[4] Persistent steroid use and high recurrence rates after 5 years make this condition incompatible with aviation. TSH-secreting adenomas are more aggressive and cause all the side effects of hyperthyroidism with visual impairment and goiter. Pituitary carcinomas are extremely aggressive and have very poor prognosis.[3]

The mass-effect seen with macroadenomas is another concern. Common symptoms related to this include headache and panhypopituitarism. With only a 1 cm gap between the pituitary and the optic chiasm, visual complications are common, and a complete visual workup needs to be done to evaluate for visual defects from compression of the chiasm or diplopia from oculomotor nerve impingement. Neuro-ophthalmologic finding could clearly impact individual performance and mission accomplishment. Except for prolactinomas, surgery is indicated when mass effect is present. If the prolactinoma doesn't respond to therapy, surgery is then indicated. As above, surgery has good remission rates and 10-year recurrence rates around 1% per year. Potential complications of surgery include CSF leak, transient diabetes insipidus, and inappropriate ADH secretion.[1] Adjuvant radiotherapy or radiosurgery results in good control, but high rates of subsequent hypopituitarism. This may lead to issues with hormone replacement in the future.

III. Waiver Consideration.

All pituitary tumors, whether benign or malignant, are disqualifying for all flying classes, ATC/GBC and SMOD duties. The severity of the condition, the medications required to control the condition and/or complications/results of surgery impact waiver consideration.

Table 3. Waiver potential for pituitary tumors.

Flying Class	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Incidental microadenomas, non functional, unchanged for 2 years	Yes AETC	Yes
	Nonfunctioning micro or macroadenomas treated with surgery and requiring no pharmacotherapy	Maybe AETC	Yes
	Secreting microadenoma or macroadenoma treated with or without pharmacotherapy or treated with surgery and requiring pharmacotherapy	No AETC	No
	Pituitary carcinoma	No AETC	No
II/III ATC/GBC SMOD**	Microadenomas, non functional	Yes MAJCOM	Yes
	Secreting prolactinoma, asymptomatic requiring no pharmacotherapy	Yes* MAJCOM	Yes
	Micro or macroadenomas treated with surgery, in remission and requiring no pharmacotherapy	Maybe* MAJCOM	Yes
	Micro or macroadenomas treated with or without surgery and requiring pharmacotherapy	No MAJCOM	No†
	Pituitary carcinoma	No MAJCOM	No

* Waiver for untrained FC II and III unlikely.
† If pharmacotherapy is stopped after an interval (12-24 months) and remission is maintained for six months, waiver will be considered after ACS review.
** Waiver authority for SMOD personnel is AFSPC or GSC.

AIMWITS search in Apr 2012 revealed a total of 44 individuals with a diagnosis of a pituitary tumor. There were a total of 8 disqualifications. Breakdown of the cases was as follows: 3 FC I/IA cases (3 disqualifications), 20 FC II cases (1 disqualification), 15 FC III cases (3 disqualifications), 4 ATC/GBC cases (1 disqualification), and 2 SMOD cases (0 disqualifications. All 8 disqualified cases were related to the pituitary diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver should include the following:

A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Thorough history and physical to identify possible endocrinologic, neurologic, or ophthalmologic clinical findings with directed evaluation based on findings.
C. MRI of pituitary or CT if unable to perform MRI.
D. Serum PRL level for all pituitary tumors.
E. Endocrinology consult to include need for further hormonal evaluation and management.
F. Neurosurgery consult for evaluation for surgery on any pituitary tumor other than prolactinoma or incidentaloma, or any pituitary tumor with suspected mass effect.
G. Baseline formal visual field testing (Humphrey visual field 30-2), acuity, and dilated fundoscopic exam. If surgery is performed, then repeat testing afterwards.
H. Echocardiogram in GH secreting pituitary adenoma.
I. MEB results.

Note: If steroids are temporarily required after treatment of ACTH pituitary adenoma, see waiver guide on systemic glucocorticoid (steroid) treatment.

The AMS for waiver renewal for pituitary tumor should include the following:
A. History – brief summary of initial work-up, interval signs or symptoms including pertinent negatives.
B. Physical – complete with focus on previous findings.
C. MRI/CT of pituitary annually for first two years, then every two years if stable.
D. Endocrinology consult.
E. Formal visual field testing and acuity testing annually for macroadenomas (not needed if a macroprolactinoma and has responded to therapy) , history of surgery/radiation therapy, or increase in tumor size, and more frequently as indicated for any visual complaints.

ICD 9 codes for pituitary tumors	
194.3	Malignant neoplasm in pituitary gland
227.3	Benign neoplasm of pituitary gland craniopharyngeal duct (pouch)
242.8	Thyrotoxicosis (overproduction of TSH)
253.0	Acromegaly and gigantism (overproduction of growth hormone)
253.1	Other and unspecified anterior pituitary hyperfunction (except ACTH and TSH)
255.0	Cushing syndrome (overproduction of ACTH)

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WAIVER GUIDE
Updated: Jun 2010
Supersedes waiver guide of Feb 2000
By: LtCol Hans Bruntmyer (RAM X) and Dr. Dan Van Syoc
Reviewed by Maj Joshua Sill, staff Pulmonologist at the ACS

CONDITION:
Pneumothorax (Jun 10)

I. Overview.

Spontaneous pneumothorax is best defined as "air in the pleural space of non-traumatic cause." Secondary spontaneous pneumothorax is one that occurs in the presence of underlying parenchymal or airway disease, and for aviation purposes will not be considered further. Primary spontaneous pneumothorax, by default, is one that occurs in the absence of such underlying disease[1]. However, it would be incorrect in such cases to define the lung as normal, since the vast majority prove to have visceral subpleural blebs at thoracoscopy.[2] Most cases of primary spontaneous pneumothorax occur at rest, and it is actually unusual to see cases in the athletic realm.[3, 4]

Primary spontaneous pneumothorax typically peaks in the 10 to 30 year age group, affecting males about 5 to 10 times more frequently than females. The age-adjusted incidence in males is estimated to be about 7.4/100,000/yr and 1.2/100,000/yr in females (1979 data from Olmstead County, Minnesota).[5] It occurs primarily in tall, thin individuals and is rare in those over the age of 40. Smoking has been shown to increase the risk of primary spontaneous pneumothorax by a factor of 20 in a dose-dependent manner. More than 20,000 new cases of spontaneous pneumothorax occur each year in the United States at a cost of more than $130 million (2006 costs).[6] Although the incidence in the general population is usually quoted as 9 per 100,000, the real incidence is probably higher.[7] In most large series, 1% to 2% are incidentally found on chest film; since small pneumothoraces resolve themselves within a few days, the odds of identifying an asymptomatic pneumothorax in this way are slim, arguing that the disease is probably more common than thought.[8]

The classic presentation in a symptomatic patient with spontaneous pneumothorax is dyspnea and pleuritic chest pain. The chest pain is almost always ipsilateral and may radiate to the shoulder, neck, and into the back. Physical exam may demonstrate tachycardia, tachypnea, hyperresonance to percussion, diminished breath sounds, and asymmetrical chest wall expansion may be present.[4] There are also a multitude of possible ECG changes that can be seen in the setting of a pneumothorax. The diagnosis is best confirmed with a standard chest film. Expiratory films are no more sensitive than inspiratory films in detecting pneumothoraces and are not recommended. If present on the chest film, it will demonstrate a pleural line.[1]

A specific subcategory that deserves mention is catamenial pneumothorax. This is a spontaneous pneumothorax occurring in a female within 48 to 72 hours of the onset of menses. Although these are often ascribed to endometriosis, pleural endometrial implants have been identified in only a third of patients. It is important to question any female with a spontaneous pneumothorax about the timing in relationship to menses, since the initial treatment of catamenial pneumothorax is hormonal. Should the patient fail a trial of contraceptive steroids, this disorder responds well to the same prophylactic surgical treatments described below.[9]

Depending on the size of the pneumothorax, acute treatment may consist of observation, usually combined with oxygen, which hastens resolution (rate of pleural air absorption in the absence of supplemental oxygen is 1.25%/day; this is increased 3-4X in the presence of supplemental oxygen); simple aspiration of the air, which is successful about 65% of the time; or catheter or tube thoracostomy.[10] There has been discussion for many years as to the emergency management of spontaneous pneumothorax. For many years, the gold standard was insertion of a chest tube (tube thoracostomy). Recent evidence indicates that needle aspiration is at least as safe and effective as tube thoracostomy and also carries the benefit of fewer hospital admissions and shorter length of hospital stay.[11]

The major issue with spontaneous pneumothorax is recurrence. After an initial pneumothorax, the chance of recurrence in the absence of definitive treatment is 20 to 50%, a risk which probably rises after subsequent episodes. (some researchers have shown that after two pneumothoraces, the risk of a third is 62%; of those who have had three episodes, 83% will have a fourth).[10, 12] The clinical standard care for a number of years has been to perform a definitive surgical procedure after the second pneumothorax, but with the availability of thoracoscopic pleurodesis, there are many who feel that surgery is indicated after the first episode, particularly in those who are at high risk because of their occupation or because of travel to remote areas.[6]

The definitive procedure until relatively recently was pleurodesis which was accomplished via the chest tube by inserting a sclerosing substance into the pleural space causing the pleura to adhere to the chest wall thereby preventing recurrences. The most common substances used were tetracycline or talc. The recurrence rate with each of these was not totally acceptable and also was potentially fraught with unacceptable side effects. Problems with talc range from pain and fever to respiratory failure and ARDS. The newer and more successful interventions are surgical. Thoracotomy can lead to recurrence prevention by either mechanical abrasion pleurodesis or pleurectomy.[10]

II. Aeromedical Concerns.

The most likely symptoms are chest pain and dyspnea, either of which could be incapacitating in aircrew. There is also the concern with gas expansion at altitude in untreated pneumothorax in aviators.[13] In a review of 112 aviators with spontaneous pneumothorax, 37% admitted they could have been incapacitated had the episode occurred during flight. Overall, seventeen percent of the episodes occurred under operational conditions. Eleven percent actually occurred during flight, although it was unclear how many of these resulted in mission aborts. Of note, another 6% occurred in the altitude chamber, and all but one of those occurred after rapid decompression.[3]

III. Waiver Considerations.

Current Air Force policy states that a history of spontaneous pneumothorax or pulmonary blebs/ bullae are disqualifying for aviation duties. A single episode of spontaneous pneumothorax does not require waiver if PA inspiratory and expiratory chest radiograph and thin-cut CT-scan show full expansion of the lung and no demonstrable pathology which would predispose to recurrence. After a second pneumothorax, or if CT demonstrates residual blebs, waiver may be considered only after definitive surgery to prevent recurrence. Pneumothorax is not disqualifying for FC IIU, nor for GBC/ATC or SMOD personnel.

In summary, any form of definitive surgical pleurodesis is acceptable for waiver, but thoracoscopic abrasive pleurodesis appears to offer the best combination of efficacy and minimal morbidity. Chemical pleurodesis with talc, tetracycline compounds, or other pleurodesing agents is generally not acceptable for waiver. If chemical pleurodesis has been completed prior to entry into the military service or an aviation career field, a waiver may be considered on a case-by-case basis after review by the ACS.

Table 1: Waiver potential for Pneumothorax

Flying Class (FC)	**Condition**	**Waiver Potential*** **Waiver Authority**
I/IA	Primary pneumothorax	None needed – if resolved
	Multiple pneumothoraces or pathology noted on chest CT	Yes* AETC
II	Primary pneumothorax	None needed – if resolved
	Multiple pneumothoraces or pathology noted on chest CT	Yes* MAJCOM
IIU**	Primary pneumothorax	N/A
	Multiple pneumothoraces or pathology noted on chest CT	Needed only if there is pain or significant symptoms at ground level AFMSA
III	Primary pneumothorax	None needed – if resolved
	Multiple pneumothoraces or pathology noted on chest CT	Yes* MAJCOM
GBC/ATC	Any diagnosis of pneumothorax	N/A-not disqualifying
SMOD	Any diagnosis of pneumothorax	N/A-not disqualifying

* If definitive surgery has been performed with resolution of symptoms.
**AETC is waiver authority for initial certification for FC IIU.
***Indefinite waiver can be considered after successful surgical treatment on a case-by-case basis.

AIMWTS review in May 2010 revealed 66 aircrew members with an aeromedical summary and the diagnosis of pneumothorax. There were 20 FC I/IA cases, 23 FC II cases, 0 FC IIU cases, 23 FC III cases, and 0 GBC/ATC/SMOD cases. Fifty-three of the 66 cases were granted a waiver. Of the 13 disqualified (4 FC I/IA, 4 FC II, and 5 FC III), 8 were due to either multiple episodes of pneumothoraces, inadequate treatment, or major side effects of pneumothoraces.

IV. Information Required for Waiver Submission.

Waiver submission should only be submitted after treatment has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. List and

fully discuss all clinical diagnoses requiring a waiver. The aeromedical summary for the initial waiver for pneumothorax should include the following:
A. A complete history of the event to include any possible predisposing factors.
B. Documentation of all treatments given.
C. Labs/Imaging: Reports of all imaging exams and date of report that shows complete resolution of the pneumothorax.
D. Copies of all operative reports and a statement from treating physician.

The aeromedical summary for waiver renewal for pneumothorax should include the following:
A. Interval history specifically noting any symptoms, changes in disease course and treatments since the last waiver submission.
B. Recent chest X-ray documenting absence of pneumothorax.
C. Statement of patient condition from treating physician.

ICD 9 codes for Pneumothorax	
512	Pneumothorax
512.0	Spontaneous tension pneumothorax
512.1	Iatrogenic pneumothorax
512.8	Other spontaneous pneumothorax
860	Traumatic pneumothorax and hemothorax
860.0	Traumatic pneumothorax without mention of open wound into thorax

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WAIVER GUIDE
Initial Version: Nov 2010
By: Maj Amy Gammill (ACS internist) and Dr Dan Van Syoc
Reviewed by LtCol Anthony Propst (AF/SG consultant for OB/GYN) and LtCol Thomas Sauerwein (AF/SG consultant for Endocrinology)

CONDITION:
Polycystic Ovary Syndrome (PCOS) (Nov 10)

I. Overview.

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in reproductive aged women, affecting between 6.5% and 8% of women overall. It is typically characterized by findings of irregular or anovulatory cycles, symptoms or signs of androgen excess and polycystic ovaries on ultrasound. Obesity is a frequent concomitant finding in women with PCOS.[1, 2] Several professional groups have proposed diagnostic criteria for PCOS, using the criteria of ovulatory dysfunction, hyperandrogenism, polycystic ovaries, and exclusion of other disorders in varying combinations. The 1990 National Institutes of Health conference on PCOS developed the following minimal criteria for the diagnosis of PCOS: 1) menstrual irregularity due to oligo- or anovulation, 2) evidence of hyperandrogenism, whether clinical (hirsutism, acne, or male-pattern balding) or biochemical (high serum androgen concentrations), and 3) exclusion of other causes of hyperandrogenism and menstrual irregularity, such as congenital adrenal hyperplasia, androgen-secreting tumors, and hyperprolactinemia. In 2003, revised criteria were developed at an American and European consensus meeting in Rotterdam. These criteria encompass a broader spectrum of phenotypes considered to represent PCOS. In the revised criteria, two out of three of the following are required to make the diagnosis: 1) oligo- and/or anovulation, 2) clinical and/or biochemical signs of hyperandrogenism, and 3) polycystic appearing ovaries on ultrasound.[3, 4] The exact pathophysiology of PCOS has not been fully recognized. Many patients have evidence of abnormal luteinizing hormone (LH) secretion and a significant percentage of PCOS patients display insulin resistance.[5]

PCOS patients experience increased ovarian androgen biosynthesis as a result of abnormalities occurring at all levels of the hypothalamic-pituitary-ovarian axis. PCOS is not only a reproductive disorder but a metabolic one. These women have many features of the metabolic syndrome with a strong propensity to develop type 2 diabetes mellitus (T2DM) which makes it important to diagnose and treat at an early age due to the many long-term risk factors related to diabetes.[6] In the fertility arena, PCOS accounts for 70% of anovulatory infertility and probably accounts for up to 20% of infertile couples. The menstrual irregularity typically manifests at the time of menarche in PCOS women, and menarche may even be delayed.[7] Women with PCOS, also have higher rate of miscarriage.[8] The chronic anovulation seen in PCOS is associated with an increased incidence of dysfunctional uterine bleeding, endometrial hyperplasia, and possibly endometrial cancer.[9]

Patient evaluation should include a detailed menstrual history and an outline of the onset and duration of any hyperandrogenism symptoms. The exam should include assessment of blood pressure, body mass index, and waist circumference. The skin should be examined closely for evidence of insulin resistance (which may manifest as acanthosis nigrans or skin tags) and hyperandrogenism (evidence of hirsutism, acne, and male-pattern hair loss). Lab tests are performed to confirm the diagnosis as well as to exclude other etiologies. All patients should have

a TSH and prolactin level to exclude other common causes of anovulation. Other tests may include androgen evaluation with total, free, and bioavailable testosterone concentration along with dehydroepiandrosterone sulfate level. Congenital adrenal hyperplasia can be ruled out by measuring an AM serum 17-hydroxyprogesterone concentration. Cushing syndrome may be ruled out with a 24-hour urinary free cortisol level[4]

Treatment of PCOS depends on the most bothersome and concerning symptoms and whether or not the patient is seeking fertility treatment. If overweight or obese, weight loss can greatly ameliorate many of the symptoms. Regarding androgen excess, oral contraceptives are considered the treatment of choice, and therapy typically begins with a preparation containing 30 to 35 mcg of ethinyl estradiol combined with a progestin with minimal androgenicity. In addition, spironolactone can be used to decrease hirsutism, although it is not FDA approved for that purpose. Finally, insulin-sensitizing agents such as metformin have been shown to improve hirsutism. Endometrial protection can also be provided by using oral contraceptives. Ovulation induction can be prompted by weight loss in women with obesity. Otherwise, many clinicians recommend clomiphene citrate, alone or in combination with metformin to initiate ovulation. Obesity and glucose intolerance can be treated with weight loss and use of metformin.[9, 10] The insulin resistance seen in many of these patients is first addressed by lifestyle modifications such as weight loss, diet and exercise.

Metformin has been highly utilized over the past decade to treat women with PCOS. It acts indirectly and modestly to improve ovulation and to reduce long-term metabolic complications. It also acts to reduce the circulating levels of many markers of atherosclerosis and subclinical chronic inflammation.[11] The target dose of metformin is 1500 to 2500 mg daily, and most clinical responses are not seen in doses less than 1000 mg daily. The most common side effects are gastrointestinal: diarrhea, nausea or vomiting, flatulence, indigestion, and abdominal discomfort. Lactic acidosis has been described, but is extremely uncommon in otherwise healthy subjects. Cimetidine competes for renal clearance with metformin and can cause an increase in metformin levels. Finally, 10% to 30% of patients develop vitamin B_{12} malabsorption with decreased serum concentrations of the vitamin. In most patients, this does not create a problem and subsequent anemia is rare.[5] In the aviator population, there is concern with hypoglycemia with the use of metformin. Much of the work in this area has been done with diabetics. Studies of metformin in the absence of T2DM do not appear to demonstrate hypoglycemia of any level and metformin usage in such a setting should be safe in the aviation environment.[12]

II. Aeromedical Concerns.

Most of the symptoms related to PCOS will not normally be problematic with aviation duties. However, if untreated or unrecognized, PCOS may lead to glucose intolerance, weight gain, and even atherosclerotic heart disease, all of which can be of considerable risk to the aviator. Not all medications used to treat PCOS are safe or approved for use by the flyer in the US Air Force. Oral contraceptives are approved after a seven day grounding period, and spironolactone is also approved for use but will require a waiver. Metformin was recently approved for use in aircrew (FC IIC – dual pilot, FC IIU, and FC III) and will also require waiver.

III. Waiver Consideration.

Polycystic ovary syndrome is disqualifying for all classes of flying in the US Air Force. This diagnosis is not specifically mentioned in the AFI but is covered under the terminology of symptomatic ovarian cysts and menstrual irregularities. Some medications used to treat PCOS are currently not approved for use by Air Force aviators.

Table 1: Waiver potential for PCOS

Flying Class (FC)	**Condition**	**Waiver Potential** Waiver Authority**
I/IA	PCOS	Yes AETC
II	PCOS	Yes MAJCOM*
IIU	PCOS	Yes AFMSA*
III	PCOS	Yes MAJCOM*
ATC/GBC	PCOS	Yes MAJCOM*
SMOD	PCOS	Yes AFSPC

*Waiver authority for initial FC II, FC IIU, FC III and ATC/GBC candidates is AETC.
**Waiver candidates on medication must be utilizing medications authorized for use by aircrew.

AIMWTS search in May 2010 revealed a total of 20 submitted cases. There were no FC I/IA or IIU cases; 6 FC II cases, 10 FC III cases, 2 ATC/GBC cases, and 2 SMOD cases. Of the total, 4 resulted in a disqualification disposition; three were FC III cases and 1 was ATC/GBC, and all were related to the PCOS diagnosis. Twelve of the 16 waived cases involved treatment with glucophage which is not currently approved for use in aircrew for any diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary for the initial waiver for PCOS should include the following:
A. Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete history to include a detailed menstrual history and an outline of the onset and duration of any hyperandrogenism symptoms.
C. Exam should include assessment of blood pressure, body mass index, careful skin exam, and waist circumference.
D. Labs: CBC, fasting blood glucose, prolactin, thyroid studies, and any other endocrine studies used to evaluate for PCOS and its complications.
E. Statement from treating physician summarizing treatments and intended follow-up.

The aeromedical summary for waiver renewal for PCOS should include the following:
A. Interval history specifically noting any changes in disease course and treatments since the last waiver submission.
B. Documentation of all exam elements.
C. Labs: any completed since last waiver submission.
D. Statement of patient condition from treating physician.

ICD 9 codes for PCOS	
256.4	Polycystic ovaries
620.2	Other & unspecified ovarian cyst

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WAIVER GUIDE
Initial Version: Mar 2010
By: Dr Dan Van Syoc
Reviewed by Col (sel) Kent McDonald, psychiatrist and chief of the neuropsychiatry branch at the ACS.

CONDITION:
Post-Traumatic Stress Disorder (PTSD) (Mar 10)

I. Overview.

The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) defines posttraumatic stress disorder (PTSD) as the development of specific symptoms following exposure to a traumatic event that a person responded to with intense fear, hopelessness or horror (The term PTSD was first used in 1980 in DSM-III). It is a relatively common anxiety disorder affecting men and women of all ages and racial backgrounds, with a lifetime prevalence rate ranging from 8% to 12% in the general population. The lifetime prevalence rate is thought to be twice as high for women as men.[1] The diagnostic term PTSD is relatively new, but descriptions suggestive of the syndrome have been found as far back as ancient Greek literature. It has been described in veterans of the Civil War and was called "shell shock" in World War I. The term combat neurosis was coined during World War II and the "rape trauma syndrome" was identified in 1957. Other labels for wartime PTSD have included soldier's heart, fright neurosis, combat fatigue, railway spine, concentration camp syndrome, and post-Vietnam syndrome.[2, 3] PTSD is characterized by intrusive thoughts, nightmares and flashbacks of past traumatic events, avoidance of reminders of the trauma, hypervigilance, and sleep disturbances, all of which can lead to considerable social, occupational, and interpersonal dysfunction.[4]

Not all individuals respond to traumatic events in the same fashion. It is estimated that the overall conditional probability of PTSD after a traumatic event is about 9.2%. The risk varies with the type of trauma experienced and assaultive violence demonstrates the highest probability, over 20%. In fact, nearly 40% of all PTSD cases result from assaultive violence. For men, combat exposure accounts for approximately 30% of PTSD cases.[5] The most common condition encountered in all wars has been battle fatigue or shellshock, which would now be referred to as acute stress disorder (ASD) if the duration is greater than 2 days but less than 30 days and PTSD if greater than 30 days. PTSD becomes chronic if the duration exceeds 90 days. The signs associated with this condition are similar to those noted above and include insomnia, apprehension, repetitive dreams, nightmares, excessive startle responses, difficulty with concentration and focus, fear of return to combat, feelings of guilt and shame, tachycardia, sweating, nausea and vomiting, vertigo, and other somatic symptoms. The initial approach to such afflicted aviators was to send them to a rear echelon treatment facility for rest and relaxation for weeks to months prior to return to active flight status. Some more recent reports, particularly from the Israelis, report less disability if treated at or close to the battle front.[6] The US Army has taken great interest in the issue of combat stress and works hard to treat stressed soldiers quickly, close to the combat areas and return them as soon as possible to their units.

With PTSD in the general population, psychiatric co-morbidity is the rule rather than the exception. The percentage of lifetime history of other psychiatric disorders in individuals diagnosed with PTSD has been estimated to be nearly 90% in men and 80% in women. In fact, nearly 60% of men

and 45% of women with PTSD report more than three co-morbid psychiatric conditions. Major depressive disorder is among the most common comorbid condition for both men and women, affecting nearly 50%. Alcohol abuse is highly co-morbid in men (seen in over half of all cases). Additionally, there is a threefold to sevenfold increased risk for both men and women with PTSD for diagnosis with other anxiety disorders, including generalized anxiety disorder (GAD), panic disorder, and specific phobias.[6] The initial step in identifying individuals with PTSD involves screening for recent or remote trauma exposure, although the clinical approach may vary depending on the recency of the traumatic event. If eliciting vivid and detailed recollections of the traumatic event immediately after exposure enhances the patient's distress, the interview may be limited to gathering information that is essential to provide needed medical care.[7]

Recovery from acute PTSD most likely occurs within the first year following trauma. However, more than 30% of those diagnosed with PTSD fail to show a clinical remission and develop disease symptoms exceeding one year. Unlike many other psychiatric conditions, those with PTSD often delay or fail to seek treatment in a timely fashion, and this has led to the relatively high number of chronic cases. With longer disease duration treatment becomes more difficult.[5, 8] Research into the effects of combat trauma and trauma from aircraft mishaps is sparse. There have been very few standardized assessment instruments developed or used in these settings, although the DoD and the Department of Veterans Affairs have been studying this issue very closely.[9, 10]

As PTSD is a complex disorder, those afflicted benefit most from long-term multifaceted treatment. Early intervention and treatment may prevent chronic disease and should commence once symptoms of PTSD persist for three or more weeks following the initiating trauma. Various psychotherapeutic modalities have been shown to be effective in PTSD. Behavioral (exposure), cognitive, cognitive-behavioral, and eye movement desensitization therapies (eye movement desensitization and reprocessing or EMDR) have been found effective in randomized trials. Evidence suggests that the key component of success with cognitive behavioral therapy and EMDR is exposure to traumatic memories.[8] It is advisable for primary care providers and flight surgeons to refer these patients to a therapist or treatment team with experience in such therapies. The therapeutic goals of psychopharmacologic therapy are to decrease intrusive thoughts and images, phobic avoidance, pathological hyperarousal, vigilance, impulsivity, and depression. Selective serotonin reuptake inhibitors (SSRIs) were found to be effective as first-line drug therapy in a systematic review of 35 randomized trials and are recommended in treatment guidelines for PTSD from the American Psychiatric Association. SSRIs reduce flashbacks, arousal, and avoidance in patients with PTSD.[4, 7] Most military treatment facilities have mental health providers trained to treat combat casualties using prolonged exposure therapy, which is felt to be the most effective treatment modality for these patients.

Progress has been made in understanding the disease process and therapy of PTSD. However, many PTSD patients continue to suffer despite treatment. There is currently no efficient way to prevent the disorder under its naturally occurring circumstances. Despite advances in knowledge, PTSD remains prevalent, chronic, disabling, and costly. Nonetheless, the emergence of theory-driven biological therapies designed to alter the longitudinal course of the disorder is encouraging, particularly when such therapies are applied during the disorder's critical first few months.[8] The key element for our aviator population is quick recognition of the disease and prompt therapy by qualified mental health providers.

II. Aeromedical Concerns.

Many of the emotional and behavioral manifestations of PTSD can interfere with flying safety and mission completion. Severe anxiety symptoms markedly impair the ability to focus and concentrate on the task at hand. Some of the more severe symptoms may be acutely incapacitating. Associated mental health conditions can also negatively affect the ability of the aviator to successfully complete the mission. Flight surgeons caring for afflicted aviators in times of combat need to be particularly sensitive to these issues, and not allow an aviator to return to flying duties until they have significantly improved. It would be wise to have a psychiatrist or psychologist evaluate these aviators before consideration of returning to flying and combat duties.

III. Waiver Consideration.

PTSD is disqualifying for all aviation duties in the USAF. It is not mentioned specifically in AFI 48-123 for FC I/IA, II or III, but would be covered under the general category of anxiety. It is mentioned specifically in the UAS section as disqualifying. It would be wise to limit waivers to those with six months of sustained remission and off all pharmacotherapy.

Table 1: Waiver potential for PTSD

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Evaluation or Review#**
I/IA	Maybe* AETC	Yes
II	Yes MAJCOM	Yes
IIU	Yes AFMSA	Yes
III	Yes MAJCOM	Yes

*Must clearly demonstrate complete resolution of all PTSD symptoms before acceptance into initial flying training and have complete documentation from mental health providers.
#Must be reviewed by the ACS prior to consideration for a waiver.

AIMWTS review in December 2009 revealed a total of 36 aviator cases submitted with a diagnosis of PTSD. There were no FC I/IA or FC IIU cases, 10 FC II cases and 26 FC III cases. Of that total, there were 30 cases resulting in a disposition of disqualified; 8 were FC II and 22 were FC III. The major factors resulting in a disqualification were persistent symptoms, chronic disease, other mental health diagnoses, and the need to treat with medications not approved for use in USAF aircrew.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver request should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for PTSD should include the following:
A. History – symptoms to include the inciting event(s), good time-line of events; how symptoms affect job, home life, finances, and relationships. Discuss all other psychiatric conditions. Include drinking and drug use history, if applicable.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. Treatment – medications and therapy used for PTSD and any other psychiatric conditions.
D. Psychiatry/psychology consultation: Need all treatment notes from treating mental health professional as well as an MEB-type narrative summary of the mental health record.
E. Report of all psychological testing, if performed.
F. Basic labs – CBC, Chem 7, LFTs, TSH.
G. Letter of support from immediate commander.

The aeromedical summary for waiver renewal for PTSD should include the following:
A. History – interim history since last waiver.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s) if accomplished since last waiver request.

ICD 9 code for PTSD	
309.81	Posttraumatic Stress Disorder

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WAIVER GUIDE
Updated: Oct 09
Supersedes Waiver Guide of Feb 08
By: Maj Kim Bradley, Dr Karen Fox, and Dr. Dan Van Syoc

CONDITION:
Pregnancy (Oct 09)

I. Overview.

Pregnancy is a physiological state not a disease. The associated alterations in anatomy and physiology warrant aeromedical attention due to an increasing number of female aviators, most of who are in their reproductive years. The diagnosis of pregnancy is made through serum laboratory testing. Dating of the pregnancy is calculated in reference to the woman's last menstrual period, and ultrasound if medically indicated.

II. Aeromedical Concerns.

The aeromedical concerns can be considered in two separate categories: effects of pregnancy on the ability to perform in-flight duties and effects of the aviation environment on the fetus. This includes: 1) danger of incapacitation, especially during the first trimester, due to spontaneous abortion, ectopic pregnancy, nausea and vomiting, or other complications, 2) weight gain and change in body habitus (e.g., inability to wear protective equipment, safely egress aircraft), unsteadiness, and a risk of premature labor during the third trimester, and 3) potential effects of hypoxia, decompression sickness, and radiation on the fetus. Although extreme hypoxia is obviously detrimental to the fetus, the oxygen saturation of fetal hemoglobin decreases less precipitously than maternal hemoglobin. Radiation exposure at very high altitude or in space flight poses a theoretical risk of congenital malformation and developmental abnormality.

III. Waiver Considerations.

Pregnancy is disqualifying for flying class (FC) I and IA. Trained aviators may be eligible for FC IIC, IIU, or III waiver for uncomplicated singleton or twin pregnancies (Pregnancies with multiples greater than two need to be excluded as they have earlier and more frequent complications than twins). This eligibility is dependent upon 1) a voluntary request initiated by the aviator and 2) concurrence with this request by the aviator's squadron commander, flight surgeon, and obstetrician. Flying is restricted to pressurized multi-crew, multi-engine, non-ejection seat aircraft. The waiver is valid for uncomplicated pregnancies from the 13th through the 24th week of gestation. The aviator is DNIF during the 1st and 3rd trimesters. Crewmembers are released from all mobility requirements and physiological training is waived during pregnancy. FC IIU crewmembers may be eligible for UAS duties throughout most of the pregnancy; this needs to be coordinated closely with Flight Medicine personnel.

Table 1 – Waiver Potential for Pregnant Aircrew

Flying Class	Condition	Waiver Potential Waiver Authority
I/IA	Pregnant	No AETC
II	13th through 24th gestational weeks+	Yes* MAJCOM
III	13th through 24th gestational weeks+	Yes# MAJCOM
IIU	1st through 36th gestational weeks	Yes@ MAJCOM

* FC IIC waiver will be granted (pressurized multi-crew, multiengine, non-ejection seat aircraft). AFMSA has delegated this FC IIC waiver (must meet restrictions) to the MAJCOM who may delegate further if desired.
\# Restricted to pressurized multi-crew, multiengine, nonejection seat aircraft.
\+ Other than designated gestational period, waiver not allowed.
@ Pregnant UAS pilots and sensor operators flying during pregnancy need to be coordinated/followed by the Flight Medicine Clinic. Late in pregnancy, prolonged sitting, the need for more frequent urination breaks, and uncomfortable seats that may not accommodate a large abdomen - these factors may make doing the job difficult or impossible despite lack of other complications.

Review of AIMWTS in Sep 09showed 204 aviators with a request for a pregnancy waiver; 1 FC I case, 105 FC II cases, and 98 FC III cases. All but 3were granted waivers. The only FC I case was disqualified and the only FC II disqualified case was a student pilot. The reason for the FC III DQ is unclear. Several aviators had more than 1 pregnancy waiver submission and the number of pregnant female aviators who did not request a waiver during this time is unknown.

IV. Information Required for Waiver Submission.

The aeromedical summary should include the following:
A. Brief gynecology history – confirm singleton pregnancy (or uncomplicated twin pregnancy), estimated date of confinement, symptoms during pregnancy (e.g. nausea, vomiting, fatigue, etc.) including negatives, dates waiver would be valid (e.g., date of 13th through 24th week)
B. Statement that waiver request was initiated by aviator.
C. Statement that squadron commander, flight surgeon and obstetrician agree with request.

ICD 9 Codes for Pregnancy	
V22	Normal Intrauterine Pregnancy

V. References.

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WAIVER GUIDE
Updated: Sep 2010
*Supersedes Waiver Guide of Feb 2008 (Ulcerative Colitis **and** Primary Sclerosing Cholangitis)*
By: Dr Dan Van Syoc
Waiver Guide reviewed by Col David Smith, AF/SG consultant in General Surgery and Col Patrick Storms, AF RAM and gastroenterologist.

CONDITION:
Primary Sclerosing Cholangitis (Sep 2010)

I. Overview.

Primary sclerosing cholangitis (PSC) is a chronic, progressive disease that is characterized by inflammation, fibrosis and stricturing of medium and large ducts in the intrahepatic and extrahepatic biliary tree leading to the formation of multifocal bile duct strictures. It is likely an immune mediated progressive disorder that eventually develops into cirrhosis, portal hypertension and hepatic decompensation, in the majority of patients.[1] PSC and primary biliary cirrhosis represent the two most common adult chronic cholestatic liver diseases, and PSC is one of the most common indications for liver transplantation in adults. There are no good data regarding the overall prevalence of PSC; the estimated incidence in the United States is 0.9 to 1.3 cases per 100,000 population. It is predominately a disease of young and middle-aged men (male:female = 2:1) with a mean age at the time of diagnosis of 40 years, but children can also be affected.[2, 3] The prevalence of PSC appears to be increased among first-degree relatives of patients with PSC.[4]

The first description of sclerosing cholangitis was by Delbet in 1924. It was considered a rare condition until the advent of endoscopic retrograde cholangiopancreatography (ERCP) in the 1970s, which aided in the understanding of the disease prevalence and its natural history. More recently magnetic resonance cholangiopancreatography (MRCP) has been used with success as a diagnostic tool. There is still much to learn about this condition, to include proven effective medical therapy.[5] Although ERCP has become the gold standard for the diagnosis of PSC, a liver biopsy may necessary to confirm the diagnosis (particularly in children). Focal concentric edema and fibrosis around the interlobular bile ducts may be considered to be the main histologic features of PSC. The loss of very small bile ducts may also be seen in many of the cases.[6] Most liver specialists now report that a liver biopsy may support the diagnosis, but is rarely diagnostic.[7]

PSC is a progressive disease, often leading to biliary cirrhosis within 10 to 15 years. Patients who are asymptomatic at the time of diagnosis fare better than those who are symptomatic, but the disease tends to progress in either case. The average overall survival time is approximately 10 years from the date of diagnosis.[8] Independent risk factors correlating with a poor prognosis for PSC include increased age, hypoalbuminemia, persistently elevated bilirubin over three months, hepatomegaly, splenomegaly, dominant bile duct stenosis and changes in the intra- and extrahepatic ducts at the time of the initial diagnosis.[9]

The majority of patients with PSC are asymptomatic at the time of diagnosis, although a few may have advanced disease. The disease should be considered in patients with inflammatory bowel disease who have otherwise unexplained abnormal liver function tests, particularly if the elevation is with the serum alkaline phosphatase. The great majority of cases (80%) are associated with inflammatory bowel disease, although PSC occurs in only a small minority (2.4% to 4 %) of

individuals. In addition, individuals with PSC have a 10 to 15% lifetime risk of developing cholangiocarcinoma.[7]

PSC can be considered to progress through four distinct phases (though individuals may not develop all phases):
A. Asymptomatic – cholangiographic evidence of PSC but no symptoms and normal liver function tests.
B. Biochemical – no symptoms but have abnormal liver function tests, typically serum alkaline phosphatase (ALP) and variable serum bilirubin and aminotransferases.
C. Symptomatic – symptoms of cholestasis, liver injury or both, typically pruritus, fatigue, symptoms of cholangitis and jaundice. Fatigue and pruritus are very common features in symptomatic patients.
D. Decompensated cirrhosis – worsening symptoms and complications of end-stage liver disease, such as ascites, encephalopathy and variceal bleeding.

As noted above, there are no proven effective treatments for this condition. The only drug extensively evaluated for PSC is ursodeoxycholic acid (UDCA) also known as ursodiol (Actigall®, Ursosan®, Ursofalk®, Urso®, and Urso Forte®). Its use in PSC is based on its capacity to improve bile viscosity. A large prospective trial with UDCA at 17 to 23 mg/kg/day revealed a trend toward improved survival and decreased transplantation rate, but the outcome results were not statistically significant. A number of other drugs have been used in the past, but none have shown any benefit.[10, 11]

The clinical course of PSC is unpredictable due to the highly variable segmental involvement. It has been postulated that successful stenting of these sclerotic segments may subsequently lead to normalization of the biochemical tests and clinical features. To date this approach has met with mixed results and there have been no comparative trials to identify a preferred endoscopic strategy.[11]

Many patients ultimately progress to the point where liver transplantation is the best option. In the absence of hepatic transplantation, median survival after diagnosis is approximately 12 years.[6] Disease-specific clinical indications for transplantation in PSC include the development of intractable severe pruritus, recurrent episodes of bacterial cholangitis or sepsis, and progressive severe bone disease. Outcomes for liver transplantation in PSC compare favorably to transplants for other indications, with five-year survival rates as high as 85 percent. [10, 11]

II. Aeromedical Concerns.

In primary sclerosing cholangitis, initial symptoms relevant to aviation include pruritus, fatigue, nausea, vomiting and abdominal pain. The symptoms are of concern primarily due to the potential impact while performing aircrew duties and the effects on mission safety and completion. UDCA is the only widely used drug that has shown symptomatic relief. As it is not currently on the approved medication list, AFMSA will be the waiver authority for all PSC cases.

III. Waiver Consideration.

PSC is not mentioned by name in AFI 48-123, but “bile duct abnormalities or strictures” is mentioned as disqualifying for FC I/II/III. There is no similar statement for FC IIU, ATC/GBC, or

SMOD duties. For the latter career fields, cholestatic disease severe enough to lead to the use of medication or surgical procedures would likely place continued special duty functions in jeopardy.

Table 1: Waiver potential for Primary Sclerosing Cholangitis (PSC)

Flying Class (FC)	**Waiver Potential#** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	No AFMSA	N/A
II	Yes* AFMSA	Yes
IIU	Yes* AFMSA	If requested by AFMSA
III	Yes* AFMSA	Yes
ATC/GBC	Yes* AFMSA	If requested by AFMSA
SMOD	Yes AFMSA	If requested by AFMSA

* Waiver not recommended for untrained members.
#To be considered for a waiver, the member must asymptomatic and LFTs stable.

AIMWTS search in May 2010 revealed a total of 8 submitted cases with the diagnosis of PSC. There were 0 FC I/IA cases, 3 FC II cases, 0 FC IIU cases, 4 FC III cases, 0 ATC/GBC cases, and 1 SMOD case. Of the 8 total cases, 3 were disqualified; 1 FC II case and 2 FC III cases, all due to complicated or advanced disease.

IV. Information Required for Waiver Submission.

Waiver package should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for primary sclerosing cholangitis should include the following:
A. History - symptoms and signs of cholestasis, cholangitis, liver injury, end-stage liver, including negatives (e.g. pruritus, fatigue, fever, abdominal pain, jaundice, ascites, encephalopathy and variceal bleeding).
B. ERCP or MRCP report.
C. Gastroenterology consultation report.
D. LFTs, chemistry 7, CBC, and PT/PTT. (For renewal LFTs every 3-4 months.)

ICD 9 code for Primary Sclerosing Cholangitis	
576.1	Cholangitis

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WAIVER GUIDE
Updated: Jun 2012
Supersedes Waiver Guide of Jan 2009
By: Nguyen V.T. Tran (Ram12) and Dr Dan Van Syoc
Reviewed by LtCol Edith Canby-Hagino, AF/SG Consultant for Urology

CONDITION:
Prostate Cancer (Jun 12)

I. Overview.

Prostate cancer is the most common cancer in men, and the second leading cause of cancer death for men, with increasing incidence with age (the median age at diagnosis is 72 and more than 75% of all cases are diagnosed in men older than age 65).[1] It has a tendency to metastasize to bones and lymph nodes. In 2007, the disease was diagnosed in 223,307 men in the United States, and there were 29,093 deaths.[2] This approximates to an incidence rate of 157/100,000 men per year in the US.[3] With the increased utilization of PSA screening, the majority of cases are localized at presentation (e.g. not metastatic) and at least 95% of all cases are pathologically classified as adenocarcinoma.[4]

A number of risk factors for prostate cancer have been identified, including increasing age, as noted above. Other factors which confer increased risk for prostate cancer include African-American race and family history. African Americans have the highest incidence of disease and the lowest rates are in men from China and Japan.[5] A positive family history is a risk factor and that risk increases with the number of affected relatives. Diet does appear to play a role in risk as well although not definitively proven as yet. Data does seem to point to an increased risk with consumption of red meat, animal fat, and a higher total fat consumption. Infection and/or inflammation have also been proposed to confer increased risk for prostate cancer, but specific causative organisms have not been identified.[6] For many men, the development of prostate cancer likely results from exposure to multiple environmental factors superimposed on a background of variable genetic susceptibility, making it difficult to identify specific causal events or agents.

In the late 1980s and early 1990s, the number of newly diagnosed cases of prostate cancer in the US greatly increased and this is attributed to the introduction of screening with prostatic-specific antigen (PSA).[7] Screening with the PSA test has greatly improved detection and most cases are asymptomatic at the time of diagnosis. The vast majority of cases are found after a routine screening with PSA plus digital rectal exam. Symptoms at the time of presentation usually indicate locally advanced or metastatic prostate cancer. Local symptoms can include dysuria, hematuria, difficulty voiding, frequency, urinary retention, hematospermia or renal colic from ureteral obstruction. Metastatic disease can present with back or hip pain from bone metastases.

Screening for prostate cancer consists of a digital rectal exam plus serum PSA. The use of the PSA test for prostate cancer screening has revolutionized the approach to this disease and its treatment. PSA does not obviate the need for a digital rectal exam, as some cancers may present with a low PSA but abnormal prostate exam (nodule, induration or asymmetry). Guidelines for screening are evolving. Previously, screening was recommended annually for men beginning at age 50, or younger if a patient had risk factors such as family history or African American race. However, there is growing recognition that screening can lead to detection of clinically insignificant prostate

cancers that might never progress over a man's lifetime. PSA-based screening has led to an increase in the diagnosis of lower grade, localized prostate cancer.[8] In the United States, 90% of men diagnosed with prostate cancer will seek some form of treatment. With early detection of small tumors, many of these men may incur the side effects of treatment many years before the disease reaches a state where it poses a threat to health or longevity, and as a result may not benefit from early detection. As a result, the U.S. Task Force for Preventive Health Services (USTFPS) no longer recommends prostate cancer screening, citing that the harms of prostate cancer screening and subsequent treatment outweigh potential benefit in lives saved.

However, the costly problems of over-diagnosis and over-treatment of clinically insignificant prostate cancer must be balanced against incontrovertible public health data that demonstrate a substantial reduction in prostate cancer death with PSA-based screening. Mortality attributed to prostate cancer in the United States is now 40% lower than what it was prior to PSA testing (US Mortality Files, National Center for Health Statistics, CDC, April 2011, National Cancer Institute). The American Urological Association is currently revising its prostate cancer screening guidelines in light of USTFPS recommendations which discourage screening. . Their most recent guideline from 2009 recommends baseline PSA at 40 years of age or older, if life expectancy is more than 10 years. Periodic screening may ensue, but annual screening is no longer recommended for all men, and frequency of screening should be based on baseline PSA and other risk factors (Prostate Specific Antigen Best Pracice Statement, American Urological Association, www.AUAnet.org/content/media/psa09.pdf). At this time, the American Cancer Society recommends screening with an annual digital rectal exam (DRE) beginning at age 50 for men at average risk, and recommends earlier screening (age 45) for men with risk factors for prostate cancer, which include African American race and first degree relatives diagnosed with prostate cancer before age 65.[9] Men with multiple first degree relatives diagnosed with prostate cancer before age 65 should consider screening as early as age 40.

If screening with PSA and digital rectal examination indicates an increased risk for prostate cancer, transrectal ultrasound guided (TRUS) biopsy with 10-12 cores (concentrated in the peripheral zone of the gland) is performed for definitive diagnosis.

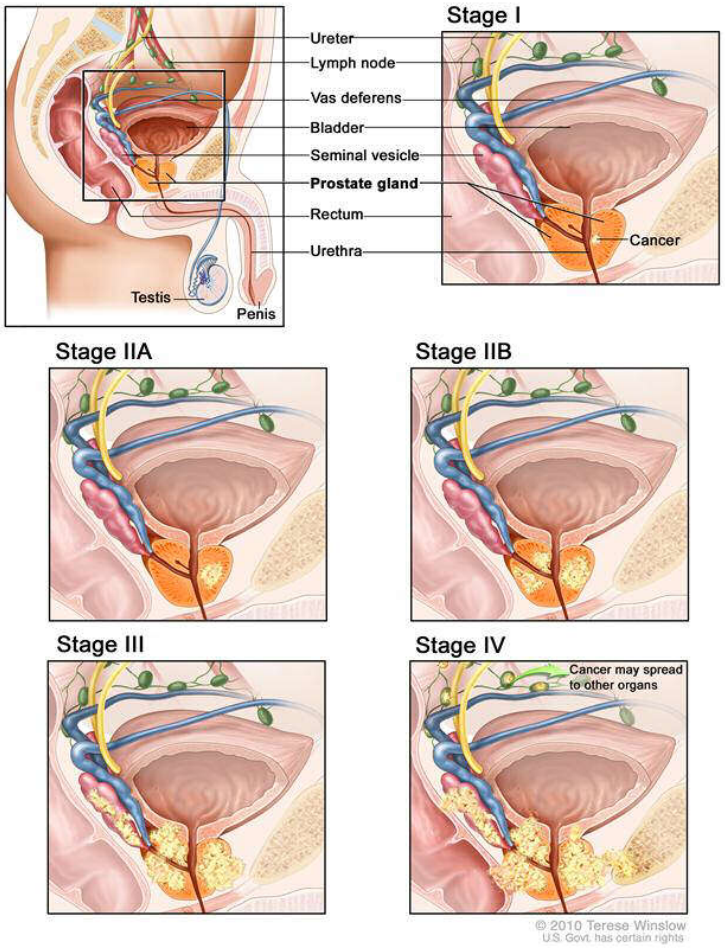
A PSA of 4 ng/ml is frequently used as the "upper limit of normal", but in actuality there is no level of PSA below which the risk of prostate cancer is negligible.[10] Lower PSA generally indicates lower likelihood of finding prostate cancer on a biopsy. For this reason, men with a lower baseline PSA may consider less frequent screening, although optimal screening intervals have not been validated in large clinical trials. Because benign prostatic hyperplasia (BPH) can also be a source for PSA and because of the increased incidence of BPH as men age, some propose lower thresholds of PSA for recommending biopsy in younger men.[11] In addition, some have identified rate of increase in PSA over time (PSA velocity) as a risk for prostate cancer.[12] These issues make it difficult to identify a "normal cutoff" for PSA. PSA represents a range of risk for prostate cancer, and the risk for prostate cancer should be weighed against a patient's competing risks for morbidity and mortality, such as age, cardiovascular disease, and other serious health conditions.

Table 1. American Joint Committee on Cancer (AJCC) Prostate Cancer Staging System.[13]

Stage (cT)	Clinical Tumor (cT) Stage
Tx	Primary tumor cannot be assessed
T0	No evidence of primary tumor
T1	Clinically inapparent tumor neither palpable nor visible by imaging
T1a	Tumor incidental histologic finding in five percent or less of tissue resected
T1b	Tumor incidental histologic finding in more than five percent of tissue resected
T1c	Tumor identified by needle biopsy (e.g., because of elevated PSA)
T2	Tumor confined within the prostate
T2a	Tumor involves one-half of one lobe or less
T2b	Tumor involves more than one-half of one lobe but not both lobes
T2c	Tumor involving both lobes
T3	Tumor extends through the prostate capsule
T3a	Extracapsular extension (unilateral or bilateral)
T3b	Tumor invades the seminal vesicle(s)
T4	Tumor is fixed or invades adjacent structures other than seminal vesicles: bladder neck, external sphincter, rectum, levator muscles, and/or pelvic wall
Stage (pT)	**Pathologic Tumor (pT) Stage**
T2	Organ confined
T2a	Unilateral, involving one-half of one lobe or less
T2b	Unilateral, involving more than one-half of one lobe, but not both lobes
T2c	Bilateral
T3	Extraprostatic extension
T3a	Extraprostatic extension
T3b	Seminal vesicle invasion
T4	Invasion of bladder, rectum
	Regional Lymph Nodes
NX	Regional lymph nodes not assessed
N0	No metastasis in regional lymph nodes
N1	Metastasis in regional lymph nodes
	Distant Metastasis
M0	No distant metastasis
M1	Distant metastasis present
M1a	Non-regional lymph nodes
M1b	Bone(s)
M1c	Other site(s) with or without bone disease
	Histological Grade (G) from Gleason Scoring
GX	Grade cannot be assessed
G1	Well differentiated (Gleason 2-4)
G2	Moderately differentiated (Gleason 5-6)
G3-4	Poorly differentiated/undifferentiated (Gleason 7-10)

Table 2 – AJCC Stage Grouping for Prostate Cancer.[13]

Stage	Primary Tumor (pT)	Regional Lymph Nodes (N)	Distant Metastasis (M)	Histologic Grade (G)
I	T1a	N0	M0	G1
II	T1a	N0	M0	G2, 3-4
	T1b	N0	M0	Any G
	T1c	N0	M0	Any G
	T1	N0	M0	Any G
	T2	N0	M0	Any G
III	T3	N0	M0	Any G
IV	T4	N0	M0	Any G
	Any T	N1	M0	Any G
	Any T	Any N	M1	Any G



Staging (an estimation of the extent of the tumor) is based on the clinical exam and biopsy findings. If metastatic disease is suspected, additional studies such as CT, MRI or bone scans can be performed, but are not frequently indicated in patients presenting with localized disease. Radiolabelled monoclonal antibody scanning (Prostascint) or PET scanning with 11C-Acetate or 11C-Choline have been used for prostate cancer staging, but both modalities have significant

limitations due to poor specificity and sensitivity. Prostate adenocarcinoma is graded, using the Gleason grading or scoring system. Gleason grading is based on glandular architecture and a score ranging from 2 to 10 is assigned. A score of 2-4 indicates a well differentiated tumor, a score of 5-7 indicates a moderately differentiated tumor, and a score of 8-10 indicates a poorly differentiated tumor. Although tumors with a score of 7 have traditionally been grouped with moderately differentiated tumor, a Gleason score of 7 is associated with increased risk for disease progression and cancer-specific mortality compared to a score of 6 or less.[14, 15]

Patients can be grouped into risk strata or risk categories, based on 2002 AJCC clinical stage, Gleason score and PSA level. These risk categories correlate with increasing risk of PSA failure and prostate cancer-specific mortality following radical prostatectomy, external beam radiotherapy, or interstitial prostate brachytherapy.[14, 16]

• Low risk: PSA ≤10 ng/mL and a Gleason score of 6 or less and clinical stage T1c or T2a
• Intermediate risk: PSA >10 to 20 ng/mL or a Gleason score of 7 or clinical stage T2b but not qualifying for high risk
• High risk: PSA >20 ng/mL or a Gleason score of 8 to 10 or clinical stage T2c

The decision whether or not to treat prostate cancer and the choice of treatment should depend on a man's expected longevity, comorbidities, and genitourinary health status (such as erectile function, fertility concerns, symptoms of BPH), in conjunction with the clinical characteristics of his cancer (symptoms, stage, grade, PSA, risk category). Currently, high level evidence to support one form of treatment over others is lacking, and the decision should be individualized, based on above factors. Treatment options for localized prostate cancer include active surveillance, radical prostatectomy (RP), external beam radiotherapy (EBRT), and brachytherapy. Practice guidelines for the management of localized prostate cancer have been developed by the American Urological Association and can be found at www.AUAnet.org.

Patients falling into a low risk category may do well with any of the above options, as monotherapy. Intermediate risk tumors have an increased risk for progression, and therefore may not be good candidates for active surveillance in men with expected longevity of 10 or more years. Patients with high risk disease are very likely to progress and therefore are not good candidates for active surveillance unless they have significant competing risks for mortality in the short term. In addition, both intermediate and high risk tumors are more likely to require more than one mode of therapy for disease control, and more likely to recur and progress despite therapy. Combination therapy (i.e. radiotherapy + androgen deprivation) appears to afford better disease control for intermediate and high risk disease compared to monotherapy.

When metastatic disease is likely or definitively diagnosed, the first line treatment is androgen deprivation therapy (ADT). This can be accomplished with surgical castration, or with depot injections or implants of LHRH agonists. ADT is the primary therapeutic approach for men with metastatic disease, alleviating bone pain in 80 to 90 percent of men and leading to objective responses in the serum PSA, and it may modestly prolong survival.[17] Other options for advanced disease or failure of previous therapies include RT (if previous therapy was surgery), RP in a small well-selected group of men with previous RT, and cryotherapy. Systemic chemotherapy (docetaxel and cabazitaxel) is used to treat metastatic prostate cancer that has progressed despite androgen deprivation therapy. Recently, sipuleucel-T (Provenge), an immunotherapy, was approved for treatment of castration-resistant prostate cancer.

The choice of therapy is based on stage of the disease, patient age, any co-morbid conditions, concern about treatment side effects on the quality of life (QOL), and ultimately, the patient's desires. As with any cancer treatment, the goals are to prevent death and disability and to minimize the complications of the therapy. Goals need to be very clear to all involved (patient, family and treatment team). As prostate cancer is a disease of older men, life expectancy (is there a reasonable chance that the man will be alive in ten years?), rather then patient age, should be a major factor in the selection of treatment for a given man. Other factors are overall health status, and tumor characteristics. Currently, there are no evidence-based recommendations for when to intervene in patients with a long life expectancy since markers of disease progression are poorly validated.[15, 18]

Radical prostatectomy (RP) has been used to treat prostate cancer for many years. It can be performed by a retropubic or perineal approach, laparoscopically, and with robotic assistance. In 2008, the majority of treated men chose radical prostatectomy (this is also true in our Air Force population).[18] Life-threatening complications to this procedure are very rare, but there are complications that are common and can be troublesome to the patient. Urinary incontinence, due to damage to the urinary sphincter, can occur and is more common in older men, but normally diminishes with time. Impotence, or erectile dysfunction (ED), can result due to damage to the cavernosal nerves. Nerve-sparing can be performed for clinically localized prostate cancer, with 2/3 to 3/4 of men recovering erectile function if they have good pre-surgical function and if bilateral nerve sparing can be performed.

The two forms of RT available to treat prostatic cancer are EBRT and interstitial implantation, also known as brachytherapy. ERBT is administered daily for 7-8 weeks, and is usually photon therapy. Proton therapy can also be used in conjunction with photon therapy, but is not widely available and evidence is lacking to demonstrate superiority of proton therapy in terms of both cancer control and treatment morbidity. Prospective trials investigating higher dose fractionation are underway to determine if a tumoricidal dose can be delivered over a shorter time frame with acceptable toxicity and cancer control. Brachytherapy involves placing radioactive, rice-sized pellets directly into the prostate gland, in a same-day outpatient procedure. The advantages to this approach over EBRT are convenience and better preservation of sexual function. Brachytherapy results in negligible radiation exposure to medical personnel and family members.[16] Sexual dysfunction is very common after EBRT, but is better preserved with brachytherapy. Urinary incontinence is not as common as with RP, but irritative bowel and bladder complaints can occur.[7]

Patients with low risk disease or significant competing risks for mortality may be candidates for active surveillance. Unfortunately, a standardized, ideal follow-up regimen supported by high level evidence does not yet exist. Active surveillance regimens are currently being evaluated in several prospective trials, but due to the long natural history of prostate cancer, it may be quite some time before the optimal candidates for active surveillance and the optimal regimen of surveillance are identified. Current regimens include periodic PSA, digital rectal exams and repeat biopsies, but it is not known whether these are sufficient to identify incipient progression before it is too late to successfully intervene. Advantages of active surveillance include (1) avoiding some of the more troublesome side effects of treatment, (2) maintenance of quality of life and daily activities, (3) avoidance of unnecessary treatment of low-grade tumors, and (4) decreased initial costs.[7] It is unknown whether patients managed with active surveillance will have cancer-specific survival comparable to those managed with early intervention.

The largest randomized prospective trial to date investigating early treatment with prostatectomy vs. no treatment (watchful waiting) in men with localized prostate cancer recently published 10-year follow up data.[19] Investigators identified significantly reduced disease specific mortality and reduced risk of metastatic disease among men randomized to radical prostatectomy, compared to those with no treatment. Interim reports at 5 and 8 years identified a cancer-specific and overall mortality advantage to prostatectomy over watchful waiting. Overall mortality at 10 years, however, was not significantly different. It would seem, then, that the prostate cancer intervention allowed men to live long enough to die from other causes, and reinforces the common practice of deferring definitive local therapy for men not expected to live 10 or more years. Two positive predictors for survival in those randomized to no initial treatment were a Gleason score less than 7 and a PSA level less than or equal to 10 ng/ml at the time of diagnosis, e.g. men with favorable risk disease.[20] It would appear that younger patients electing no treatment have a significant probability of progression from localized and indolent to metastatic mortal disease after long-term follow-up.[21] Due to the age of most Air Force aviators with the disease, active surveillance would be an unlikely treatment choice.

At this time, there is little high-quality evidence to guide physicians, patients, and families to formulate the best treatment plan, especially in men with PSA-detected disease. The very few randomized controlled studies are either inconclusive or have not reached maturity in order to give more definitive guidance.[15] All treatments (including no treatment) can cause adverse events and the severity varies among treatments.[22]

For patients with metastatic or locally advanced disease (stages III and IV), more aggressive options need to be considered after the standard three (RP, RT, and active surveillance).

One of the more important considerations in the care of men with prostate cancer is appropriate follow-up care. There are no clearly-defined criteria to prompt therapy in those undergoing active surveillance or to signal recurrence in those who have undergone some form of definitive therapy. Some of the widely used strategies include: a significant increase in serum PSA or a decrease in PSA doubling time to three years or less; a change in the DRE; or a detection of disease progression on surveillance biopsies. For the majority of men in our aviation population who undergo RP and are pathologic stage T2 with negative surgical margins, with a Gleason score of six or less, the follow-up should consist of a PSA at three months post-operatively, and then every six months for four years and then annually. If the Gleason score is seven or greater, there are positive surgical margins, or pathologic stage is >T2, the testing should be every three months for two years, then every six months for an additional two years, followed by annual testing thereafter.[23] Those men not electing RP should have a new biopsy annually for the first several years to confirm lack of residual disease. If there is a concern about possible metastasis, an initial or repeat bone scan is in order to rule out bone metastasis.

II. Aeromedical Concerns.

The aeromedical concerns for most men are based more on the treatment and possible complications than on the disease itself. If the aviator is off all treatment medications and is disease-free (considered to be in remission) and asymptomatic, he can be considered for a waiver.

III. Waiver Consideration.

History of prostate cancer is disqualifying for flying classes I/IA, II, and III. It is not specifically noted as disqualifying for ATC/GBC and SMOD personnel, but all cancers require a medical board, so retention is at stake and a waiver will then be necessary for these personnel.

Table 3. Waiver potential of prostate cancer (assume all cases are adenocarcinoma).

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA Untrained II, III, and ATC/GBC	Stages 1 and 2	Yes#† AETC	Yes
II	Stages, 1, 2 and possibly early 3	Yes+† AFMSA	Yes
III	Stages, 1, 2 and possibly early 3	Yes+† MAJCOM	Yes
ATC/GBC	Stages, 1, 2 and possibly early 3	Yes+! MAJCOM	No
SMOD	Stages, 1, 2 and possibly early 3	Yes! AFSPC or GSC	No

For FC I/IA and untrained individuals, waiver may be considered after 5 years of remission, asymptomatic.
+ For trained individuals waiver may be considered six months after treatment completed, in remission and asymptomatic.
† No indefinite waivers.

Review of AIMWTS through February 2012 revealed 86 cases of prostate cancer. Of this total, 0 were FC I/IA, 56 were FC II, 26 FC III, 3 SMOD, and 1 ATC. A total of 74 waivers were granted and 12 were disqualified. Of the twelve disqualifications (8 FC II, 3 FC III, and 1 SMOD), three were disqualified for medical reasons other than prostate cancer.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for prostate cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, surveillance plan and activity level.
B. Physical – genital, DRE.
C. Urology/oncology consults to include the six month follow-up - all consistent with National Comprehensive Cancer Network (NCCN) guidelines.
D. Labs – All PSA tests with dates.
E. Pathology report to include Gleason scoring results.
F. MRI and bone scan for a Gleason score > 7.
G. Tumor board report, military or civilian, if applicable.

H. Medical evaluation board results.
I. List any and all treatment for erectile dysfunction secondary to disease or treatment.

The AMS for waiver renewal for prostate cancer should include the following:
A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level; all must be consistent with NCCN guidelines.
B. Physical – DRE.
C. Urology/oncology consult.
D. Labs – all PSA test results since previous waiver.
E. List any and all treatment for erectile dysfunction secondary to disease or treatment.

ICD9 Codes for Prostate Cancer	
185	Malignant neoplasm of prostate
233.4	Carcinoma in situ of the prostate

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WAIVER GUIDE
Updated: Jun 2012
Supersedes: Waiver Guide of Jul 2008
By: LtCol Dan Mirski (RAM 12) and Dr. Dan Van Syoc
Reviewed by LtCol Edith Canby-Hagino, AF/SG Consultant for Urology

CONDITION:
Prostatitis (Jun 12)

I. Overview.

Prostatitis is the most common urologic diagnosis in men younger than 50 years of age and is the 3rd most common diagnosis in men above that age. It is defined as an increased number of inflammatory cells in the prostatic parenchyma. In the US, prostatitis accounts for nearly two million encounters annually and for 8 percent of visits to urologists and 1 percent of visits to primary care physicians.[1,2] The National Institutes of Health (NIH) classification for prostatitis is recognized as the best clinical classification system.[3, 4, 5, 6]

1. Acute bacterial prostatitis (NIH category I) – This category is relatively uncommon in the general population but flight surgeons may see it more often due to the preponderance of male gender in flying career fields.. Findings may include fever, genitourinary pain, obstructive voiding symptoms, dysuria, urgency and frequency. Individuals may also present with malaise, nausea, vomiting and can progress to frank septicemia. The most common organisms are gram negative enterobacteriaceae such as *E. coli* from gastrointestinal sources and less commonly gram positive enterococci.[5, 7] Initial diagnosis is made by history, physical, urinalysis and culture. A digital rectal exam may be performed with gentle prostatic palpation but prostatic massage should never be performed, if prostatitis is suspected, because it can lead to bacteremia. The prostate surface antigen (PSA) may be acutely elevated but will subside over the ensuing weeks and should be followed toward normal particularly in the older population. For this reason, it may be preferable to defer PSA testing until acute prostatitis is treated. Midstream urine will show significant white blood cells (WBCs) and may show bacteriuria with a positive culture.[5] Treatment for uncomplicated cases requires 2-4 weeks of oral antibiotics depending on the antibiotic chosen.[5, 8, 9] For those who are significantly ill, or who fail to respond to oral treatment, consider an abscess and treat with intravenous antibiotics and urologic referral.[5] Consult a current antibiotic reference book for the most appropriate agent based on patient age, potential pathogens or resistance patterns as recommendations change with time and location. Fluoroquinolones, macrolide or sulfa antibiotics, however, are the usual treatments of choice.[9] For effective treatment, the chosen antibiotic must achieve high concentrations in urine and tissue.

2. Chronic bacterial prostatitis (NIH category II) – NIH II typically affects men aged 40-70 years of age but can affect younger men as well.[7] Of the 4 NIH categories, this is the most commonly waivered condition for prostatitis in USAF aviators. The patient usually has a history of recurring lower urinary tract infections (UTIs).[4, 5] The bacteria reside in aggregates or biofilms found in ducts and acini of the prostate gland. The risk for recurrence is greater in those with functional voiding abnormalities or inadequate initial treatment for an acute infection.[7,9] Diabetes, prior manipulation and urethral catheterization are also risk factors affecting the potential progression from acute to chronic prostatitis.[10] Organisms such as *Chlamydia trachomatis* may also play a role in some patients.[4,7] For NIH category II or higher, examination of urine and culture before and after

prostatic massage is indicated. A digital rectal exam with gentle prostatic massage should be performed after the patient has produced the first urine specimen followed by a post-massage urine sample. This massage is not done on a patient with a significant acute illness to prevent inducing a bacteremia.[4,7] Oftentimes, the post-massage urine sample has increased WBCs and may reveal pathogens but cultures may be sterile unless an acute UTI is also present.[4] Antibiotic treatment may range from 1-3 months depending on the medication selected and the severity of illness. Although currently most antimicrobial guides still recommend fluoroquinolones as a first-choice agent, macrolide antibiotics are emerging as an important alternative option for the treatment of chronic bacterial prostatitis.[9] Treatment of chronic infections of the prostate gland are not easily amenable to drug therapy and this category requires a urologist consultation to evaluate for any possible functional abnormality.[7, 9]

3. Chronic pelvic pain syndrome (CPPS) (NIH category III) – This category is composed of two sub-types and accounts for the majority of all prostatitis cases in the general population.[4, 7] Based on a review of the USAF waiver file, it is rarely seen in USAF aviators. NIH III type A and B CPPS have persistent chronic genitourinary pain without uropathogenic bacteria.[3, 4] The syndrome becomes chronic after three months of duration and the patient's quality of life is significantly affected. Examination of urine and culture before and after prostatic massage is required. Treatment may involve anti-inflammatory therapy and/or alpha-adrenergic blockers to improve urine outflow. Empiric antibiotic therapy may be useful but it is not understood if improvement results from the antimicrobial effect on uncultured organisms or from an anti-inflammatory affect.[4, 7] Urologic consultation is required.

A. Nonbacterial prostatitis or inflammatory CPPS (NIH category IIIA) – Patients may complain of traditional symptoms of prostatitis but report increased pain localized to the perineum, suprapubic area, penis, groin or lower back. Additionally, they may report pain during or after ejaculation.[4] Increased numbers of WBCs are found in expressed prostatic secretions and may also be found in the post-prostatic massage urine or semen. All cultures are negative. There may be an association between this syndrome and an increased incidence of depression or psychological disturbances.[4, 11]

B. Prostatodynia or noninflammatory CPPS (NIH category IIIB) – The symptoms are similar to IIIA and all cultures are sterile. However, there are few to no WBCs found in expressed prostatic secretions, urine or semen.[4, 11] The etiology is unknown, but some postulate that symptoms result from smooth muscle tone abnormalities in the prostatic urethra.

4. Asymptomatic inflammatory prostatitis (AIP) (NIH category IV) – WBCs are expressed in prostatic secretions, post-prostatic massage urine sediment, semen or histological specimens of the prostate gland but the patient is completely asymptomatic. No infection is present, cultures are negative and patients frequently have benign prostatic hypertrophy and/or an elevated PSA. A noninfectious etiology may be present such as prostate cancer.[3, 4] Urologic consultation is required.

Treatment:

Antibiotic selection for NIH I and II is optimally based on positive culture results but this is not always available. Common choices include: quinolones, macrolides, doxycycline and trimethoprim-sulfamethoxazole (TMX/SMX). Other drugs, such as erythromycin have been

previously advocated in literature as second line agents. Current medical literature review does not support the use of ampicillin unless specific sensitivities prove effective.

Unless complicated by an abscess, acute prostatitis does not usually require urologic consultation. NIH categories II – IV however, do require consultation. Individuals with NIH category II-IV may have reasons for recurring infections or inflammation such as dysfunctional voiding, intraprostatic ductal reflux, pelvic floor musculature abnormalities, neural dysregulation or prostatic calculi requiring urological evaluation and/or therapy.[5] Although a causal association between prostatitis and prostate cancer has not been definitively established, prostatic inflammation has been associated with prostatic epithelial changes that may be precursors to invasive carcinoma. In addition, locally advanced prostate cancer may cause symptoms similar to prostatitis. Therefore, prostate cancer should be in the differential diagnosis for men with prostatitis symptoms. Screening for prostate cancer and urologic consultation are required.

II. Aeromedical Concerns.

Acute prostatitis symptoms are not compatible with flying duties. They include urinary frequency, urgency, back and perineal pain, fever and chills. Chronic bacterial prostatitis is often asymptomatic between episodes but bacteriuria persists. The likelihood of recurrent acute UTI with rapid onset of symptoms makes this condition not compatible with flying duties unless cured or suppressed with antibiotics. Vibration in the cockpit may traumatize the perineal area and aggravate prostatitis.[9] Those assigned to high G-force aircraft may also exacerbate the condition secondary to G-load on the perineal area.[12]

Doxycycline, TMP/SMX, and erythromycin are all antibiotics listed on the Official Air Force Approved Aircrew Medications list. Short courses of therapy (2-4 weeks) for uncomplicated acute prostatitis treated with these antibiotics allows a return to flying status (RTFS) once idiosyncratic medication reactions are ruled out and the symptoms of infection have resolved. While quinolones have very good penetration into prostatic secretions and can shorten the course of therapy, they are not approved for flying duties. Ciprofloxacin may be used for biological warfare exposure but due to the increased risk for CNS side effects is not otherwise approved for flying duties. Quinolone therapy has been associated with QT prolongation, as well as increased risk for tendonitis and tendon rupture in the pediatric population. If an aviator does need a quinolone for therapy, it can be used as long as the flyer is DNIF during the entire antibiotic duration. Chronic prostatitis may require 1-3 months of antibiotics depending on the medication selected and the severity of illness.[4, 9] The subsequent waiver for chronic prostatitis may allow treatment with the same antibiotic in the future (if the bacteria are sensitive) and a smoother RTFS.

For those requiring prolonged antibiotic therapy during times of significant sun exposure, one must be cognizant of drugs with increased risk for photodermatitis such as doxycycline and Bactrim® (TMP/SMX). Use good operational risk management (ORM) for drug selection and reference your antibiotic pocket guide as recommendations change with time.

III. Waiver Considerations.

Chronic prostatitis (NIH II – IV) and abscess of the prostate are disqualifying for all flying classes, to include FC IIU. Prostatitis is not listed as disqualifying for ATC/GBC and SMOD personnel.

Table 1: Waiver potential of prostatitis base on NIH category.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	NIH I	N/A
	NIH II	No* AETC
	NIH III	No† AETC
	NIH IV	No# AETC
II/III**	NIH I	N/A
	NIH II	Yes MAJCOM
	NIH III	Maybe†$ MAJCOM
	NIH IV	Maybe# MAJCOM

* Risk of recurrent and prolonged infections prevents waiver for I/IA.
** Waiver authority for FC IIU is AFMSA.
† Treatment of chronic pain is usually with alpha blockers and they are not waivered for FC I/IA or II and are rarely waivered for FC III (alpha blocker's aeromedically significant side effects include postural hypotension, dizziness, vertigo and syncope).
# Responsive conditions like prostate cancer may be waived for trained FC II or III once treatment completed and six months has elapsed. See prostate cancer waiver guide.
$ Waiver for untrained FC II and III is unlikely.

A query of the Aeromedical Information Management Waiver Tracking System (AIMWTS) database -- via ICD9 codes-- was performed through January 2012. A total of 43 entries were identified for flying personnel; 38 were granted waivers and 5 were disqualified from flying duties. Of the 43 prostatitis disorders, 28 were for FCII, 13 for FCIII, 1 for Ground Based Controller (GBC) and 1 waiver for an IFCIA. This latter patient was granted a waiver despite an initial FC exam because he was discovered to have asymptomatic chronic prostatitis by cystoscopy as an incidental finding while undergoing a work-up for microscopic hematuria. Of the 5 DQ, 4 belonged to FCII and 1 was an initial FCIII. The initial FCIII was a GBC who was not granted a waiver since he had 0 hours and had chronic prostatitis with severe urinary retention. Of the FCII DQs, 2 required continuous (>1 year) multidrug treatment regiments, another had chronic prostatitis along with benign prostatic hypertrophy (BPH) and required flomax therapy. The last one would have been given a waiver for his chronic prostatitis, but was disqualified for other medical problems including diabetes (DM).

IV. Information for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver of prostatitis should include the following:
A. History (present and past) plus current absence of symptoms and medication side effects.
B. Complete examination. In addition to a general physical exam with temperature, this exam includes an external urologic exam as well as a rectal exam.
C. Urinalysis, cultures and labs such as PSA and CBC if required.
D. Urologist's consultation, diagnosis and study results to rule out other abnormalities. (Consultation notes and test results may be scanned into the AIMWTS program.)
E. In NIH III/CPPS cases, consider the psychological status of the flyer.

The AMS for waiver renewal for prostatitis should include the following:
A. History – address recurrence frequency, symptoms, treatment and any side effects, and activity levels.
B. Physical – External urologic exam and rectal.
C. Urology consult.

ICD 9 codes for Prostatitis	
601.0	Acute prostatitis
601.1	Chronic prostatitis
601.2	Chronic prostatitis
601.4	Prostatitis in disease classified elsewhere
601.8	Other specified inflammatory diseases of the prostate
098.12	Gonococcal prostatitis (acute)
098.32	Gonococcal prostatitis (chronic)
131.03	Trichomonal prostatitis

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WAIVER GUIDE
Updated: Nov 2011
Supersedes Waiver Guide of Nov 2008
By: LtCol Dwight Peake (RAM 12) and Dr. Dan Van Syoc
Reviewed by LtCol Laveta McDowell, AF/SG Consultant for Nephrology

CONDITION:
Proteinuria & IgA Nephropathy (Nov 11)

I. Overview.

Proteinuria is an early and sensitive marker for renal damage in many types of chronic kidney disease.[1] It characterizes most forms of glomerular injury, but is not necessarily diagnostic for renal injury.[2] Urinalysis is a common test in the clinic and is performed for many reasons. Urinalysis is often part of a screening exam such as school physicals, preplacement exams and flight physicals. A positive urinalysis for protein is not an uncommon finding in adolescents, but is less common with adults.[3] Annual screening for proteinuria is no longer felt to be cost-effective in the general population for those less than 60 years of age, but the National Kidney Foundation recommends regular surveillance for those at risk of kidney disease. Risk factors for kidney disease include family history of kidney disease, diabetes, hypertension, ethnic minority, obesity, and metabolic syndrome.[4, 5] For patients at risk, it is important to detect disease early in its course as current therapy can significantly slow progression of proteinuric chronic kidney disease.[6]

Urinary protein excretion in the normal adult should be less than 150 mg/day. If the excretion exceeds this level beyond a single measurement, the patient needs to be evaluated for possible glomerular disease. Transient proteinuria can occur in up to 7% of women and 4% of men and is often associated with fever or exercise. Such benign proteinuria nearly always resolves on follow-up; thus, isolated proteinuria is normally not evaluated unless confirmed on repeat analysis.[6] The standard screening testing for proteinuria in persons with risk factors is an albumin-specific dipstick or urine albumin/creatinine ratio. Testing for albumin provides greater testing sensitivity for the predominant adult causes of chronic kidney disease than testing for total protein.[4]

Common causes of proteinuria in an adult population include isolated proteinuria, orthostatic proteinuria, conditions causing nephritis, and as a result of systemic illness. Isolated proteinuria can result from problems such as febrile illness, other physiologic stress or vigorous exercise or from abnormal production in conditions including myeloma and monoclonal gammopathies, or from toxins such as cadmium. Evaluation of isolated proteinuria, confirmed on repeat urinalysis, in persons 30 years and older should include serum and urine protein electrophoresis.[7]

Orthostatic proteinuria is not an uncommon condition in adolescents and young adults but it is rare after age 30. This condition is characterized by an increase in protein excretion in the upright position, but a normal excretion (< 50 mg/8 hours) when supine. This postural response contrasts with most patients with glomerular disease who will normally demonstrate a modest reduction in protein excretion while supine, but commonly not to normal levels. Glomerular disease may initially present with mild manifestations therefore people with orthostatic proteinuria should have a follow-up evaluation after one year to evaluate for persistence or progression.[3]

Patients with signs or symptoms suggestive of glomerular disease, such as persistent proteinuria or hematuria and/or impaired renal function, should be considered for a renal biopsy in order to obtain a diagnosis. The risks associated with a biopsy, such as bleeding, are minimal with experienced clinicians.[8] Patients with persistent proteinuria, along with hematuria, red cell casts (which establish the glomerular origin of the red cells), but a normal plasma creatinine and blood pressure, likely have a focal glomerulonephritis that is due to one of the following three disorders: IgA nephropathy, hereditary nephritis, or thin basement membrane disease.[9] However, one cannot rule out other serious glomerular disease such as lupus nephritis or vasculitis. The most common adult nephropathies are IgA nephropathy and focal segmental glomerulosclerosis (FSGS) and the most common cause of nephrotic syndrome ($\geq$ 3 gm proteinuria/24 hours) is idiopathic membranous glomererulopathy.[7]

IgA nephropathy is a relatively newly recognized disease, first described by Berger and Hinglais in 1968. It is now the most common cause of primary (idiopathic) glomerulonephritis in the developed world and is defined as an immune-complex-mediated disease characterized by the presence of glomerular IgA deposits accompanied by a variety of histopathologic lesions.[10]

IgA nephropathy presents with episodic hematuria and often follows an upper respiratory infection – so called "synpharyngitic hematuria". It has macroscopic and microscopic forms; the latter is the more common form seen in adults. Between episodes of macroscopic hematuria, the urinalysis is often normal. The presence or absence of proteinuria at the time of clinical diagnosis often determines whether patients with asymptomatic hematuria are biopsied.[11] The disease was initially considered a benign form of hematuria, but it is now clear that up to 50% of patients may progress to end-stage renal disease.[12] The remaining patients may enter a sustained clinical remission or have persistent low grade hematuria or proteinuria. The prognosis is variable and the outcome difficult to predict with accuracy in individual patients. It can present at any age, but is more common in the second and third decades. There is a male to female ratio ranging from 2:1 to 6:1 in Europe and the US. Ethnically, Caucasians and Asians are much more prone to this disease than are African Americans.[10]

IgA nephropathy may present in one of three ways. About 40-50 percent of patients present with one or more episodes of gross hematuria usually following an upper respiratory infection. Another 30-40 percent have microscopic hematuria and mild proteinuria incidentally detected on a routine examination. Less than 10 percent of patients present with nephrotic syndrome, or with acute rapidly progressive glomerulonephritis characterized by hematuria, edema, hypertension and renal insufficiency. A definitive diagnosis can only be made by renal biopsy and immunohistologic examination.[8] In patients who have isolated hematuria, a renal biopsy is usually performed only if there are signs suggestive of severe disease or progressive protein excretion above 0.5 to 1 gram/day, an elevated plasma creatinine, or hypertension. A skin biopsy looking for IgA deposition in the dermal capillaries has not proven to be predictive in IgA nephropathy.[13]

While there is no recognized cure for this disease, there are treatment options that slow disease progression, and up to 23% of patients will show a complete remission. Risk factors for progressive renal failure include: elevated serum creatinine above 2.5 mg/dL at the time of diagnosis, hypertension, and persistent proteinuria above 0.5 to 1 g/day. The relationship between increasing proteinuria and a worse prognosis is probably a reflection of proteinuria as a marker for the severity of glomerular disease. The rate of progression is low among patients excreting less than 500mg/day and fastest among those excreting more than 3.0 to 3.5 g/day of protein.

There are two separate approaches to the treatment of IgA nephropathy. General interventions to slow progression of renal disease that are not specific to IgA nephropathy include blood pressure control, angiotensin converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) in patients with proteinuria. These drugs reduce proteinuria and preserve renal function even in normotensive patients. Reduction in proteinuria is the hallmark of effective treatment in preserving renal function in other types of nondiabetic proteinuric renal diseases.[10, 14] Corticosteroids can be used in advanced cases of IgA nephropathy. Statin therapy for lipid-lowering is recommended in the majority of chronic kidney disease patients to lower cardiovascular risk and possibly reduce disease progression. Fish oil has been studied but its role in treating IgA nephropathy is not well defined.[12] Some studies indicate that it may be useful for reducing renal inflammation and glomerulosclerosis.

There are some newer approaches looking at dietary modifications. An uncontrolled Italian study used a gluten free diet in patients with primary IgA nephropathy. In 75 percent of the 29 patients, a decrease in IgA containing circulating immune complexes was noted. Mean proteinuria values significantly decreased after 6 months of the diet and a reduction was also observed in microscopic hematuria. However, mean blood creatinine levels showed a significant increase after the gluten-free diet was stopped and the clinical course of the disease was not favorably influenced since a relentless progression towards renal failure was observed.[15] Intravenous immune globulin has been used in selected patients. The rationale for use in IgA nephropathy stems from observations that an IgG deficiency, which could be corrected with IVIG, may predispose patients to infections that trigger flare-ups of the renal disease. The benefit of IVIG needs to be confirmed prospectively in large numbers of patients.

The treatment of choice for individuals who progress to end-stage renal disease is preemptive renal transplantation – that is, transplantation before they require hemodialysis. Many of these patients are younger and otherwise healthy. Transplantation provides a reasonable quality of life and a lifespan longer than that of the hemodialysis patient. Kidney disease recurrence does occur in transplanted kidneys, however transplant centers are accustomed to monitoring patients at risk. The largest reported retrospective analysis of 532 allograft recipients with primary IgA nephropathy is from Australia, where the estimated 10-year incidence of graft loss due to recurrent disease was 9.7 percent.[16] The rate of recurrence is equal between cadaveric and living donors.[10]

II. Aeromedical Concerns

Regarding proteinuria, flyers will be disqualified when diagnosed with "proteinuria under normal activity (at least 48 hours post strenuous exercise) greater than 200 mg in 24 hours. Waiver may be considered for fixed and reproducible orthostatic proteinuria when the urinary protein to urinary creatinine ratio on a randomly collected urine (not first morning void) is less than or equal to 0.2. It is not necessary to collect a 24 hour urine specimen." In other words, if the protein loss can be explained by a relatively benign process or is stable, the aeromedical concerns would be negligible and waiver is favorably considered. For IgA nephropathy, the aeromedical concerns would be related to the renal function, any symptoms, and the medications being used. For most flyers, a return to flying (waiver) would be in order once the disease is in remission and requiring no medication. In those with a more chronic or indolent form, the disease is usually one that is slowly progressive.[13] Typically such patients are treated with ACE inhibitors to preserve renal function, and a waiver will likely be granted if the patient is otherwise stable.[17]

III. Waiver Considerations.

Benign forms of proteinuria are routinely waived for all flying classes. IgA nephropathy is disqualifying for FC I/IA, II, and III duties if the proteinuria exceeds 200 mg/24 hours. Chronic nephritis with renal function impairment and nephrosis worse than mild are disqualifying for all flying and special operational duties and require an MEB prior to waiver submission. Certain ACE inhibitors and ARBs are approved for aircrew use, as are a number of statins, though the role of the latter in IgA nephropathy is unclear. Corticosteroid therapy is not waiverable. If significant hematuria is also present, please consult with the waiver guide for hematuria for assistance.

Table 1 – Waiver potential for proteinuria and IgA Nephropathy

Flying Class (FC)	**Condition**	**Waiver Potential** **Waiver Authority**
I/IA Untrained II/III	Proteinuria without evidence of renal disease or hypertension	Yes AETC
	Proteinuria without evidence of renal disease, but with hypertension*+∫	Maybe AETC
	Proteinuria with evidence of renal disease with or without hypertension	No AETC
	IGA Nephropathy with proteinuria	
II/IIU**/III	Proteinuria without evidence of renal disease or hypertension	Yes MAJCOM
	Proteinuria without evidence of renal disease, but with hypertension *+#	Yes MAJCOM
	Proteinuria with evidence of renal disease with or without hypertension *+#	Yes MAJCOM
	IGA Nephropathy with proteinuria +	
ATC/SMOD***	Chronic nephritis with renal function impairment	Maybe, after MEB MAJCOM
	Nephrosis worse than mild	Maybe, after MEB MAJCOM

***** Hypertension controlled on low dose HCTZ, lisinopril, ramipril or losartan may be considered for waiver.
** Waiver authority for FC IIU is AFMSA
*** Waiver authority for SMOD personnel is AFSPC or GSC
+ No indefinite waivers.
# FC IIA waiver can also be considered with HCTZ combined with lisinopril, ramipril or losartan; atenolol alone or in combination; nifedipine (coat-core or GITS) alone or in combination; or amlodipine alone or in combination.
† HCTZ and/or lisinopril, ramipril, losartan, atenolol, nifedipine (coat-core or GITS) or amlodipine.
ʃ Waiver for FC I/IA and untrained FC II and FC III may be considered if sustained HTN control well documented, on low standard dosage, no evidence of end organ damage and no side effects.

AIMWTS review in Aug 2011 for the diagnoses of proteinuria and IgA nephropathy revealed a total of 81 cases. Of this total, 44 were IgA nephropathy with or without proteinuria, 3 were focal sclerosing glomerulosclerosis, 1 was an unspecified glomerulonephritis, 1 was idiopathic membranous glomerulonephropathy, 11 were postural proteinuria, 12 were nonspecific proteinuria, and 6 were proteinuria associated with another diagnosis [diabetes (2), metabolic syndrome (4), hypertension (1), or lupus (1)].

One FCIII case and one SMOD case of focal sclerosing glomerulosclerosis, one FC II case of nonspecified glomerulonephritis, and one FC II case of idiopathic membranous glomerulonephropathy waivers were approved. In the IgA nephropathy category, there were 5 FC I/IA cases and all were disqualified, but one received an indefinite CSAF exception to policy; 23 cases were FC II and three were disqualified (one for CML, one for recurrent major depression, and one for nephrotic syndrome), 1 was IIU disqualified for end-stage renal disease; and there were a total of 11 FC III cases with one (IFCIII) disqualification for macroproteinuria. Of the postural proteinuria cases, all were qualified (1 FC I/IA, 4 FC II, and 4 FC III). Of the unspecified proteinuria, 1 ATC was disqualified for sleep apnea, 1 SMOD for unsatisfactory ARMOD, and 1 FC III for pernicious anemia; in the other proteinuria cases, one FC II case was disqualified for diabetes and one FC III was disqualified for multiple medical problems.

IV. Information for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for <u>initial waiver</u> for proteinuria and/or IgA nephropathy should include the following:
A. Complete history of the problem to include all consultants seen.
B. Physical exam results.
C. Labs – all urinalysis tests to include microscopic results, BUN/Cr, 24 hour urine, renal biopsy results if done.
D. Nephrologist consultation report if completed.
E. Current treatment to include all medications and dates started.
F. Results of MEB if aviator has IgA nephropathy, or nephropathies, or nephritis.
G. Detail of all other medical problems, if applicable.

The aeromedical summary for waiver renewal for proteinuria and/or IgA nephropathy should include the following:
A. Updated history since last waiver
B. Physical exam results.
C. Labs – all urinalysis tests, other labs and additional renal biopsies since last waiver.
D. Nephrologist consult report if new one accomplished.
E. Current treatment to include all medications and dates started.

ICD 9 Codes for Proteinuria	
791.0	Proteinuria
583.81	Nephropathy, not specified

V. References.

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WAIVER GUIDE
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Supersedes Waiver Guide of Jan 08
By: Maj Justin Tingey (RAM 11) and Dr Dan Van Syoc
Reviewed by Col Steven Ritter, AF/SG consultant in Dermatology and Col William Venanzi, AF/SG consultant in Rheumatology

CONDITION:
Psoriasis and Psoriatic Arthritis (Mar 11)

I. Overview.

Psoriasis affects about two percent of the population in the United States, with approximately 150,000 new cases diagnosed per year, and is equally common in males and females. Onset is a lifelong threat as it has been documented at birth and up to age 108, with peak incidence at 22.5 years. An early onset (before age 15) predicts more severe disease relative to the percentage of body surface involved and response to therapy.[1] While looked at as a simple dermatological disease, recent research has demonstrated a far more complex immune-mediated disease process. Psoriasis is associated with arthritis and inflammatory bowel disease. It has been shown to be an independent risk factor for diabetes, hypertension, myocardial infarction and coronary artery calcification.[2, 3]

Psoriasis is a hyperproliferation and immune regulation disorder.[4, 5] Hyperproliferation is seen with increased numbers of epidermal cells, increased number of cells undergoing DNA synthesis, and an increased turnover of epidermal cells.[6] A T-cell immune response is noted with increased T-cells seen in the skin.[7] TNF-alpha, gamma interferon, and various interleukins are overexpressed in psoriasis patients.[8] Dendritic cells play a key role in this immune response as they are activated by environmental factors and subsequently produce interferon alpha and stimulate T-cell differentiation in the dermal layers.[9, 10] Current psoriasis therapies attempt to address this complex interaction.

Morphologic appearance and distribution are keys to diagnosis, as well as the Auspitz phenomenon (after mechanical removal of a scale, small droplets of blood appear on the erythematous surface). Typical plaques are erythematous, dry, and scaling (silvery white scale). Presentation may vary from a few localized psoriatic plaques to generalized skin involvement, to a life-threatening pustular psoriasis. The course of psoriasis is chronic and unpredictable. Plaques are the most common form of the disease and most (65%) have mild disease. While genetics appear to play a variable role in the development of psoriasis, the most significant triggers include environmental and behavioral factors such as cold weather, physical trauma, infections, stress, and drugs (lithium, beta-adrenergic blockers, antimalarial agents, angiotensin-converting enzyme inhibitors, and corticosteroid withdrawal).[1, 4, 6, 7, 11, 12]

Psoriasis distribution is usually symmetrical, and favors the elbows, knees, scalp, and sacrum. Palms, soles, nails and intertriginous (inverse psoriasis) areas can be involved. Guttate psoriasis is a form of psoriasis with typical lesions the size of water drops, 2 to 5 mm in diameter, that occur as an abrupt eruption following an acute infection, such as streptococcal pharyngitis, and usually in patients under 30. Chief complaints of psoriasis include: disfigurement, lowered self-esteem, being

socially ostracized, pruritus and pain (especially palms, soles, and intertriginous areas), excessive scale, heat loss (with generalized lesions), and arthralgias.

Dermatologists may grade the severity of psoriasis on body surface area (BSA); less than three percent is mild, three to 10 moderate, and greater than 10 percent severe.[13] The palm of the hand equals one percent of the skin. However, the severity of psoriasis is also measured by how psoriasis affects a person's quality of life. Psoriasis can have a serious impact even if it involves a small area, such as the palms of the hands or soles of the feet.

Treatment includes topical steroids, topical tar, topical vitamin D_3 (calcipotriene [Dovonex®]), topical retinoid (tazarotene [Tazorac®]), topical calcineurin inhibitors (pimecrolimus and tacrolimus), phototherapy, and systemic agents such as methotrexate, acitretin, or newer biologic immune response modifiers, such as etanercept and infliximab, for moderate to severe disease.[14] Newer immunosuppressive agents such as alefacept (Amevive®) may also be considered, but are not approved for use in aircrew. Goal of therapy is to decrease body surface area, decrease erythema, scaling and thickness of plaques, improve quality of life and avoid adverse effects.[15]

Approximately 70 to 80% of all patients with psoriasis can be treated adequately with use of topical therapy. In cases of moderate-to-severe psoriasis (e.g. affecting large surface areas), the use of phototherapy, systemic drugs or both are more likely to be required.

Psoriatic Arthritis: Psoriatic arthritis is one of the seronegative spondyloarthritis disorders, and as such, it is associated with a negative rheumatoid factor. It may precede (in children only), accompany or more often, follow skin psoriasis. Estimates of the prevalence of psoriatic arthritis among individuals with psoriasis vary from 4 to 6 percent up to 30 percent; equal in female and male.[16] Nail involvement occurs in more than 80% of patients with psoriatic arthritis, compared with 30 % of patients with uncomplicated psoriasis.[12] Approximately 20% of individuals with psoriatic arthritis develop destructive and potentially disabling disease.[17]

As in psoriasis, proinflammatory cytokines and activated T-cells are found in the affected tissues; namely synovium and joints. Joint symptoms include stiffness, inflammation and swelling. The most common areas involved include the distal interphalangeal joints and the spine.[16] Pain is usually improved with physical activity. Over half of patients with psoriatic arthritis have radiographic abnormalities and nearly half of those recently diagnosed will have erosions within two years.[18] There are five recognized presentations of psoriatic arthritis:[12]

Table 1: Presentation of Psoriatic Arthritis

Type	Percentage of all psoriatic arthritis	Features
Asymmetric oligo-arthritis (involving DIPs, PIPs and MCPs)	60 -70	Joints of fingers and toes ("sausage finger")
Symmetric polyarthritis	15	Clinically resembles rheumatoid arthritis, rheumatoid factor negative
Distal interphalangeal joint disease only	5	Mild, chronic, associated with nail disease
Destructive poly arthritis (arthritis mutilans)	5	Osteolysis of small bones of hands and feet; gross deformity; joint subluxation
Ankylosing spondylitis	5	With or without peripheral joint disease

Treatment usually begins with nonsteroidal anti-inflammatory drugs (NSAIDs). Sulfasalazine, etanercept (Enbrel®), and infliximab (Remicade®) are other waiverable medications used to treat psoriatic arthritis. Etanercept in one study resulted in 20% and 50% improvement in 59% and 37% of individuals, respectively.[19] Although etanercept may be administered at a dose of 25 mg twice a week, a dosage schedule of 50 mg once a week has shown similar efficacy and simplifies the regimen, particularly with the autoinjector dosage form. The drug is given in rotating fashion over the subcutaneous tissue of the thighs. Etanercept must be kept refrigerated between 36° to 46°F, for it degrades rapidly even at room temperature. Additional medications used for treatment such as methotrexate, cyclosporine, and other anti-tumor necrosis factor-alpha (TNF-α) therapy (adalimumab) are not waiverable..[15, 19]

II. Aeromedical Concerns.

The main concerns are interference with wear of protective aviation equipment; distraction by pruritus or pain; triggering or exacerbation of the disease through repeated occupational trauma to the skin (Köebner's phenomenon); use of treatment medications that are incompatible with flying duties; unavailability of treatment in a deployed setting (ultraviolet light therapy); frequency of follow-up requiring excessive time lost from flying duties; and psychological factors. Although psoriasis usually spares the face and may not affect wear of a mask, scalp involvement is possible and may interfere with helmet use. Involvement of palms and soles may interfere with use of flight controls. Discomfort from pruritus or pain can be significant and the resulting distraction may jeopardize flight safety. Köebner's phenomenon may be caused by repeated rubbing or pressure including wear of a helmet or prolonged sitting in the cockpit.

While most topical treatments are well tolerated with few side effects, some may cause an irritant skin reaction. Topical calcineurin inhibitors tacrolimus and pimecrolimus are not approved for the treatment for psoriasis in Air Force aviators due to subclinical neurotoxicity.[21] UVB phototherapy is well tolerated except for risk of burning and skin dryness. PUVA (oral photochemotherapy) short term side effects include nausea, dizziness, headache, pruritus, cutaneous and eye photosensitivity and long term side effect of increased risk of skin cancer. Joint involvement may interfere with use of flight controls, be a distraction due to discomfort and limit egress ability. Some forms of therapy

(e.g. ultraviolet light) may require several treatments per week, would usually not be available in a deployed setting, and may require excessive time lost from flying duty. It is important to maintain awareness of the psychological aspect of this potentially disfiguring disease and its affect on the aviator's social situation.

Systemic treatments may have a range of significant side effects that are incompatible with flying duties in addition to the disqualifying nature of the severe forms of psoriasis. Sulfasalazine toxicity consists of dose-related adverse effects, and a number of more serious hypersensitivity reactions primarily related to the sulfa moiety. Methotrexate, because of serious toxicity involving multiple organs (e.g., lung, central nervous system), is not waiverable. Of the toxicities associated with anti-TNF therapy, those related to immunosuppression have been of greatest concern. The increased risk of developing demyelinating disease appears to be well within aeromedical standards. The same is true of lymphoma, and the latter would be unlikely to be of particular aeromedical concern. There is inconclusive evidence of possible increased risk for congestive heart failure in anticytokine therapy. Individuals on anti-TNF therapy appear to be at greater risk of granulomatous infections, although etanercept has been associated with less risk than infliximab. Before etanercept therapy is begun, CBC, sedimentation rate, C-reactive protein, chest radiography and testing with intermediate strength PPD are required; tuberculin reactivity of 10 mm or more should be interpreted as a positive response, and antituberculous prophylaxis begun.[19] Recommendations regarding duration of INH prophylaxis before beginning etanercept have been inconsistent.

III. Waiver Considerations.

For entry into the US Air Force, a current or past history of psoriasis is disqualifying; this would definitely impact those individuals applying for initial flying training as well. Diagnosis of psoriasis is disqualifying for flying duties. Although psoriasis is not listed as disqualifying for FC IIU, ATC/GBG, or SMOD, medications used to control this disorder may be disqualifying. Use of personal protective equipment is also going to be a big factor for all career fields for members with psoriasis. Psoriatic arthritis is not mentioned by name as disqualifying for aviation service, ATC/GBG, or SMOD, however, chronic arthritis is disqualifying for FC I/IA/II/III. Also, a medical evaluation board (MEB) is required if the psoriasis is extensive and not controlled or controllable only with potent cytotoxic/systemic agents (methotrexate, cyclosporine, oral retinoids, PUVA and immune modulating drugs).

Table 2: Waiver Potential for psoriasis and psoriatic arthritis

Flying Class (FC)	Condition/Treatment for Psoriasis	Treatment for Psoriatic Arthritis	Waiver Potential Waiver Authority
I/IA	History of psoriasis at any time whether or not under current therapy of any kind	History of psoriatic arthritis currently treated or not	No AETC
		NSAIDS, sulfasalazine	Yes AETC
		Oral retinoids, methotrexate, cyclosporine, and immune modulating drugs#	No AFMSA
II/III	Topical steroids, calcipotriene, topical retinoids (e.g. tazarotene), UVB	NSAIDS, sulfasalazine	Yes MAJCOM
	Etanercept or Infliximab	Etanercept or Infliximab	Yes (FC IIC/III)$ AFMSA
	Topical calcineurin inhibitors*, oral retinoids, methotrexate, cyclosporine, and immune modulating drugs(except etanercept and infliximab), PUVA#	Oral, retinoids, methotrexate, cyclosporine, and immune modulating drugs[#]	No AFMSA
IIU, ATC/GBC, SMOD	Topical steroids, calcipotriene, topical retinoids (e.g. tazarotene), UVB	NSAIDS, sulfasalazine	No waiver required
	Etanercept or infliximab or pimecrolimus	Etanercept or infliximab or pimecrolimus	Yes$ MAJCOM
	Tacrolimus, oral retinoids, methotrexate, cyclosporine, and immune modulating drugs, (except etanercept and infliximab) PUVA#	Oral retinoids, methotrexate, cyclosporine, and immune modulating drugs,[#] (except etanercept and infliximab)	No MAJCOM

* e.g. tacrolimus, pimecrolimus (pimecrolimus is approved for atopic dermatitis but not for psoriasis in aviators)[16]

**All initial training applicants to be treated as FC I/IA

e.g. etanercept, infliximab, adalimumab, alefacept, efalizumab

$ TDY requires access to transport and refrigeration of etanercept and/or infliximab, not worldwide qualified.

A review of AIMWTS through January 2011 showed 124 cases of psoriasis and psoriatic arthritis; six FC I/IA, 53 FC II, three FC IIU, 56 FC III, three ATC/GBC, and one SMOD. Nineteen cases were disqualified. Of the 19 psoriasis/psoriatic arthritis cases disqualified, three were FC I/IA, two were FC II, 13 were FC III, and one was SMOD. All three FC IIU and three ATC/GBC were approved for waiver. All three FC I/IA cases, one FC II case, eight FC III cases were disqualified due to psoriasis and/or psoriasis treatment. The other 11 disqualified had other disqualifying conditions (e.g. sleep apnea, TIA, excessive refractive error, cognitive disorder, anxiety, alcohol abuse, pregnancy).

IV. Information Required for Waiver Submission.

The aeromedical summary for initial and renewal waivers must include:
A. History - to include extent of lesions, locations, symptoms, and a description of current therapy, all medications including dosage, and frequency, and comments addressing interference with use of aviation equipment or jeopardy to safe mission accomplishment. If arthritis, then in addition to joints involved should address any interference with flight controls and egress ability.
B. Physical - joints involved, surface area affected and description of lesions.
C. Copy of dermatology consultation.
D. All cases of psoriatic arthritis should be evaluated by a rheumatologist. These cases need to have results of radiographs for hands, feet, and any symptomatic joints.
E. Laboratory testing for initial waiver for psoriatic arthritis: complete blood count, sedimentation rate, C-reactive protein.
F. If topical vitamin D_3 (calcipotriene) is used, verify with the aviator the amount of topical vitamin D_3 cream use is less than 100 gm a week. Also baseline normal renal function should be confirmed prior to usage.
G. If on etanercept, for initial waiver results of chest x-ray and IPPD results.
H. If on etanercept and/or infliximab, then MEB required.

ICD-9 Codes for Psoriasis and Psoriatic arthritis	
696.0	Psoriatic arthropathy
696.1	Psoriasis

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WAIVER GUIDE
Updated: Apr 2010
Supersedes Waiver Guide of Feb 2002
By: Dr Dan Van Syoc
Reviewed by Col (sel) Kent McDonald, psychiatrist and chief of the ACS Neuropsychiatry Branch

CONDITION:
Psychotic Disorders (Apr 10)

I. Overview.

Psychosis is a symptom complex that can include impaired reality testing, delusions, hallucinations, disorganized thinking and/or speech (e.g. derailment or incoherence), or grossly disorganized or catatonic behavior. Psychosis can occur in conjunction with many psychiatric and medical disorders. For example, schizophrenia is probably the best-known psychotic disorder, but is extremely rare in aviators.[1] It is difficult to assess the prevalence of psychotic disorders in the population as these people often do not seek medical care. Some recent estimates of the lifetime prevalence of such disorders are as high as 3.0% of the US population.[2] Other recognized psychotic disorders include schizophreniform disorder, schizoaffective disorder, delusional disorders, brief psychotic disorder, and shared psychotic disorder.

According to DSM-IV-TR, the narrowest definition of psychotic is restricted to delusions or prominent hallucinations, with the hallucinations occurring in the absence of insight into their pathologic nature.[3] Due to the multiple screening processes involved in aircrew selection, it is unlikely that someone with a psychotic disorder would ever be selected for training. It is recognized that most serious psychotic conditions begin in adolescence with initial subtle symptoms that may be very hard to detect. This early period often consists of nonspecific symptoms in otherwise normal functioning people and detection can be very difficult.[4] As with all mental health conditions, there are various degrees of severity of psychotic disorders with some individuals leading a relatively normal life with rare to occasional symptomatic flares. Such episodes have occurred in military aircrew. The short lived psychotic symptoms that occur in aircrew usually are induced by severe stress and or sleep deprivation. Those that last greater than one day but less than 30 days, are usually classified as a brief psychotic disorder or psychotic disorder not otherwise specified.[5]

A form of psychotic disorder that may impact our aircrew members is that associated with alcohol use, substance abuse, prescribed medications, or as a reaction to a medical condition. Psychotic disorders can occur from intoxication from these substances: alcohol, amphetamines, cannabis, cocaine, hallucinogens, inhalants, opioids (such as meperidine), phencyclidine, sedatives, hypnotics, and anxiolytics. Similar disorders can occur from withdrawal from these classes of substances: alcohol, sedatives, hypnotics, and anxiolytics.[3] Regarding substance abuse (to include alcohol), it may be difficult to separate primary psychotic disorders from those resulting from substance abuse. There are often some slight differences in the demographics of these two populations that may make it easier to discern the cause. Patients with a substance abuse etiology tend to occur at a later age, have greater antisocial personality disorder comorbidity, higher homelessness, and poorer family support.[6] A flier's chances of returning to fly after a psychotic episode are far greater if it can be shown that a substance or medication was the cause. For this reason it is of paramount importance

to get a blood alcohol level and a toxicology screen in any aviator who has an episode of psychosis or bizarre behavior.

Treatment for patients with psychotic disorders can be difficult. It may take some time to make a correct diagnosis and these patients are frequently noncompliant with treatment modalities and follow up care. A good history is critical for our aircrew to determine reversible causes such as psychosis secondary to alcohol, a medication, or a medical condition. Many of these patients need to be evaluated and treated in a very structured environment with the use of neuroleptic medications. Most of the more serious psychotic disorders have a significant risk of suicide (and perhaps homicide as well), so this needs to be carefully assessed as well.[7]

II. Aeromedical Concerns.

Psychosis is disqualifying for aviation duties. Symptoms of aeromedical concern include poor reality testing, poor insight, eccentric and bizarre behavior, social withdrawal, hallucinations, delusions (sometimes of a persecutory or self-destructive nature), confusion, clouding of consciousness, illogical thought, and a risk of suicide. Because of concern about unpredictable recurrence (with potentially devastating effects upon flying safety, mission completion, and personal health), careful documentation, management, and monitoring are important to aeromedical prognosis. If and when a psychosis occurs in an aviator, the flight surgeon must consider waiverable disorders. Potentially waiverable causes of psychosis include toxic (substance-induced psychotic disorder), metabolic, or infectious conditions (psychotic disorder due to a general medical condition), and brief psychotic disorder with marked stressor(s). Thorough documentation during the illness is vital to maximize the probability of an aviator's return to flying status after psychosis. Acute, stress-related psychoses in aviators often resolve quickly with hospitalization and stress relief and without antipsychotic medication.

III. Waiver Consideration.

Psychotic disorders, as well as delirium and other cognitive disorders are disqualifying for all flying classes to include UAS duties. Waiver may be considered after the patient has been free of psychotic symptoms and off all mental health treatment including psychotropic medications for one year. A psychotic episode caused by alcohol, and occurring during the course of alcohol abuse or alcohol dependence, is considered for waiver in accordance with the waiver requirements for alcohol abuse or dependence. A psychotic episode caused by alcohol, but not in the setting of alcohol abuse or dependence, is considered for waiver according to the guidance in this waiver guide. When the inducing substance is illicit, a return to flying is unlikely. In all other cases of substance-induced psychotic disorder, there must be clear evidence (history, physical examination, and laboratory evaluation) that the substance (e.g. prescribed medication producing an idiosyncratic reaction or an unintentional overuse of an over-the-counter medication) caused the psychosis. In cases of psychotic disorder due to a general medical condition waiver may be considered once the psychosis and the medical condition have completely resolved and are unlikely to recur, and if the medical condition itself is waiverable.

Schizophrenia, schizoaffective disorder, delusional disorder, brief psychotic disorder without marked stressor(s), and shared psychotic disorder are permanently disqualifying for flying duties. Antipsychotic medications and close psychiatric monitoring are incompatible with flying duties. An MEB is required for any psychotic episode that is not due to a clearly identifiable and avoidable

cause (Any psychotic episode other than those with a brief duration, good prognosis and clearly identifiable and reversible cause must meet MEB.)

Before submitting the case for waiver consideration, the base-level flight surgeon must first discern whether the condition is unsuiting vs. unfitting for service. If the Airman requires a fit/unfit determination, the case needs MEB action; if the airman requires suited/unsuited determination, the case then needs consideration of an administrative separation or discharge via the chain of command.

Table 1: Waiver potential for Psychotic Disorders

Flying Class (FC)	**Waiver Potential#** **Waiver Authority**	**ACS Evaluation/Review**
I/IA	No AETC	Only if requested by AETC
II	Yes* MAJCOM	Yes
IIU	Yes* AFMSA	Yes
III	Yes* MAJCOM	Yes

*Untrained FC II, FC IIU, and FC III candidates should be considered similarly to FC I/IA personnel.
#No indefinite waivers

AIMWTS review in March 2010 revealed a total of 13 aircrew with a submitted aeromedical summary containing a diagnosis of psychosis. There were 0 FC I/IA cases, 7 FC II cases, 0 FC IIU cases, and 6 FC III cases. Six of the cases resulted in a disqualification disposition; 3 each FC II and FC III. Four of the 13 cases were designated as alcohol-related psychosis; 2 received a waiver and 2 were disqualified.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver request should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for <u>initial waiver</u> for psychotic disorders should include the following:
A. History – An aeromedical summary detailing history of the disorder and all treatments administered, the current status of any social, occupational, administrative or legal problems associated with the case, and an analysis of the aeromedical implications of this particular case history.
B. Treatment – medications and therapy used for the psychotic disorder and any other psychiatric conditions. Are there any side effects due to the medication? A good laboratory examination to include a toxicology screen and blood alcohol level are vital to the waiver. Psychosis almost always results in an emergency room visit so ensure the records are attached.
C. Psychiatry/psychology consultation: Need all treatment notes from treating mental health professional as well as an MEB-type narrative summary of the mental health record.

D. Report of all psychological testing, if performed.
E. Letter of support from squadron commander.

The aeromedical summary for waiver renewal for psychotic disorders should include the following:
A. History – interim history since last waiver.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s) if accomplished since last waiver request.

ICD 9 codes for psychotic disorder	
291.3	Alcohol-induced psychotic disorder
298.9	Unspecified psychosis
293.9	Unspecified Transient Organic Mental Disorder
298.8	Other and unspecified reactive psychosis
291.8	Other specified alcoholic psychosis
291.0	Alcohol withdrawal delirium

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WAIVER GUIDE
Updated: Jun 08
By: Dr William Kruyer (Chief Cardiologist at ACS) and Dr Karen Fox

CONDITION:
Radiofrequency Ablation (RFA) of Tachyarrhythmias (Jun 08)

I. Overview.

Curative therapy of some tachyarrhythmias by radiofrequency ablation (RFA), with high success rates and low complication rates, offers the potential to waiver these individuals for initial flight training and return to flying status. Ablation was first performed by surgical interruption of Wolff-Parkinson-White (WPW) accessory pathways. Catheter ablation followed, first with direct current and more recently with radiofrequency energy. By the 1990's, RFA was being used for curative treatment of WPW accessory pathways and supraventricular tachycardia (SVT) associated with atrioventricular (AV) node reentry. It has since been used for the treatment of other supraventricular and ventricular tachyarrhythmias. However, the majority of published experience pertains to RFA of WPW accessory pathways and SVT associated with AV node reentry.

Detailed definitions and criteria for diagnosis of accessory pathways, supraventricular tachyarrhythmias and ventricular tachycardias are addressed elsewhere in the waiver guide. Waiver guidelines for these conditions without RFA are addressed in their respective waiver guides. This waiver guide chapter specifically addresses the use of RFA for WPW accessory pathways, SVT associated with AV node reentry, other SVT mechanisms, atrial flutter, atrial fibrillation, and ventricular tachycardias.

A. SUPRAVENTRICULAR TACHYARRHYTHMIAS

1. Accessory pathways. These accessory pathways conduct impulses between the atria and ventricles, WPW being the most common type. WPW electrocardiogram (ECG) pattern is the classic ECG findings of short PR interval and delta wave but without documented or suspected SVT. WPW syndrome is the ECG findings plus suspected or documented SVT. About 30% of all SVTs involve an accessory pathway. According to the general cardiac literature, the WPW ECG pattern occurs in 1-3 per 1,000 of the population and an estimated 30-35% will develop SVT over the next 10 years after diagnosis of the ECG pattern. Sudden death occurs in 1-6% over 10 years. Atrial fibrillation with rapid ventricular response, deteriorating into ventricular fibrillation, is considered the likely cause of sudden death. But it is not possible to predict which patients will develop SVT, atrial fibrillation, or sudden death. RFA is potentially curative for WPW with an immediate success rate of 95-99%. However, recurrence of a functional accessory pathway occurs in 1-5%, usually within 2-4 months after ablation. Late recurrence is rare.

2. Atrioventricular node reentrant tachycardia (AVNRT). AVNRT is the most common mechanism of SVT (about 60% of all SVT cases). It is caused by a reentry circuit within the AV node. The published experience on RFA for AVNRT is comparable to that of WPW ECG pattern and syndrome, with a success rate approaching 99% and a recurrence rate of 1-2%.

3. Other supraventricular tachycardias. The remaining 10% of SVTs are due to a variety of uncommon mechanisms. These may include reentrant pathways and automatic foci, such as

automatic atrial tachycardia and paroxysmal junctional tachycardia. Published experience of ablation regarding these rhythm disturbances is limited.

4. Atrial flutter. Atrial flutter is due to a localized reentry circuit in the right atrium near the tricuspid valve. Curative RFA is very feasible, with success rates matching those of accessory pathways and AVNRT. However, atrial flutter is rare as an isolated rhythm. It is often associated with atrial fibrillation and residual atrial fibrillation often complicates successful atrial flutter ablation. There is limited published experience regarding long-term outcomes of RFA of atrial flutter.

5. Atrial fibrillation (AF). Lone AF does not mean a single episode of AF. Rather it means idiopathic AF. Lone AF is usually defined as no underlying structural heart disease, hypertension, or hyperthyroidism and age younger than 60 years at time of diagnosis. RFA may be curative for the subset of paroxysmal or chronic lone AF individuals who have one or a few triggering arrhythmogenic sites, most commonly in or near the pulmonary vein ostia. The reported success rates range from 50-80%, much lower than for ablation of WPW or AVNRT. And many of these individuals required one or more repeat ablations to effect a cure. Most centers performing atrial fibrillation ablation do so for quality of life issues – poor control on medications or unacceptable symptoms from the rhythm or medications. Successful ablation may then be defined as control of the AF on continued medications but with no or acceptable symptoms/side effects. This would not be an acceptable endpoint for all flying classes. Absence of atrial fibrillation without need for medications would be the desired aeromedical result. There is limited published experience regarding long-term outcomes of RFA of AF. Several procedures have been used; success rates and complications depend partly on the specific technique.

In 1993 the USAF implemented its first waiver policy for trained aircrew (FC II/III) with successful RFA of WPW syndrome and quickly extended the policy to AVNRT. The waiver policy was revised in 1998 to simplify the post-RFA evaluation and to include FCI/IA applicants. Initially, follow-up electrophysiologic testing was required after ablation, to clearly document a cure. Analysis of the first approximately 50 evaluees demonstrated cure rates comparable to the literature. Routine follow-up electrophysiologic testing is no longer indicated for WPW and AVNRT, but may be required for select cases. ACS experience with ablation of other tachydysrhythmias is limited, with about 10 atrial fibrillation ablations, a few atrial flutter ablations and three ventricular tachycardia ablations.

B. VENTRICULAR TACHYCARDIA

Ventricular tachycardia (VT) is defined as three or more consecutive ventricular beats at a rate of 100 beats per minute or faster. Guidelines for VT without RFA are addressed in the ventricular tachycardia waiver guide. Most published experience with ablation for VT deals with ablation performed for sustained VT or hemodynamically symptomatic nonsustained VT, often in the setting of failure of one or more antiarrhythmic medications. Recurrence rates post-RFA vary in the clinical literature from 0% to 30% within 1-2 years. In many reports control of VT on antiarrhythmic medications is considered an ablation cure. Long-term success, outcomes, recurrence rates and late adverse consequences of the several mechanisms of VT are not well described in the literature. There are several mechanisms for VT and ablation cure rates are very dependent on the VT mechanism and location within the ventricles, as well as presence or absence

of underlying cardiac pathology. Only ablation of idiopathic VT (no underlying cardiac pathology) may be favorably considered for waiver.

II. Aeromedical Concerns.

Sudden cardiac death is the most compelling concern; however, in many tachyarrhythmias this risk is low. The risk of recurrent sustained tachyarrhythmia and associated hemodynamic symptoms is the more likely aeromedical concern. To quantify these risks, the specific tachyarrhythmia, the presence or absence of hemodynamic symptoms and results of electrophysiologic studies and/or RFA must be considered.

A. Accessory pathways. Sudden cardiac death is the most compelling concern but is rare (0.1-0.6% per year). This is felt to be due to atrial fibrillation with a rapid ventricular response across the accessory pathway, deteriorating into ventricular fibrillation. The more likely event is SVT (up to 3.5% per year for at least 10 years after diagnosis) with possible hemodynamic symptoms.

B. Atrioventricular node reentrant tachycardia (AVNRT). Published data in community populations with SVT report recurrence rates of 10-15% per year within the first two years after diagnosis. In a review of 430 military aviators evaluated at the Aeromedical Consultation Service (ACS) with SVT, those who initially presented with a single episode of sustained SVT had a recurrence rate of 1% per year and those who presented with more than one episode had a recurrence rate of 2% per year.

C. Other supraventricular tachycardias. The aeromedical concern is again recurrent SVT with possible associated hemodynamic symptoms plus the relative lack of published experience and outcomes data for RFA of these tachyarrhythmias. Unless there is a compelling clinical indication for RFA, the ACS should review the case before RFA is performed, to determine if waiver may be a consideration post-RFA.

D. Atrial flutter. Atrial flutter is generally considered a lower risk than AF. However, rapid ventricular rate response in the absence of rate controlling medication is a concern. Usual conduction is 2:1 block, yielding a ventricular response of about 150 beats per minute. In a young healthy population 1:1 conduction is possible, yielding a ventricular rate of about 300 beats per minute. Residual atrial fibrillation may complicate successful ablation of atrial flutter.

E. Atrial fibrillation. AF concerns include thromboembolism, antithrombotic therapy and medication to control ventricular rate response at rest and during exertion. These risks may differ, depending on the type of AF, i.e. a single episode without recurrence versus paroxysmal and chronic AF. The risk of stroke appears to be less than 1% per year without anticoagulation or antithrombotic therapy, though in some reports total mortality may be increased. The aeromedical concerns for ablation of AF include recurrence of AF and complications of the specific ablation procedure used.

F. Ventricular tachycardia. Aeromedical concerns are risk of recurrent VT and possible associated hemodynamic events, such as sudden death, syncope and presyncope. RFA of VT associated with underlying cardiac disease has an unfavorable prognosis. Idiopathic VT is VT occurring in the absence of underlying cardiac disease. Idiopathic VT has a more favorable prognosis; only ablation of idiopathic VT is likely to be favorably considered for waiver.

III. Waiver Considerations.

Radiofrequency ablation of cardiac tachydysrhythmias is disqualifying for flying class (FC) I/IA, II and III. **If RFA is being performed only for aeromedical reasons and not for clinical indications, then ACS review and/or evaluation is highly recommended before RFA to assure that it is aeromedically indicated.**

Flying Class	Condition Treated with RFA	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	WPW ECG pattern only, WPW syndrome and AVNRT	Yes* AETC	Yes
	Other supraventricular tachycardias	Maybe+ AETC	Yes
	Atrial fibrillation, atrial flutter or ventricular tachycardia	No AETC	No
II/III (including untrained applicants)	WPW ECG pattern only – treated with RFA	Yes# MAJCOM	Yes
	WPW syndrome and AVNRT	Yes* MAJCOM	Yes
	Other supraventricular tachycardias	Maybe+ MAJCOM	Yes
	Atrial fibrillation, atrial flutter or ventricular tachycardia	Maybe+ MAJCOM	Yes

No observation post-RFA required prior to waiver submission.
* Submit waiver 4 months post-RFA observation.
+ Submit waiver 6 months post-RFA observation.

Review of AIMWTS through 31 Mar 08 for radiofrequency ablation showed 97 cases; nine FC I/IA, 52 FC II and 36 FC III. Of the 97 cases, seven (7%) were disqualified; two FC I and 5 FCIII. Of the seven disqualified cases, two were for continued symptoms, two for the diagnosis OF WPW or SVT treated with RFA and three were for other medical conditions (e.g., excessive refractive error, head injury and history of bulimia and depression).

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver should contain the following information:

A. Complete history and physical exam – to include description of symptoms before and after the acute episode, medications, and activity level.

B. Cardiology consult.

C. Official report of RFA and electrophysiologic study/studies (EPS).

D. Electrocardiogram (ECG) at 2 months, 3 months and 4 months post-RFA for WPW ECG pattern only and WPW syndrome only.

E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

The aeromedical summary for waiver renewal should contain the following information:

A. History – brief summary of previous symptoms and treatment, any interval symptoms, medications, and activity level.

B. Physical – blood pressure and cardiac.

C. Electrocardiogram (ECG).

D. Additional local cardiac testing is not routinely required for re-evaluation cases followed at the ACS but may be requested in individual cases. If so, the previous ACS evaluation/review will specify details regarding any requested local testing.

E. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:

Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD9 Code for radiofrequency ablation procedure	
37.34	Radiofrequency ablation

ICD9 Code for conditions requiring radiofrequency ablation	
426.7	Anomalous atrioventricular excitation (Wolff-Parkinson-White syndrome)
427.0	Paroxysmal supraventricular tachycardia
427.1	Ventricular tachycardia
427.31	Atrial fibrillation
427.32	Atrial flutter

V. References.

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WAIVER GUIDE
Updated: Nov 2011
Supersedes Waiver Guide of Apr 2008
By: Lt Col Natalie L. Restivo (RAM 12) and Dr. Dan Van Syoc
Waiver Guide reviewed by the AF/SG Consultant for Rheumatology, Col William E Venanzi

CONDITION:
Raynaud's Phenomenon (Nov 11)

I. Overview.

Raynaud's phenomenon (RP), first described by Maurice Raynaud in 1862, is an exaggerated vascular response to cold temperatures or emotional stress. Skin perfusion is normally 10 to 20 times that needed for tissue nutrition/oxygenation allowing alterations in skin perfusion to serve as a principal means of thermoregulation. Peripheral vasoconstriction in response to cold is physiologic, and vasoconstriction sufficient to produce digital pallor or cyanosis may occur in healthy persons, given a prolonged or severe cold exposure.[1] In RP, the digital arteries and arterioles exhibit an abnormal degree of vasoconstriction with provoking stimuli (cold, emotional stress). There are a number of different physiologic mechanisms which partially explain RP, none of which are fully understood.

Typically RP presents as episodic attacks that have two distinct phases, an ischemic phase followed by a hyperemic phase. The ischemic phase is noted by well demarcated pallor of the fingers or toes progressing to cyanosis, typically starting in one or several digits spreading symmetrically to all digits. On re-warming, the attack generally ends with rapid reperfusion resulting in erythema (reactive hyperemia). In addition to the vasospastic color changes, other symptoms due to ischemia include pain, paresthesias, numbness, clumsiness of the hand/foot, and potentially ulceration of the skin.

Patients with RP are classified as primary (formerly known as Raynaud's disease) or secondary (formerly known as Raynaud's syndrome). Differentiation between primary RP and secondary RP does not reflect a diagnosis in the strict sense, but rather a description of the current findings in an ongoing screening process.[2] Primary RP describes those RP patients without an underlying disease identified or suspected. Secondary RP describes those RP patients who have a definitively established underlying disease. Some underlying diseases associated with secondary RP include scleroderma, mixed connective tissue disease, systemic lupus erythematosus, vasculitis, hematologic abnormalities including cryglobulinemia, and neurologic disorders including carpal tunnel syndrome. Certain medications (β-adrenergic receptor antagonists, ergot, amphetamines), trauma, and vibration are also noted secondary RP triggers. A third category, suspected secondary RP, is mentioned in the literature and describes those patients with findings suggestive of an underlying disease, such as abnormal nailfold capillaroscopy (NC) or abnormal rheumatologic laboratory testing, but that disease cannot be firmly established at the time of exam. It is strongly recommended that RP be differentiated from Buerger's Disease in smokers, which represents mixed fixed and vasospastic vascular components, typically involving medium-sized vascular structures, and thus placing a more significant volume of tissue at risk of ischemia.

The prevalence of RP estimated through population surveys has ranged between 5-20 percent for women and 4-14 percent for men with significant variation noted between populations studied.

Additionally, colder climates have a higher RP burden.[3] A meta-analysis of 10 studies with 640 patients diagnosed with primary RP found that 13% eventually developed a connective tissue disorder (secondary RP).[4]

The diagnosis of the RP is based on the history since there are no simple office tests for cold or emotion induced vasospasm and provocative testing is not recommended.[4] Criteria for the diagnosis of primary RP include vasospastic attacks precipitated by cold or emotional stress, symmetric attacks involving both hands, absence of tissue necrosis or gangrene, no history or physical findings suggestive of a secondary cause, normal NC, normal ESR, and negative antinuclear antibody test.[3] The likelihood of secondary RP is increased with presence of any of the following features: age of onset > 40 years, male gender, painful severe events with ulceration, asymmetric attacks, RP associated with signs or symptoms of another disease, abnormal labs suggestive of an autoimmune disorder of vascular disease, RP affecting areas proximal to the digits (hand, foot), or abnormal NC with enlarged or distorted capillary loops.[4]

A growing body of literature supports the use of NC in the primary care setting in the workup of RP.[5, 6] The use of NC provides the clinician a tool to be used in conjunction with the history and physical exam in discriminating between primary and secondary RP. One study suggests that in patients with RP and negative serologic tests, the presence of giant capillaries ($p=0.001$), avascular fields ($p=0.02$), or irregular architecture ($p=0.0001$) in NC is predictive for the development of a connective tissue disease, mainly scleroderma, CREST, or mixed connective tissue disease.[6]

The technique for NC involves placing a drop of immersion oil on the base of the fingernails of fourth and fifth digits and examining with a handheld ophthalmoscope set at 40+ diopters. The ophthalmoscope is advanced in and out (not touching the oil) until the capillaries are in focus. The normal vascular pattern seen in primary RP and normal vascular control patients consists of a longitudinal linear array of delicate “hairpin” capillary loops while the pattern seen in secondary RP often includes enlarged capillary loops, architectural derangements, and areas of decreased vascularity.[7]

The laboratory evaluation for patients suspected of secondary RP varies based on source cited but generally includes: complete blood count, basic metabolic panel and liver function tests, urinalysis, erythrocyte sedimentation rate, rheumatoid factor, C-reactive protein, complement (C3 and C4), and ANA (if positive ANA: test for anti-topoisomerase I and anticentromere antibodies).[4, 8] A rheumatology consultation is also appropriate for suspected secondary RP.

Management of RP is best accomplished by avoidance of cold temperatures and maintenance of total body warmth including the hands and feet. If emotional stress is a contributor, therapies aimed at stress reduction may be of benefit. Avoiding known RP triggers like sympathomimetic drugs, clonidine, and ergotamine is crucial as is avoiding smoking.[3] Pharmacologic management is reserved for poorly controlled/severe RP. Calcium channel blockers are first line therapy with 30mg of sustained release nifedipine or 5 mg of amlodipine daily recommended. Other classes of medications found beneficial include alpha adrenergic receptor antagonists, topical nitroglycerin, angiotensin converting enzyme inhibitors (ACEi), angiotensin receptor antagonists (ARB), phosphodiesterase inhibitors and selective serotonin reuptake inhibitors. Surgical management focuses on thorascopic sympathectomy and less commonly digital sympathectomy. In each instance recurrence/complication rates were high (82% with the thorascopic sympathectomy and 37% with the digital sympathectomy).[9]

II. Aeromedical Concerns.

The major aeromedical concerns associated with a RP episode during flight include sudden subtle incapacitation, distraction and a reduced ability to manipulate cockpit switches. Secondary RP associated with an established underlying connective tissue disease is not compatible with flying. Unavoidable exposure to cold conditions may increase the frequency of episodes and interfere with the performance of flying duties. This may be a significant factor in determining if the member should be maintained in the aviator status.

Calcium channel antagonists (specifically coat-core and GITS [Adalat CC® and Procardia XL®, respectively] and amlodipine [Norvasc®]) are approved in aviators; they are restricted to non-high performance aviators.

III. Waiver Considerations.

Raynaud's is disqualifying for Flying Classes I/IA, II, IIU, and III. Waiver potential for primary Raynaud's is outlined in the table below. For ATC/GBC and SMOD personnel, retention standards state that Raynaud's phenomenon, if frequent, severe, associated with systemic disease or would limit worldwide assignability is disqualifying. Waiver potential for secondary Raynaud's is based on the causal systemic illness or disease process and will be handled on a case by case basis.

Table 1: Waiver potential for primary Raynaud's

Flying Class (FC)	Condition/Treatment	Waiver Potential Waiver Authority
I/IA	Primary Raynaud's of at least two years duration, infrequent, requiring no medications	Maybe AETC
	Primary Raynaud's requiring medication	No AETC
II/IIU**/III	Primary Raynaud's, requiring no medications	Yes† MAJCOM
	Primary Raynaud's requiring medications	Yes†* IIA - AFMSA (e.g. calcium channel antagonist) II – MAJCOM (e.g. ACEi or ARB)
ATC/GBC	Primary Raynaud's, requiring no medications	N/A
	Primary Raynaud's requiring medications	Yes MAJCOM
SMOD	Primary Raynaud's, requiring no medications	N/A
	Primary Raynaud's requiring medications	Yes AFSPC or GSC

† Initial waiver duration for primary RP will generally be 2 years. If stability is noted at time of waver renewal, then a 3-year waiver duration is generally appropriate.
* Specifically, coat-core and GITS [Adalat CC® and Procardia XL®, respectively] and amlodipine [Norvasc®]) are the only calcium channel antagonists approved in aviators; they are restricted to non-high performance aviators (FC IIA).
** Waiver authority for all FC IIU personnel is AFMSA.

A review of AIMWITS in July 2011 revealed 23 cases with a diagnosis of Raynaud's. All of the aeromedical summaries were reviewed. Twelve cases had primary Raynaud's, 5 cases had secondary Raynaud's, 1 case had Raynaud's secondary to chemotherapy, and 6 cases did not contain enough information to determine if they were secondary versus primary. Twenty of the waiver requests were approved and were either asymptomatic or had very infrequent exacerbations. Three of the 23 cases were disqualified due to uncontrolled RP and other disqualifying diagnoses.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for RP should include the following:
A. A detailed RP history with attention to inciting factors, frequency, severity and duration of attacks; treatments tried and responses; smoking history; family history of RP and connective tissue diseases. The history should identify factors increasing suspicion for secondary RP as listed above. Pertinent positives as well as negatives should be included.
B. Thorough physical exam looking for evidence of peripheral vascular disease, peripheral nerve entrapment syndromes, and evidence of diseases associated with secondary RP. A NC should be performed.
C. Laboratory studies should include: complete blood count, basic metabolic panel and liver function tests, urinalysis, erythrocyte sedimentation rate, rheumatoid factor, c-reactive protein, complement (C3 and C4), and ANA (if positive ANA: test for anti-topoisomerase I and anticentromere antibodies).
D. Rheumatology consult if any evidence exists for auto-immune related secondary cause of RP.

The aeromedical summary for waiver renewal for RP should include the following:
A. History – frequency and severity of attacks; treatment and response; identify factors increasing suspicion for secondary RP.
B. Physical – looking for evidence of peripheral vascular disease, peripheral nerve entrapment syndromes, and evidence of diseases associated with secondary RP. A NC should be performed.
D. Laboratories – not required unless evidence exists for auto-immune related secondary cause of RP.
C. Rheumatology consult – if evidence exists for auto-immune related secondary cause of RP.

ICD9 Code for Raynaud's phenomenon	
443.0	Raynaud's syndrome/disease
443.9	Peripheral vascular disease, unspecified

V. References.

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WAIVER GUIDE
Updated: Mar 2012
Supersedes Waiver Guide of Jun 2008
By: Maj William A. Hayes (RAM 12) and Dr. Dan Van Syoc
Reviewed by LtCol Matthew Carroll, AF/SG Consultant for Rheumatology

CONDITION:
Reactive Arthritis (Reiter's Syndrome) (Mar 12)

I. Overview.

Reactive arthritis is an aseptic arthritis that occurs subsequent to an extra-articular infection (within 4-8 weeks), most commonly involving the gastrointestinal or genitourinary tract.[1] Reiter's syndrome is a historic term, used when a reactive arthritis is accompanied by non-gonococcal urethritis and conjunctivitis or anterior uveitis.[2] The complete triad is only present, however, in a minority of cases and incomplete symptoms occur frequently.[1] Reactive arthritis affects males 5:1 over females.[3] It has been linked to several infective agents including Chlamydial or Ureaplasma urethritis, Shigella, Salmonella, Campylobacter, or Yersinia enteritis.[1] It is hypothesized that infection with an organism or unknown antigen, combined with environmental factors in a genetically predisposed individual (HLA-B27 histocompatability antigen), results in the syndrome.[1, 4, 5, 6]

The classic arthropathy is usually an asymmetrical extra-articular manifestation, a local enthesopathy, affecting tendon insertions rather than synovia as in rheumatoid arthritis. It usually occurs rapidly, over a few days, and asymmetrically, in 2 to 4 lower extremity joints. Dactylitis with distinctive sausage-digits, Achilles tendonitis, plantar fasciitis and sacroiliitis are common.[1] Reactive arthritis is usually self limited, resolving in 3-12 months but 15% may have symptoms lasting over a year.[3] Recurrence of joint pain and swelling is noted in up to 50% and 15 – 30% develop a chronic arthritis or sacroiliitis.[3, 5] Chronic heel pain gives a poorer prognosis and up to 26% of these eventually develop spondylitis.[7] Common, and helpful, radiologic features include reactive new bone and periosteal spur formation at sites of enthesitis, rather than the bony erosions seen in rheumatoid arthritis.[2]

Extra-articular manifestations are many and varied. Nonpurulent urethritis is often related to Chlamydia or Ureaplasma and may be associated with circinate balanitis, a painless erythematous or vesicular lesion of the glans penis or cervix in up to 20-26% of cases.[1, 3] The triad of Reiter's syndrome is actually classified under an ICD code that is actually listed as "other venereal diseases." Conjunctivitis or anterior uveitis/iritis in one or both eyes occurs in up to 50%, especially when spondyloarthropathy presents as sacroiliitis.[3, 5] Keratoderma blenorrhagicum (in up to 20% of cases) is a characteristic hyperkeratotic skin lesions on the soles or palms; indistinguishable from pustular psoriasis.[1, 8 9] Painless lingual or oral ulcers affect the oral mucosa and oncholytic nail changes may occur.[1, 3, 8] Cardiac complications are more concerning. An abnormal ECG occurs in 5-13% of patients with prolonged disease, with conduction defects in up to 4%. Rarely, aortic regurgitation, myocarditis, pericarditis, aortitis, peripheral neuropathy, meningoencephalitis and transient hemiplegia can occur.[1]

The diagnosis is primarily clinical, based on the history and physical findings. The differential diagnosis includes septic joint, Lyme disease, bacterial endocarditis, mycobacterial and fungal

arthritis, HIV, inflammatory bowel disease or Whipple's disease.[3, 5] Uncertain diagnosis may prompt synovial fluid and biopsy analysis. The absence of rheumatoid factor, elevation of sedimentation rate, or C-reactive protein and the presence of anemia of chronic disease are common but nonspecific.[5] The human leukocyte antigen, HLA-B27, is present in 80% of reactive arthritis cases (usually those cases including sacroileitis), but varies widely among populations and has a low predictive value.[3]

First line treatment of reactive arthritis is nonsteroidal anti-inflammatory drugs (NSAIDs). Sulfasalazine has been effective, primarily on peripheral arthritis but not axial disease, with toxicities consisting of dose-related adverse effects, and a number of more serious hypersensitivity reactions primarily related to the sulfa moiety. Antibiotic therapy, such as doxycycline, though commonly used, has not been found effective in several trials except in those cases of disease in which evidence of recent or recurring chlamydial infection is found.[5, 9] Intra-articular steroids have been used. In patients who were refractory to NSAIDs and intra-articular steroids, have chronic ocular inflammation uncontrolled by steroids, or who do not respond to sulfasalazine, a trial of anti-TNF agents, such as etanercept, has been suggested.[4, 5, 10] These drugs have received approval for use treating ankylosing spondylitis and psoriatic arthritis but, no large studies have assessed the usefulness of these agents for reactive arthritis. Small studies of undifferentiated spondyloarthritis patients and patients with refractory uveitis have shown improvement with etanercept therapy and it has been used for these indications. (Standard practice prior to starting therapy with any TNF inhibitor is to screen for HBVor HCV).[5] If treatment is expanded to include disease modifying anti-rheumatic drugs or corticosteroids, it is imperative that HIV serology be assessed.

II. Aeromedical Concerns.

The common course of the disease includes remissions and exacerbations of lumbosacral, large joint and/or heel/ankle involvement which could limit mobility and egress capability. Fortunately the onset and recurrence is not associated with sudden incapacitation. Aeromedical concerns in patients with prolonged disease include the occurrence, in up to 10%, of early cardiac complications including the conduction abnormalities, arrhythmias, myocarditis, pericarditis and aortic insufficiency as well as peripheral nervous system involvement. Conjunctivitis, iritis and/or uveitis can interfere with vision thus impacting flying safety and mission completion. In addition, topical ophthalmic steroids commonly used to treat these conditions require at minimum temporary grounding.

NSAIDs, the first line of treatment, is compatible with flying (e.g. ibuprofen, naproxen). As with rheumatoid arthritis the treatment of reactive arthritis with sulfasalazine probably requires the sulfa moiety of sulfasalazine as opposed to the 5-ASA base. Although sulfasalazine is waiverable, the sulfa moiety may cause side effects which can impact flight safety, such as nausea, flatulence, headache, anemia, leucopenia and hepatotoxicity. More recently, anti-tumor necrosis factor such as infliximab (Remicade®) and a human monoclonal antibody (adalimumab) have been effective for more severe disease, but the latter is not waiverable. The soluble TNF alpha receptor-immunoglobulin fusion protein, etanercept (Enbrel®), has been effective in reactive arthritides, such as psoriatic arthritis and ankylosing spondylitis and has also been approved for aeromedical waiver with limitations.[4, 10] Of the toxicities associated with anti- TNF therapy, those related to immunosuppression have been of greatest concern.[11] Before etanercept therapy is begun, chest radiography and testing with intermediate strength PPD are required; tuberculin reactivity of 10 mm or more should be interpreted as a positive response, and antituberculous prophylaxis begun. Anti-

TNF therapy is not compatible with deployment, due to the need for expedited work-up of infectious symptoms and for rapid treatment of suspected infections. It is also incompatible with live attenuated vaccines (such as smallpox, yellow fever, or intranasal influenza. Etanercept must be kept refrigerated at 36° to 46°F. It degrades rapidly even at room temperature, thus the instability of the drug not only affects deployment, but largely rules out any TDY of longer than a week's duration.

III. Waiver Consideration.

History of Reiter's syndrome/reactive arthritis is disqualifying for all flying classes (due to appointment, enlistment, and induction standards). Medical evaluation board is required when reactive arthritis interferes with a physically active lifestyle or with the satisfactory performance of military duties. In addition, use of medications to control symptoms is disqualifying for all flying classes. In those few cases where control can be achieved with etanercept, a restricted waiver (FC IIC and/or restricted from deployment (not worldwide qualified) and TDY requires access to transport and refrigeration of etanercept) can be favorably considered. ACS evaluation will be performed in conjunction with rheumatology consultation at the 88th MDG to confirm the diagnosis, to assess disease severity, and to determine the aeromedical implications of the disease and therapy for those individuals on etanercept. Initial waiver for etanercept will only be for one year, thereafter usually three years consistent with guidance for the drug in rheumatoid arthritis. Individuals granted waivers for the use of etanercept will be required to follow-up with the ACS for waiver renewal. If disease activity is such that another anticytokine or methotrexate therapy is required, disqualification will be recommended.

Table 1 – Waiver potential depending on medication required for control of Reiter's Syndrome

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	Required ACS Review/Evaluation
I/IA Untrained FC II and FC III	History of reactive arthritis; reactive arthritis requiring NSAIDs, sulfasalazine or immunomodulators (including etanercept) for control	No AETC	No
II/IIU/III	History of reactive arthritis, reactive arthritis requiring NSAIDs and/or sulfasalazine	Yes, FC II* MAJCOM	No
	Etanercept‡	Yes, FC IIC*†$ AFMSA	Yes
	Other immunomodulators (other anticytokines, methotrexate, etc)	No AFMSA	Yes
ATC/GBC SMOD	History of reactive arthritis, reactive arthritis requiring NSAIDs and/or sulfasalazine	Yes MAJCOM**	No
	Etanercept‡	Yes†# MAJCOM	Yes
	Other immunomodulators (other anticytokines, methotrexate, etc)	No MAJCOM	Yes

* Waiver will not be granted for untrained FC II and III.
** Waiver authority for SMOD personnel is AFSPC or GSC.
‡ If individual started on etanercept (Enbrel®) and responds, then after two months submit waiver (needs to be on therapy three months before seen at ACS).
† Initial waiver will be granted for only one year, thereafter usually three years.
# FC III needs to be restricted from deployment (not worldwide qualified) and TDY requires access to transport and refrigeration of etanercept.
$ FC IIC (TDY requires access to transport and refrigeration of etanercept, not worldwide qualified)

Review of AIMWTS in March 2012 showed 18 cases of reactive arthritis. Breakdown of the cases was as follows: 2 FC I/IA cases (1 disqualification), 9 FC II cases (0 disqualifications), 4 FC III cases (2 disqualifications), 2 ATC/GBC cases (1 disqualification), and 1 SMOD case (0 disqualification). The one waived FC I case was for an individual with one episode of possible reactive arthritis six years prior to the IFC I exam. The ATC DQ was being treated with Humira which is not compatible with WWD. One of the FC III DQ cases was an initial exam and the other was very difficult to treat.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for Reiter's syndrome should include:
A. Detailed history: onset, time course, joints and/or extra-articular involvement, extra-articular manifestations, medication and side effects and activity level.
B. Physical exam: joints/extra-articular tissues involved, eyes, and skin.
C. Rheumatology consult.
D. Ophthalmology/optometry consult if eye involved.
E. Laboratory: complete blood count (CBC), HLA B27 serology, HIV serology, estimated sedimentation rate (ESR)/C-reactive protein (CRP), bacterial antibody titers if prior enteric symptoms, or gram stain and Chlamydial assay results if venereal symptoms.
F. Radiographs: baseline of involved joints.
G. Current ECG.
H. If on etanercept (Enbrel®), results of chest x-ray and IPPD.
I. Medical evaluation board results, if required.

The AMS for waiver renewal for Reiter's syndrome should include:
A. History: brief summary of onset, time course, joints/ligaments involved, and extra-articular involvement. Special emphasis on symptoms, objective evidence control or progression, and treatment side effects and changes since last waiver submission.
B. Physical exam: thorough exam and details of strength and enthesitis for joints involved, extra-articular manifestations including iritis.
C. Internal Medicine/Rheumatology consult if continued or recurrent symptoms.
D. CBC if on Enbrel®.

ICD9 codes for Reiter's syndrome	
099.3	Reiter's disease (syndrome) [venereal disease]
372.33	Conjunctivitis in mucocutaneous disease
711	Arthropathy associated with infections

V. References.

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WAIVER GUIDE
Updated: Mar 2012
Supersedes Waiver Guide of May 2008
By: Lt Col Christopher Rohde (RAM 12) and Dr Dan Van Syoc
Reviewed by Col John Gooch, chief of ACS Ophthalmology branch

CONDITION:
Refractive Error, Excessive (Myopia, Hyperopia & Astigmatism) & Anisometropia (Mar 12)

I. Overview.

A refractive error is present when the optical power of the eye produces an object image that is not focused on the retina. Myopia is present when the anterior-posterior diameter of the eye is too long relative to the refractive power of the cornea and lens. The focal point of the object image occurs anterior to the retina. Hyperopia is present when the anterior-posterior diameter of the eye is too short relative to the refractive power of the cornea and lens. The focal point of the object image occurs posterior to the retina. Myopia and hyperopia are spherical refractive errors and the optical components act with equal power in all meridians. Astigmatism is present when there is variability in the optical powers of the eye in various meridians, or axes, thus creating more than one focal point. Anisometropia is present when there is a difference in the refractive power between the two eyes.

Myopia has been divided into pathologic (also known as malignant, progressive, or degenerative) and physiologic (or simple). Pathologic myopia is caused by excessive growth in the axial length of the eye while the rest of eye has normal growth. These individuals show marked choroidal and retinal degenerative changes, high incidence of retinal detachment, glaucoma, and increased occurrence of staphyloma (ectasia) development. Pathologic myopia occurs primarily in myopes with a refractive error > -6.00 diopters (D). Physiologic myopia is associated with normal growth of each of the refractive components of the eye, the combination of which results in mild to moderate myopia. Physiologic myopia will usually progress during the adolescent years and stabilize in the early 20s.

A 2010 prevalence study of corrective lens use based on aircrew spectacle orders in the Spectacle Request Transmission System (SRTS) among USAF pilots showed 41% of active duty (AD) pilots require corrective lenses to meet vision standards for flight versus 39.4% in1995. The prevalence of corrective lens use was much lower among Air National Guard (ANG) and Air Force Reserve Component (AFRC) pilots at 24.0% and 20.7%, respectively. The majority of AD pilots, 87.8% utilize single vision lens correction while multifocal lenses accounted for nearly one-quarter of spectacles worn by ANG and AFRC pilots. The typical refractive correction among AD pilots using lenses was low myopia, with 83% of all spectacle orders falling between +2.00 and -2.00 diopters. One-third of all AD spectacle orders contained 0.75 diopters or more astigmatism correction. High astigmatism correction (over 2.00 diopters) was rare occurring only 2% of the time in pilots and 4% of the time in non-pilots. Corrective lens use was relatively constant across aircraft platforms. Lens use was observed most frequently (43.4%) among pilots of “other” groups (training aircraft, rotary wing aircraft, unmanned aircraft, special ops, and test pilots), followed by fighter and mobility (both 40.8%) and was least frequent among bomber pilots (38.7%). The prevalence of corrective lens use from ages 25 to 45 gradually increased as a function of age. Above age 45, lens use was more frequent due to the onset of presbyopia.

Severe (high) myopia (greater than 6 diopters) is more prevalent among FC III aviators and FC II flight surgeons since entry standards for pilot and navigator aircrew have been more stringent and have excluded those with higher risk due to higher levels of refractive error. As the degree of myopia increases, the risk of retinal detachment also increases. The risk of retinal detachment in normals is 0.06% over a 60 year time span compared to 2.5% in myopes with > -5.00 diopters refractive error. Beyond -9.75 diopters, the risk increases to 24%. However, the risk for retinal detachment dramatically increases in the presence of associated peripheral retinal lattice degeneration. The lifetime risk for retinal detachment in myopes > -5.00 diopters is 35.9%. Likewise, the prevalence of lattice degeneration rises as the level of myopia rises.

Aeromedical refractive error is based on the cycloplegic refraction for FC I/IA and for initial FC II and III if medical qualification is in question. The authorized cycloplegic exam technique uses one percent cyclopentolate (Cyclogyl), 2 drops each eye, 5 to 15 minutes apart, with examination performed no sooner than one hour after the last drop and within two hours of the last drop of cyclopentolate. The cycloplegic refractive error is the minimum refractive power needed to achieve 20/20 vision in each eye separately. The refractive error standard for aeromedical purposes is that produced "in any meridian" following transposition. The rules of transposing are: (1) Algebraically add the cylinder power to the sphere power to determine the transposed power of the sphere (2) Change the sign of the cylinder (3) Change the axis by 90 degrees (do not use degrees greater than 180 or less than 0). Note: 180 degrees is on the same axis as 0 degrees.

	Sphere		Cylinder		Axis
Example 1:	+2.25	-1.50	X	179	
Transposed	+0.75	+1.50	X	089	
Example 2:	-4.25	-1.25	X	068	
Transposed	-5.50	+1.25	X	158	

Aeromedical standards and waiver requirements are based upon the magnitude of sphere power in the meridian that gives the largest value. In example 1, +2.25 is the largest sphere power. This value is achieved at axis 179 prior to transposition. In example 2, -5.50 is the largest sphere power. This value is achieved at axis 158 after transposition. Myopia is represented by a negative diopter value in the sphere and hyperopia by a positive diopter value. Astigmatism may be represented by either a positive or negative cylinder value depending on the axis referenced.

II. Aeromedical Concerns.

Improper or unbalanced correction with spectacles or contact lens can degrade stereopsis and contrast sensitivity as well as induce generalized ocular pain and fatigue (asthenopia). Myopia is more likely to progress, with respect to the degree of myopia, regardless of age, while hyperopia tends to remain static over time. In addition, myopes may see halos or flares around bright lights at night and are also at risk for worsening under dim illumination and with pupil enlargement, a phenomena known as "night myopia." Myopes also have an increased risk of retinal detachment, open angle glaucoma and retinal degenerations, such as lattice.

Hyperopes, especially those with greater than +3.00D of correction, will experience greater problems with visual acuity after treatment with atropine or topical cycloplegic agents. They have a greater predisposition for tropias, microstrabismus, and phorias that can decompensate under the rigors of flight. They also have a higher prevalence for amblyopia due to the accommodative esotropia and anisometropia. Moreover, hyperopes have more problems with visual aids, such as night vision goggles, as they develop presbyopia at earlier ages compared to myopes. Lastly, hyperopes are more likely to develop angle closure glaucoma than myopes.

Higher levels of astigmatism or progressive astigmatism can indicate a potentially progressive corneal condition, such as keratoconus, that can degrade image quality and visual performance during productive years of flying career. Anisometropias have greater association with diplopia, fusional discrepancies (e.g. defective stereopsis), and amblyopia, especially when greater than 2.00 diopters refractive error difference between the two eyes.

In general, corrective measures presently available to correct refractive errors include spectacles, contact lenses, and corneal refractive surgical techniques such as PRK and LASIK. Spectacles interpose an additional other optical interface between the aircrew's eyes and the outside world. This increases the risk of internal reflections, fogging, reduces the light reaching the retina and can create visual distortion, especially in high myopes and in higher levels of astigmatism. Finally, spectacle frames interfere with the visual fields, cause hot spots, and displace under G forces. Depending on refractive errors, the lenses themselves can induce optical blind spots (scotomas), optical image size changes, and can create unacceptable effects on other visual performance parameters, such as stereopsis. Contact lenses share some of these same problems, but reduce some of the drawbacks of spectacles, such as changes in image size, peripheral vision interference, hot spots from frames, fogging, and blind spots. However, contact lenses introduce their own unique aeromedical problems particularly related to maintenance and wear. In addition, further concern exists with the risk of acutely having to perform without the corrective lenses, such as after spontaneous lens loss, e.g. after ejection or during a deployment without adequate backups. See corneal refractive surgery waiver guide for further discussion on advantages and risks of refractive surgery.

III. Waiver Considerations.

Refractive errors standards are listed in AFI 48-123 for all flying classes. Excessive refractive error is not listed specifically as disqualifying for ATC/GBC and SMOD duties, but these members must be able to correct to 20/20 near and far in each eye.

The following tables cover the different flying classes, waiver potential and ACS review/evaluation for myopia, hyperopia, astigmatism and anisometropia. If refractive errors are greater than those listed in the tables (FC I/IA), no waiver will be granted.

Table 1: Myopia

Flying Class	**Refractive error**	**Waiver Potential** **Waiver Authority**	**ACS review/evaluation**
I	> -1.50 but ≤ -3.00	Yes AETC	No
IA	> -2.75 but ≤ -4.50	Yes AETC	No
II pilot	> -4.00	Yes MAJCOM	No
II/III (non-pilot)	> -5.50	Yes* MAJCOM	No

* Initial FCII/III waivers are approved by AETC and depend on AFSC job requirements if waivered or not (e.g. combat controller, pararescue uncorrected visual acuity of 20/70).

Table 2: Hyperopia

Flying Class	**Refractive error**	**Waiver Potential** **Waiver Authority**	**ACS Review/evaluation**
I	> +2.00 but ≤ +3.00 if waiverable degradation or no degradation in stereopsis** > +3.00 but ≤ +4.00 if no degradation in stereopsis	Yes AETC Yes AETC	Yes Yes
IA	> +3.00 but ≤ +4.00 if waiverable degradation in stereopsis** > +3.00 but ≤ +5.50 if no degradation in stereopsis	Yes AETC Yes AETC	Yes Yes
II pilot	> +3.50 if waiverable or no degradation in stereopsis**	Yes MAJCOM	No
II/III (non-pilot)	> +5.50 if waiverable or no degradation in stereopsis**	Yes* MAJCOM	No

* Initial FC II/III waivers are approved by AETC and depend on AFSC job requirements if waivered or not. Jobs that require stereopsis may be waived if degradation meets waiver standards.

** Waiverable degradation of stereopsis means meets waiver criteria for defective depth perception (see waiver guide on subject)

Table 3: Astigmatism

Flying Class	Refractive Error	Waiver Potential Waiver Authority	ACS review/evaluation
I	>1.50 but ≤3.00	Yes AETC	Yes*
IA	>2.00 but ≤3.00	Yes AETC	Yes*
II pilot	>2.00	Yes MAJCOM	Yes, initial waiver
II/III (non-pilot)	>3.00	Yes MAJCOM	Yes, initial waiver

*If waivered then individual is member of ACS Excessive Astigmatism Management Group and will require ACS re-evaluation after UPT/UNT.

Table 4: Anisometropia

Flying Class	Refractive error	Waiver Potential Waiver Authority	ACS review/evaluation
I	> 2.00 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes AETC	Yes
IA	> 2.50 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes AETC	Yes
II pilot	> 2.50 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes MAJCOM	No
II/III (non-pilot)	> 3.50 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes MAJCOM	No

* Waiverable degradation of stereopsis means meets waiver criteria for defective depth perception (see waiver guide on subject).

Individuals that were waivered for FC I/IA for excessive astigmatism are members of the Excessive Astigmatism Management Group and will require ACS re-evaluation after UPT/UNT.

Review of AIMWTS (ICD 9 code 367.1) in Feb 2012 showed 5136 individuals with a diagnosis of myopia; there were a total of 521 disqualifications. The breakdown of the cases was as follows: 1481 FC I/IA cases with 207 disqualifications; 1340 FC II cases with 43 disqualifications; 29 FC IIU cases with 1 disqualification; 2090 FC III cases with 250 disqualifications; 125 ATC/GBC cases with 12 disqualifications; and 72 SMOD cases with 8 disqualifications.

Review of AIMWTS (ICD 9 code 367.0) in Feb 2012 showed 282 individuals with a diagnosis of hyperopia; there were a total of 58 disqualifications. Breakdown of the cases was as follows: 170 FC I/IA cases with 58 disqualifications; 42 FC II cases with 4 disqualifications; 2 FC IIU cases with no disqualifications; 59 FC III cases with 22 disqualifications; 7 ATC/GBC cases with 3 disqualifications; and 2 SMOD cases with no disqualifications.

Review of AIMWTS (ICD 9 code 367.2) in Feb 2012 showed 728 individuals with a diagnosis of astigmatism; there were a total of 120 disqualifications. Breakdown of the cases was as follows: 196 FC I/IA cases with 48 disqualifications; 236 FC II cases with 7 disqualifications; 9 FC IIU cases with no disqualifications; 262 FC III cases with 56 disqualifications; 17 ATC/GBC cases with 6 disqualifications; and 8 SMOD cases with 3 disqualifications.

Review of AIMWTS (ICD 9 code 367.31) in Feb 2012 showed 108 individuals with a diagnosis of anisometropia; there were a total of 26 disqualifications. Breakdown of the cases was as follows: 39 FC I/IA cases with 17 disqualifications; 37 FC II cases with no disqualifications; 2 FC IIU cases with no disqualifications; 29 FC III cases with 8 disqualifications; 2 ATC/GBC cases with 1 disqualification; and there were no SMOD cases.

There were multiple duplicates in each of these four categories so the total number of individuals identified in these four AIMWTS searches is not a sum of the four totals.

IV. Information Required For Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

For <u>initial waiver</u> for excessive myopia the AMS should include:
A. Cycloplegic refraction (FC I/IA and initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Optometry/ophthalmology exam to include a dilated peripheral retina exam of each eye.

For <u>initial and renewal of waiver</u> for excessive hyperopia the AMS should include:
A. Cycloplegic refraction (FC I/IA and initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Stereopsis testing (OVT or VTA testing).
C. Optometry/ophthalmology exam to include all test listed in AFI 48-123 (stereopsis, ocular motility and alignment testing).

For initial and renewal of waiver for excessive astigmatism the AMS should include:
A. Cycloplegic refraction (FC I/IA and initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Corneal topography imaging.
C. Corrected visual acuity with spectacles, and contact lenses if applicable, each eye.
D. Corrected low contrast acuity (PV 5% chart) with spectacles, and contact lenses if applicable, each eye.
E. Stereopsis testing (OVT or VTA testing).
F. Optometry/ophthalmology exam to include slit lamp and fundus exam.

For initial waiver for anisometropia the AMS should include:
A. Cycloplegic refraction (FC I/IA and initial FC II/III) to 20/20 each eye and manifest refraction to best corrected visual acuity each eye.
B. Stereopsis testing (OVT or VTA testing).
C. Optometry/ophthalmology exam to include all test listed in AFI 48-123 (stereopsis, ocular motility and alignment testing).
D. History of asthenopic (eye pain/fatigue) symptoms, diplopia or fusional problems, to include negative responses.

Note: For all FC I/IA applicants, confirmation that individual has discontinued wear of soft contacts for at least 30 days or hard/rigid gas permeable contact lenses for at least 90 days at the time of exam is required.

ICD9 Code for Refractive Errors	
367.0	Hyperopia
367.1	Myopia
367.2	Astigmatism
367.31	Anisometropia

V. References.

1. AFPAM 48-133, Physical Examination Techniques, 1 June 2000.

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5. Miller RE, Woessner WM, Dennis RJ, et al. Survey of Spectacle Wear and Refractive Error Prevalence in USAF Pilots and Navigators. Optometry and Vision Science. 1990; 67: 833-9.

6. Waring GO, Lynn MJ, McDonnell PH, et al. Results of the Prospective Evaluation of Radial Keratotomy (PERK) Study 10 Years After Surgery. Arch Ophthalmol, 1994; 112: 1298-1308.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Oct 2009
By: Col John Gooch (Chief, ACS Aerospace Ophthalmology), LtCol Michelle Aaron (Chief, Aerospace Vision Section), and Dr. Dan Van Syoc
Waiver guide reviewed by the AF/SG Consultant for Ophthalmology, Refractive Surgery, Lt Col Charles Reilly.

CONDITION:
Refractive Surgery (RS) (Mar 11)

I. Overview.

Vision correction with spectacles and contact lenses poses some operational disadvantages, such as fogging, displacement, and potential equipment incompatibility. The AF approved RS to reduce dependence on traditional optical correction. This led to implementation the USAF Refractive Surgery (USAF-RS) program. The USAF-RS program has three management groups: (1) Trained aviation and aviation-related special duty (AASD) personnel, (2) Applicants to AASD, and (3) Warfighter personnel. This waiver guide provides program management directions for the first two groups.

The USAF-RS program authorizes two primary categories of corneal refractive surgery (CRS) for eligible AF active duty and AF Reserve Component (ARC) members; Advanced Surface Ablation (ASA) and Intra-Stromal Ablation (ISA) procedures.

Approved ASA procedures include: photorefractive keratectomy (PRK), epithelial-laser in-situ keratomileusis (epi-LASIK), and laser in-situ epithelial keratomileusis (LASEK). Approved ISA procedures include: standard laser in-situ keratomileusis (LASIK), All Laser LASIK (using a femtosecond laser for flap creation).
Wave-Front-Guided (WFG) technology combined with ASA and ISA procedures are also approved and include WFG-PRK and WFG-LASIK.

Some CRS techniques, such as radial keratotomy, thermokeratoplasty, and intra-corneal rings, are associated with less predictable outcomes and more post-treatment complications and are not authorized. Intra-ocular RS techniques, such as clear lens extraction and phakic lens implantation, are not authorized.

RS treatment plans designed to create a monovision outcome (one eye corrected for distance and the other eye corrected for near) are not authorized for AASD and AASD applicants. Monovision treatments result in reduced depth perception and a failure to meet aeromedical flight standards.

Refractive surgery techniques correct refractive errors by modifying the corneal shape. Myopic eyes tend to have a corneal profile with a steep contour (steeper centrally, flatter peripherally); hyperopic eyes have a relatively flat contour. Astigmatism is the result of a non-spherical contour. ASA and ISA procedures use a computer guided ultraviolet (UV) excimer laser to ablate (remove) corneal stroma, permanently altering corneal contour, effectively reducing the refractive error and, ideally, result in unaided visual acuity of 20/20 or better. The central corneal is flatted for treatment

of myopia. Hyperopic treatments remove para-central corneal to create a steeper corneal contour. Differential application of laser ablation is used to treat astigmatism.

In ASA procedures, the cornea epithelial tissue is first removed or displaced (PRK – mechanical abrasion, LASEK – alcohol solution, epi-LASIK – mechanized blade). The underlying stromal tissue is then ablated to a pre-programmed contour and the eye is allowed to heal (re-epithelialize). A bandage soft contact lens covers the treated area until epithelialization closes the wound. For ISA procedures, a partial thickness corneal stroma flap is first created. Using a laser or mechanical microkeratome, a lamellar cut is made into the outer corneal stroma creating a flap that is typically hinged on either the nasal or superior edge. The corneal epithelium is left intact on the surface of the flap. The flap is lifted and folded out of the way of the excimer laser. The underlying stromal bed is ablated, altering the corneal contour. The flap is repositioned over the treated area. Topical steroid eye drops are used about 1-2 weeks following ISA and up to 4 months following ASA reduce corneal haze and promote stabilization.

ISA offers some advantages over ASA including a quicker recovery of vision, less associated discomfort, shorter duration of steroid eye drop use, and potentially faster return to flight duties. However, the ISA flap never completely heals and presents a risk of incidental traumatic flap dislocations for years following treatment. ASA procedures avoid flap complications and potential flap displacement. Dry eye symptoms are a common post-RS complaint for both ASA and ISA.

The following clinical criteria must be met before permission to proceed and waiver is granted following CRS treatment in AASD personnel:

A. Age 21 or older.

B. Refractive error limits do not exceed those listed in Table 1.

C. Show demonstrated refractive stability with no more than 0.50 diopter shift in manifest sphere or cylinder power between two or more refractions (one refraction current with application data and the other at least one year older).

D. Normal corneal topography (CT) – no evidence of abnormal corneal surface topography (including but not limited to): corneal irregularity, abnormal videokeratography, keratoconus, and/or “topographical pattern suggestive of keratoconus” (TPSK) in either eye.

E. No history or evidence of (including but not limited to): active ophthalmic disease, corneal neovascularization within 1 mm of intended ablation zone, central crystalline lens opacifications (i.e. post subcapsular cataracts), severe dry eyes, keratoconjunctivitis sicca, uveitis, keratitis, excessive pupil enlargement, glaucoma, predisposing disorder to glaucoma development (i.e. pigment dispersion syndrome with IOP greater than 21 mm Hg) or retinal pathology.

F. Not currently pregnant or actively nursing--must be greater than 6 months post-partum or greater than 6 months after discontinuing nursing.

G. Not using concurrent topical or systemic medication which may impair healing (including but not limited to): corticosteroids, antimetabolites, isotretinoin (Accutane®), amiodarone hydrochloride (Cordarone®), and/or sumatriptan (Imitrex®).

F. No history of medical conditions which, in the judgment of the treating corneal refractive surgeon may impair healing (including but not limited to): collagen vascular disease, autoimmune disease, immunodeficiency disease, active or history of ocular herpes zoster or simplex, endocrine disorders (e.g. thyroid disorders and diabetes).

Table 1 contains the pre-RS cycloplegic refraction values allowed for possible waiver for FC I/IA, II, IIU, and III.

Table 1: Pre-RS Cycloplegic Refractive Error Limits

Myopia (Most myopic plane)	≤ –8.00 Diopters
Hyperopia (Most hyperopic plane)	≤ +3.00 Diopters
Astigmatism	≤ 3.00 Diopters

Aeromedical refractive error is based on the cycloplegic refraction. The authorized cycloplegic exam technique uses one percent cyclopentolate (Cyclogyl®), 2 drops each eye, 5 to 15 minutes apart, with examination performed no sooner than one hour after the last drop and within two hours of the last drop of cyclopentolate. The cycloplegic refractive error is the minimum refractive power needed to achieve 20/20 vision each eye separately. The refractive error standard for aeromedical purposes is that produced "in any meridian" following transposition. The rules of transposing are: (1) Algebraically add the cylinder power to the sphere power to determine the transposed power of the sphere (2) Change the sign of the cylinder (3) Change the axis by 90 degrees (do not use degrees greater than 180 or less than 001). Note: 180 degrees is on the same axis as 0 degrees.

	Sphere		Cylinder		Axis	
Example 1:	+2.25		-1.50	X	158	(minus cyl form)
Transposed	+0.75		+1.50	X	068	(plus cyl form)
Example 2:	-5.50		-2.75	X	090	(minus cyl form)
Transposed	-8.25		+2.75	X	180	(plus cyl form)

Aeromedical standards and waiver requirements are based upon the magnitude of sphere power in the meridian (plane) that gives the largest value (most minus or most plus). Myopia is represented by a negative diopter value in the sphere and hyperopia by a positive diopter value. Cylinder power represents the difference in power between the two major meridians and may be represented by either a positive or negative cylinder value. Astigmatism is the absolute value of the cylinder power (i.e. -1.50 cylinder power and +1.50 cylinder power represents the same degree of astigmatism which is their absolute value of 1.50)

In example 1, +2.25 is the largest hyperopic sphere power with its meridian value aligned at axis 158. This represents the most hyperopic meridian. Comparing this value to the waiver limit table above, this pre-RS prescription is eligible for waiver consideration.

In example 2, -8.25 is the largest myopic sphere power with its meridian value aligned at axis 180. This represents the most myopic meridian. Comparing this value to the wavier limit table above, this pre-RS RS prescription is not eligible for waiver consideration.

The Aviation Program Manager (APM) located at Wright-Patterson AFB reviews AASD RS applications and provides program management and oversight in accordance with AF/SG policy. ASA outcomes have been excellent with nearly 100% of aircrew returned to full operational duty. About 1% of pilots and 5% of other aircrew required spectacles to meet flight standards (20/20 visual acuity). Approximately 14% to 16% of aircrew attaining uncorrected 20/20 vision achieved their best level of visual performance with supplemental spectacle correction. Only 1% of aircrew

did not achieve the same level visual acuity as measured prior to surgery. Aircrew returned to flight duties on average 13 weeks after ASA. Similar statistics are evolving with ISA resulting in an average DNIF of 13 weeks; however, the number of trained aircrew selecting this treatment procedure remains relatively small (ISA was authorized in May 2007).

The AASD RS program is locally managed by the flight surgeon with close assistance of the local eye care professionals. Extensive screening of potential RS candidates is performed. Permission to proceed with RS is contingent upon signature approval of the candidate's squadron commander as well as the candidate, local eye care professional, and the local FS. The application for RS is then forwarded to the APM for review. This typically takes about 2 weeks; however, if the application is not completed fully or accurately, significant delays in processing can occur. The APM determines if the documented clinical information recorded on the application meets all pre-op RS policy criteria. When the application review is complete, the APM contacts the local FS, aircrew member, center selected by applicant (if DOD), and co-managing eyecare provider with their recommendation—either "permission to proceed" or "permission to proceed denied."

Pilots and boom operators requesting LASIK or who have refractive errors >-5.50 diopters, but $\leq$ -8.00, will no longer require a pre-surgical baseline evaluation or 1 year waiver exam at the ACS. Follow-up examinations will continue locally including the 12 month post-surgical appointment.

After receiving permission to proceed, **Tri-Care eligible pilots and boom operators** with hyperopia (up to +3.00 diopters) will require pre-surgical baseline evaluation at the ACS in conjunction with surgery which is currently limited to Wright-Patterson AFB (WPAFB). Follow-up examinations will occur locally except for the 12 month post-surgical appointment which is completed at the ACS in conjunction with waiver renewal. Additional ACS evaluations may be required at subsequent waiver renewals if abnormalities are present.

All other eligible active duty AASD personnel who are approved for RS can have their pre-surgical evaluation and briefings completed at any Department of Defense (DOD) Refractive Surgery Center. Their surgery is completed at this facility and follow-up examinations are performed locally.

ARC personnel, not eligible for military medical benefits must first be approved for RS by the APM, then must pursue RS at their own expense, and be followed-up by civilian providers. All post-operative data, regardless if AD or ARC, must be transmitted to the APM (documentation attached in AIMWTS meets this requirement).

For an applicant to AASD, the individual must meet pre-RS clinical criteria and documentation of such must be provided. All pre-operative, intra-operative and post-operative documentation must be forwarded to the APM (documentation attached in AIMWTS meets this requirement). At minimum the individual must be 12 months post-RS for waiver consideration. US Air Force Academy (USAFA) cadets must be treated at the USAFA Laser Center for either PRK (ASA) or LASIK (ISA). Non-active duty pilot applicants (civilians, ROTC) must pursue RS at their own expense and follow-up by civilian providers. They will be evaluated at the ACS at the time of medical flight screening (MFS) to determine if they meet waiver criteria. Active duty pilot applicants will also be evaluated at the ACS during their Medical Flight Screening (MFS) appointment.

For trained AASD refractive surgery applicants with anisometropia, appropriate waiver action and approval will be required prior to RS application approval in following scenarios: FC I pilot training applicants with greater than 2.00D of anisometropia; FC II pilots and FC IA navigator applicants with greater than 2.50D of anisometropia; FC II non-pilots and FC III aviators with greater than 3.50 of anisometropia. See the excessive refractive error (anisometropia, Table 4) and defective depth perception waiver guides for details.

For complete program information, please review the following web sites managed by the APM: https://kx.afms.mil/USAF-RS **(dot mil) or (**http://airforcemedicine.afms.mil/USAF-RS (public access). If unable to access, contact the APM at USAFSAMAircrewProgramManager@wpafb.af.mil

II. Aeromedical Concerns.

These elective surgical procedures although highly successful in general are not risk free and represent an investment by the patient and his/her squadron initially. Topical steroids are required following RS to control the healing response and reduce the risk of corneal haze and scarring. However, topical steroids may increase the risk of infection, produce elevated intraocular pressure in some individuals and may cause development of cataracts. To date, two aircrew members have sustained permanent visual field defects and vision loss as a result of topical steroid related complications. Therefore, frequent monitoring of intraocular pressure and close follow-up is required.

AASD personnel are restricted from deployment as long as steroid eye drops are in use; however, the aircrew member may be waived by the MAJCOM waiver authority to return to local flight duties in order to maintain qualifications. Participation in flight simulator and altitude chamber training while on steroid eye drops is permissible after initial waiver is granted by the waiver authority. An aeromedical summary submitted to MAJCOM waiver authority must provide evidence that all applicable vision standards are met, no post-operative complications exist, and the refraction is stable (two refractions separated by at least two weeks with no more than 0.50D change.) When the aviator has been directed to discontinue steroid eye drop use, the member may be returned to world-wide-qualified status for deployment purposes.

Degradation in the quality of vision following RS can affect operational visual performance, despite a finding of high contrast visual acuity (standard vision charts) that meets flight standards. Significant complications include dry eye symptoms, corneal haze, glare, halos, diplopia, reduced low contrast sensitivity, unaided night vision, and night vision goggles (NVG) performance. Recovery from RS complications may require extended recuperation time extending to a year or more. Under- and over-corrections of refractive errors can result from both ASA and ISA treatments. Refractive surgery enhancement (secondary treatment) or requirement to wear traditional correction (spectacles or contact lenses) may be required. UV protection is required post-RS to reduce UV-induced phototoxic damage than can potentiate corneal haze.

ISA procedures uniquely present flap complication risks. Intra-operative complications include: thin flap, incomplete flap, buttonhole flap or free flap. In addition, flap striae (wrinkles) can develop intra-operatively or at any time during the convalescent period. Surgical intervention is usually required to address striae complications. The risk of corneal flap displacement by high Gz forces or ejection sequences is believed to be low; although this has not been thoroughly studied.

The effect of chronic, low grade hypoxia on visual performance following ISA has also not been completely studied. A single study at sea level (normobaria) with simulated hypoxic environment equivalent to 25K feet revealed no reduction in vision.[6] The effects of altitude up to 35K feet following both ASA and ISA has been thoroughly studied with no adverse effects noted.[9, 10] Infectious keratitis can occur during the immediate postoperative period which can be vision-threatening. Best corrected visual acuity may decrease by two or more lines in up to 3.6% if keratitis occurs.[2]

Flight surgeons should encourage post-RS aircrew to prepare for long duration flights and pending deployments. A bottle of sterile lubricating eye drops assists aviators in managing dry eye symptoms (a common post-RS complication) and thus minimizes rubbing of the eyes which can precipitate corneal abrasions or ISA flap dislocation. Post-operatively, aircrew must continue to be alert and vigilant in the use of eye protection in both operational and recreational environments, especially after ISA.

Air Force aeromedical policy now authorizes hyperopic RS treatment for eligible aircrew to decrease eye strain and reduce accommodative effort at near and distance. Flight surgeons and base-level optometrists need to understand that the visual recovery following hyperopic RS treatment is slower and may take up to six months to reach aeromedical standards in some cases. Although hyperopic RS is FDA approved and is deemed “safe and effective”, more quality of vision issues are reported compared to myopic RS. Therefore, hyperopic RS is being closely monitored under a new ACS Management Group. AD pilots and boom operators requesting hyperopic RS must obtain a baseline examination at the ACS and treatment at the Refractive Surgery Center, Wright-Patterson AFB, OH.

III. Waiver Considerations.

RS is disqualifying for all classes of flying duties; waiver is required. **Return to flight status before waiver approval is not authorized.**

Table 2 Waiverable Examination Results

Examination	**Waiverable Results**
Best corrected visual acuity (OVT)	20/20 or better each eye*
Precision Vision 5% low contrast chart	20/50 or better each eye*
Slit lamp exam	LASIK – no striae or flap complications* PRK – no more than trace corneal haze*
Refractive error	Stable, no more than 0.50 diopter shift in **manifest** sphere or cylinder refractive power between two readings at least 2 weeks apart*
Intraocular pressure (IOP)	Normal – ≤ 21 mmHg*
Fundus exam	No new or previously unrecognized retinal pathology†
Depth perception (OVT-DP)	Line D, E or F. If fails and previously waived for depth perception using AO Vectograph then waived limits of that test. See defective depth perception/stereopsis waiver guide.

* If outside these limits, refer to local eye care provider and/or treating refractive surgery center. If condition is unable to be resolved refer case to ACS.
† Work-up and submit waiver request for new diagnosis.

Table 3: RS Requirements Summary Table

		PRK[8]		**LASIK**[7]		**Hyperopia**[6]
		≤ -5.50	> -5.50 to ≤ -8.00	≤ -5.50	> -5.50 to ≤ -8.00	Plano to +3.00
Pilots	Surgery	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	WPAFB/Civilian[1]
	1-year follow-up	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	ACS
	Waiver Authority[5]	MAJCOM	MAJCOM	MAJCOM	MAJCOM	AFMSA
In-flight Refuelers	Surgery	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	WPAFB/Civilian[1]
	1-year follow-up	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	ACS
	Waiver Authority[5]	MAJCOM	MAJCOM	MAJCOM[2]	MAJCOM[2]	AFMSA
Other Trained Flyers and Aircrew Applicants	Surgery	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]
	1-year follow-up	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]	Local Eye Clinic/Civilian[1]
	Waiver Authority[5]	MAJCOM	MAJCOM	MAJCOM	MAJCOM	MAJCOM
Pilot Applicants[2]	Surgery	USAFA/Civilian & Any DoD RS Center[1]	USAFA/Civilian & Any DoD RS Center[1]	USAFA/Civilian & Any DoD RS Center[1]	USAFA/Civilian & Any DoD RS Center[1]	USAFA/Civilian & Any DoD RS Center[1]
	Initial follow-up for waiver[3]	USAFA/FCI at time of MFS	USAFA/ACS at time of MFS	USAFA/FCI at time of MFS	USAFA/ACS at time of MFS	ACS[4]/ACS at time of MFS
	Waiver Authority	AETC	AETC	AETC	AETC	AETC[4]
RPA Pilot Applicants	Surgery	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]	Any DoD RS Center/Civilian[1]
	Initial follow-	Local Eye Clinic/Civilia	Local Eye Clinic/Civilia	Local Eye Clinic/Civilia	Local Eye Clinic/Civilia	USAFA/ACS at time of

	up for waiver	n[1]	n[1]	n[1]	n[1]	MFS
Other Flyer Applicants	Waiver Authority	AFMSA	AFMSA	AFMSA	AFMSA	AFMSA[4]

1. If not eligible for TRICARE medical benefit (e.g. civilian, ROTC & most ANG/AFRC), will go to civilian provider.
2. AD pilot applicants are considered Warfighters until selected for training [they must have a qualified PE (pending MFS) before selection]. They must meet the AASD waiver criteria.
3. Initial follow up in conjunction with FC I application must be greater than one year after surgery (e.g. history of PRK or LASIK greater than one-year ago). ACS evaluation required for all non-USAFA >-5.50 diopter myopes.
4. For USAFA cadets, ACS evaluation is required prior to waiver (no "contingent on MFS" waivers).
5. Waiver authority for initial and renewal.
6. For both PRK and LASIK
7. Minimum DNIF of 1 month is required following LASIK. Initial waiver can be requested once applicable vision standards are met and refractive stability is established.
8. No minimum DNIF period is established following PRK, however, 2-3 months is generally required for enough corneal healing to occur to meet applicable vision standards and for refractive stability to occur.

AIMWTS review in Sep 2009 revealed 1712 total cases with a waiver disposition. There were 412 FC I/IA cases, 687 FC II cases and 612 FC III cases and one case labeled "UAS". Within the FC I/IA group, 163 later had a disposition for FC II which is not reflected in the FC II total above. There were a total of 80 disqualifications; 25 were FC I/IA, 20 were FC II, and there were 35 in the FC III category. There was also one FC I case that was granted an ETP. Within the population of those disqualified, about 60% were for vision-related problems, excessive presurgical refractive error, or side effects from the procedure such as haze, and the remainder were disqualified for other medical conditions or administrative issues.

IV. Information Required for Waiver Submission.

If the trained aircrew member has an uncomplicated postoperative course and meets applicable vision standards at the initial waiver point postoperatively, an indefinite waiver may be granted, except for pilots and boom operators with pre-operative hyperopia and high myopia (>-5.50 to ≤ -8.00). For pilots and boom operators with uncomplicated hyperopia and high myopia surgical treatments, an indefinite waiver may be granted at the one year waiver renewal point. Annual routine PHA vision exams will be required after this point. Complicated cases, or cases not meeting vision standards, should be referred to the ACS for review.

Required items in the aeromedical summary for initial waiver for **trained** AASD members:

A. History:
   1. Pre-op cycloplegic refraction.
   2. Surgical procedure, date and location.

3. Assessment (negative and positive) of post-op symptoms of glare, halos, reduced night vision and diplopia.

4. Eye medications usage, past and current, include discontinuation date.

B. Physical (Current):

1. Uncorrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
2. Best corrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.

3. Cycloplegic refraction and dilated fundus exam.

4. Two post-op refractions at least 2 weeks apart that shows stability (no more than 0.50 diopter shift in **manifest** sphere or cylinder power).
5. Slit lamp exam which must include grading of haze.
6. Intraocular pressures (IOPs).
7. Depth perception (OVT-DP). (If fails and previously waived for defective depth perception using AO Vectograph, then include AO Vectograph).

C. Attach copy of "Permission to Proceed" letter.

D. Attach copy of surgical documentation, post-RS evaluations (1, 3, 6, 12 months post-op and annually, and any other additional follow-ups) and any RS-related incidents (this will meet the requirement to send this info to the USAF-RS APM). The following is a link to the post-RS evaluation/incident forms to be utilized: http://airforcemedicine.afms.mil/idc/groups/public/documents/webcontent/knowledgejunction.hcst?functionalarea=RS_USAF&doctype=subpage&docname=CTB_070886.

While on anti-inflammatory (steroid) eye drops, the aviator will be placed on non-mobility status, restricting the individual from deployment via AF Form 469. For LASIK, the aircrew member will similarly be placed on non-mobility status, restricting the individual from deployment via AF Form 469 for a minimum of one month after surgery, even if no longer on steroid eye drops.

If re-treatment is required or desired, it is considered new treatment and requirements are the same for initial waiver.

Any complications that arise after initial waiver will void the waiver and a new waiver request will be required after the complication is successfully managed.

Required items in the aeromedical summary for initial waiver for **applicants** for AASD:

A. History:

1. Address whether all clinical criteria prior to RS were met. If not, describe exceptions in detail.

2. Pre-op cycloplegic refraction.

3. Surgical procedure, date and location.
4. Assessment (negative and positive) of post-op symptoms of glare, halos, reduced night vision and diplopia.

5. Eye medications usage, past and current.

6. Presence of other surgical or post-operative complications (e.g. corneal haze, flap striae, ocular hypertension, etc.)
7. Must be 12 months post-RS, at minimum, for waiver consideration.

B. Physical (Current):

1. Uncorrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
2. Best corrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.

3. Cycloplegic refraction and dilated fundus exam.

4. Two post-op refractions that shows stability (no more than 0.50 diopter shift in **manifest** sphere or cylinder power).
5. Slit lamp exam which must include grading of haze.
6. Intraocular pressures (IOPs).
7. Depth perception (OVT-DP).

C. Attach copy of surgical documentation, post-RS evaluations and any RS-related incidents (this will meet the requirement to send this info to the APM. The following is a link to the post-RS evaluation form which should be used to report any RS related incidents: http://airforcemedicine.afms.mil/idc/groups/public/documents/webcontent/knowledgejunction.hcst?functionalarea=RS_USAF&doctype=subpage&docname=CTB_070886.

D. Initial waiver term of validity may be indefinite for uncomplicated cases at the waiver authority's discretion; however, AASD applicants are not eligible for waiver until at least one year following uncomplicated surgery. Post-RS evaluations are desired at 1, 2 (if ASA), 3, 6, and 12 months post-op. All examination documentation is required for submission at the initial waiver point.

Any complications that arise after initial waiver will void the waiver and a new waiver request will be required after the complication is successfully managed. The first waiver renewal is no longer required at 12 months post surgery if no complications are detected during the post-operative course or on the required annual refractive surgery follow-up exam.

Required items in the aeromedical summary for renewal waiver for pilots and boom operators with pre-operative hyperopia and high myopia (>-5.50 to ≤ -8.00):

A. History:
   1. Pre-op cycloplegic refraction.
   2. Surgical procedure, date and location.
3. Assessment (negative and positive) of post-op symptoms of glare, halos, reduced night vision and diplopia.
   4. Eye medications usage, past and current.

B. Physical (Current):
1. Uncorrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
2. Best corrected visual acuity high contrast (OVT) and Precision Vision 5% low contrast.
3. Manifest refraction
   4. Slit lamp exam which must include grading of haze.
5. Intraocular pressures (IOPs), if on steroid eye drops.
6. Depth perception (OVT-DP). (If fails and previously waived for defective depth perception using AO Vectograph, then include AO Vectograph).

C. Attach copy of post-RS evaluations (1, 3, 6, 12 months post-op, and annually if applicable) not previously sent and any RS-related incidents (this will meet the requirement to send this info to the USAF-RS APM). If no complications are detected during the post-op exams, an indefinite waiver may be requested and granted at the waiver authority's discretion.

The following is a link to the post-RS evaluation/incident forms to be utilized: http://airforcemedicine.afms.mil/idc/groups/public/documents/webcontent/knowledgejunction.hcst?functionalarea=RS_USAF&doctype=subpage&docname=CTB_070886.

ICD 9 Codes for Corneal Refractive Surgery	
367.1	MYOPIA Treated With OPERATIONS ON CORNEA
11.71	Keratomileusis (LASIK, WFG-LASIK)
11.79	Other operations on cornea (PRK, LASEK, epi-LASIK, WFG-PRK)

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WAIVER GUIDE
Updated: Jun 2010
Supersedes Waiver Guide of Mar 2009
By: Maj Amy Gammill (ACS Internal Medicine branch) and Dr. Dan Van Syoc
Reviewed by Lt Col Edith Canby-Hagino, AF/SG Consultant for Urology

CONDITION:
Renal and Ureteral Stones (Nephrolithiasis) (Jun 10)

I. Overview.

Urinary stone disease is the third most frequent urinary tract disorder, exceeded in frequency only by infections and prostatic disease.[1] Men are affected more frequently than women, with a ratio of 2:1. Incident rates are highest in non-Hispanic Caucasians, followed by Hispanics, then African-Americans and other racial/ethnic groups.[2] Initial presentation most commonly occurs in the third and fourth decades. The incidence of urolithiasis is increasing for both men and women, such that 13% of men and 7% of women will be diagnosed with a kidney stone during their lifetime.[3] Diet and fluid intake are important factors in the development of urinary stones. Persons with diets high in protein and/or sodium may have higher rates of stone disease, and persons in sedentary occupations have a higher incidence of stones than manual laborers. Genetic factors also contribute to urinary stone formation, such as for patients with cystinuria and renal tubular acidosis.

The disease's clinical course is usually that of a gradual onset of flank, abdominal or back pain over an hour or more before acute colic pain onset. Pain (renal colic) usually is described as sharp, severe and localized to the flank and may be associated with nausea and/or vomiting. It may occur episodically and radiate anteriorly over the abdomen or be referred to the ipsilateral testis or labium. If the stone becomes lodged at the ureterovesical junction the patient may complain of marked urinary urgency and frequency. Stone size does not correlate well with severity of symptoms. Urinalysis usually reveals microscopic or gross hematuria.

<u>EVALUATION OF NEPHROLITHIASIS</u>

In initial evaluation, the first radiograph usually obtained is the plain kidney-ureter-bladder (KUB) film. Unenhanced helical computed tomography (CT) is the most sensitive imaging method to confirm (99% diagnostic accuracy) the diagnosis of a urinary stone in a patient with acute flank pain; it also helps with the measurement of stone density and may guide treatment—stones with density > 1000 Hounsfield units respond less well to lithotripsy. Due to potential hazards of increased radiation exposure, CT scans should be used sparingly and judiciously. If a KUB is sufficient for performing follow-up, then it should be used in lieu of CT. Intravenous pyelogram (IVP) is used very infrequently now but can also be helpful in diagnosis and treatment planning. Ultrasound is a noninvasive method for demonstrating both the urinary stone and the resultant hydronephrosis and has a high specificity, but low sensitivity.[4]

Urinary calculi are polycrystalline aggregates composed of varying amounts of crystalloid and a small amount of organic matrix. There are five major types of urinary stones: calcium oxalate, calcium phosphate, struvite, uric acid, and cystine. The following requirements are needed for urinary stone formation: (1) formation of a crystal nidus through nucleation, (2) retention of the nidus within the urinary tract, and (3) growth of the nidus to a size sufficient to cause symptoms or

be visible on imaging. For crystals to occur, the urine needs to be supersaturated with the salt in consideration. Intermittent supersaturation, as seen during periods of dehydration or after meals, is sufficient. Stone formers as a group excrete larger crystals and crystal aggregates than non-stone formers and have lower levels of stone inhibitors.[5]

Approximately 75% of renal stones are composed of calcium oxalate. Furthermore, approximately 50-75% of patients with calcium oxalate stones have hypercalciuria, the most common urinary abnormality predisposing to this type of stone disease. Etiologies of hypercalciuria include metabolic acidosis (RTA), hyperthyroidism, malignancies with bone metastases, corticosteroid treatment, vitamin D excess (exogenous or diseases such as sarcoidosis), and hyperparathyroidism. Approximately 5% of individuals with hypercalciuria have primary hyperparathyroidism. A significant number of hypercalciuric patients are classified with "idiopathic hypercalciuria," which is a diagnosis of exclusion made when the particular etiology of the hypercalciuria cannot be identified. Hypercalciuria is diagnosed with the help of a 24-hour urinary calcium excretion; the upper limit of normal is 4mg (0.1mmol)/kg body weight in patients of either sex.

Hyperoxaluria may predispose to the formation of calcium oxalate stones and hyperuricosuria may predispose to the formation of uric acid stones, calcium stones, or a combination of both.[6] Hyperoxaluria will result in an elevated urinary oxalate level. Normal level for both males and females is about 45mg/day. If due to dietary excess (spinach, rhubarb, Swiss chard, cocoa, beets, peppers, wheat germ, pecans, peanuts, okra, chocolate and lime peel) the maximum would be 50-60mg/day. A level above 60mg/day should be considered abnormal. Hyperuricosuria will display an elevated urinary uric acid level. Levels greater than 800mg (4.8mmol)/day in men and 750mg (4.5mmol) in women may predispose to calcium oxalate stone formation via heterogeneous nucleation or reduction of naturally occurring urinary inhibitors.

Struvite stones, also called infection stones, represent 10-20% of renal stones. They consist of magnesium, ammonium and phosphate, mixed with carbonate. Two conditions must exist for the crystallization of struvite: urine pH of $\geq$7.2 and ammonia in the urine. This is caused by urea-splitting bacteria with the generation of ammonia. The usual causative bacteria include Proteus, Klebsiella, Pseudomonas species and Enterococci (excluding E. coli). Those who produce only struvite stones may present with large stones that cause bleeding, obstruction, or infection without stone passage. Struvite stones require complete surgical removal and possibly long-term antibiotics.

Calcium phosphate stones represent around 5% of all stones; these can be caused by renal tubular acidosis or hyperparathyroidism. The laboratory tests for this stone type are blood pH and serum bicarbonate level. If metabolic acidosis is present, along with 24-hour urinary pH > 6.5, hypercalciuria and hypocitraturia treatment is indicated. Therapy is initiated with potassium alkali and close monitoring of urinary pH, citrate and calcium. Uric acid stones also account for 5% of all stones. These usually occur in the presence of low urinary pH (5.1-5.9) and urinary uric acid levels $\geq$ 1200mg (7.1mmol) excreted daily. Treatment is accomplished by raising the urinary pH to 6.0-6.5 with potassium citrate and treating with allopurinol.

Cystine stones represent less than 1% of all stones. This etiology is secondary to a hereditary defect of amino acid transport. Cystine stones are often multiple, large and may form staghorns. The peak clinical expression is in the third and fourth decade. Cystine stones form because cystine is poorly soluble in the range of normal urinary pH. A level > 250 mg/24 hours is usually diagnostic of

cystinuria. Hydration and alkalinization of the urine above pH of 7.5 is considered first-line treatment.[7] If volume plus pH adjustment are insufficient, treatment with penicillamine or tiopronin is utilized (these are not aeromedically acceptable medications).

Observational studies describe the natural history of asymptomatic renal calculi. The risks for development of pain or need for intervention depend in part on stone size and location, with larger stones more likely to require intervention. In a 2004 review of 300 patients, the risk for progression of stones was followed for a mean of 3.26 years. In this report, 77% experienced disease progression, which was defined as the need for surgical intervention, development of pain, or stone growth on serial imaging. These investigators identified that renal pelvic stones (which are free-floating) incurred the greatest risk of surgical intervention.[8] An earlier report describes a similar rate of symptomatic events, with 32% of 107 patients with asymptomatic stones developing symptoms over a mean follow up of 31.6 months and 17% requiring surgical intervention.[9] A 2010 study demonstrated that approximately 1 in 5 adults with asymptomatic urolithiasis will experience symptoms during a 10-year period. This equates to an approximate 2% risk/year of symptomatic stone disease.[10]

While some have advocated observation for lower pole calculi based on the theory that gravity will prevent them from migrating, the above 2004 study did not find a significant difference in need for intervention based on stone location in upper, interpolar or lower pole calyces. A newer study in 2007 described 24 patients with asymptomatic lower pole stones who were followed for an average of 53 months and found that 33% experienced stone growth and 11% required intervention due to pain, obstruction or persistent gross hematuria. The rate of stone growth correlated positively with initial size of stone.[11]

Many have raised the question of whether there is a stone size threshold below which the risk for symptoms and progression is negligible, or at least less than the risks of a stone treatment intervention. This issue has been investigated through observational studies of residual fragments after various stone procedures, including extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy (PN) and ureteroscopy. Some have designated small residual calculi with the term “clinically insignificant residual fragments” (CIRF), and various authors have attempted to identify a size below which intervention should be discouraged. The size threshold for CIRFs has been reported variously, from less than 2 mm to 4 mm. There is a tendency to observe these small fragments for a number of reasons. Many settle in lower pole calyces and are held stationary by gravity. It can be difficult to eradicate smaller stones, especially when they are 2 mm or less, because they are harder to localize on fluoroscopy and harder to engage with ureteroscopic baskets. The majority of stones 4 mm or less will pass spontaneously, so the cost and risk of surgical intervention are felt to exceed the benefits of treating these smaller stones for many patients.

Stone clearance and stone-free rates after ESWL vary considerably, ranging from 30-60% (depending on the ESWL machine and imaging used to detect fragments), and it is likely that residual retained fragments contribute to a persistent risk for growing stones in those treated with ESWL alone. Much higher stone-free rates can be achieved with physical extraction of stones via ureteroscopy or PN, but to date there has not been a randomized prospective trial investigating ureteroscopy vs. observation for asymptomatic renal stones.[12]

There have been several studies in the past decade looking at the natural history of residual fragments after ESWL. Most have shown that a significant number of such patients develop stone growth and a symptomatic episode requiring intervention.[13-17] Many urologists continue to advocate observation with close follow-up for patients with residual stones $\leq$ 4 mm after an intervention due to the high rate of spontaneous passage of such stones. Despite consequential rates of stone growth, development of symptoms, and need for intervention, this is a safe and cost-effective management plan when patients have ready access to emergency medical and urology care. It is important to note that, while these smaller stones frequently pass spontaneously, they do not pass painlessly.

TREATMENT OF NEPHROLITHIASIS

In most cases, stones < 5 mm in diameter will pass spontaneously but will take variable time to do so depending on their location at presentation. Hydration is helpful to facilitate passage of small stones.

Ureteral stones: Prediction of spontaneous stone passage is difficult. Stones less than 5 mm in diameter often pass spontaneously, especially in the distal ureter.[18] In such cases, conservative observation with pain medication is appropriate for the first four weeks, as long as no infection is present.[6] In a 1999 study of 75 subjects, 95% of stones < 4 mm passed spontaneously within 40 days, and 50% of subjects with stones $\geq$ 5 mm required intervention for refractory symptoms or failure of the stone to pass. Spontaneous passage of ureteral stones can be facilitated with hydration and oral alpha-1 adrenergic antagonists (not approved for use while on flying status).[19-21]

Individuals with large stones (not likely to pass), evidence of infection, refractory symptoms or high-grade obstruction should be considered for intervention. Persistent ureteral obstruction for $\geq$ 4 weeks can increase the likelihood of renal damage in previously normal kidneys. If spontaneous stone passage has failed, therapeutic intervention is required. Ureteroscopic stone extraction or ESWL is used to extract or fragment stones from the proximal, mid or distal ureter. Complications during ureteroscopic extraction increase as the duration of conservative observation increases beyond six weeks. Percutaneous removal can be used for ureteral stones but is generally reserved for those too large to be treated effectively for ureteroscopy or when the ureter cannot be accessed from the lower urinary tract. Open surgery and blind basket extraction have fallen out of favor as ureteral and nephroscopes have improved in capability. Indications for earlier intervention include intractable pain, fever, or persistent nausea and vomiting.

Renal stones: Retained stones in the renal parenchyma, renal cyst, or calyceal diverticulum rarely migrate into the collecting system and therefore should be followed with serial abdominal radiographs and/or ultrasound. If calculi are growing or becoming symptomatic, intervention should be considered. Direct visualization with ureteroscopy may be required to determine if stones are free-floating in the collecting system or retained in parenchyma or other enclosed spaces. Renal stones in a papillary duct or more distal part of the collecting system, such as Randall's plaques are more likely to enter the collecting system. However, removal of these calculi may not be possible if they cannot be visualized. Renal stones < 2 cm in diameter can be treated successfully with ureteroscopy, ESWL, or PN. Larger stones and those located in lower pole calyces may not respond well to ESWL but can be successfully treated with ureteroscopy or PN, depending on patient anatomy and other clinical considerations.

Prevention of recurrence: Those afflicted with stone disease are encouraged to remain well-hydrated (>2L/day) and maintain a diet restricted in sodium and animal protein intake.[22] Excess intake of oxalates and purines can increase the incidence of stones in predisposed individuals. Medical therapy is dictated by a metabolic evaluation that includes 24-hour urine collection for a variety of stone-forming metabolites, as well as an assessment of parathyroid function and calcium metabolism. Medical therapy is effective in reducing the risk for future nephrolithiasis, and can also reduce the growth and risk of existing stones becoming symptomatic.[23, 24] Treatment may include a thiazide diuretic for hypercalciuria, allopurinol or potassium citrate for hyperuricosuria and potassium citrate for hypocitraturia, depending on factors identified by a metabolic evaluation. In the absence of a defined metabolic abnormality, empiric therapy with potassium citrate has also been shown to reduce the risk of future symptomatic episodes.[25]

II. Aeromedical Concerns.

The pain of renal colic can be severe and is potentially incapacitating in flight. A few cases of some degree of in-flight incapacitation have been reported.[26] Missions have been curtailed due to renal colic in aircrew. The aviation environment can be conducive to renal calculi formation; conditions of dehydration, extremes of temperature, sedentary work and adverse dietary factors are commonly experienced by aircrew members. Each case must be determined individually after consultation with urology and radiology.[27]

III. Waiver Considerations.

Renal stones, or a history of renal stones, are disqualifying for all flying classes in the US Air Force. No waiver is required for a single episode in a trained aviator unless retained stones are present. Following a recurrent episode, pilots need to be stone-free for waiver consideration unless they fly with another trained pilot; a restricted waiver (FC IIC) is considered for them if they are asymptomatic, particularly if they have 3 or less stones that are <4mm in size. These aviators are typically followed every 6-12 months for a change in the size of the calculus, and if stable over a year, annual follow-up is deemed safe. The same protocol is followed for asymptomatic stones found incidentally on imaging studies. In all instances, metabolic risk factors for stone disease must be appropriately addressed before waiver will be considered.

Table 1 – Waiver criteria for renal stones

Flying Class	Category	Waiver Potential Waiver Authority
I, IA	Single episode	No waiver required, but full workup required on FC I/IA physical.
	Recurrent, bilateral, or retained	No AETC
II	Recurrent or bilateral#	Yes MAJCOM
	Retained*#	Yes MAJCOM
IIU	Recurrent or bilateral	Yes AFMSA
	Retained*	Yes AFMSA
III	Recurrent or bilateral	Yes MAJCOM
	Retained*	Maybe MAJCOM
ATC/GBC	Recurrent or bilateral	Yes MAJCOM
	Retained*	Maybe MAJCOM
SMOD	Any evidence of stone disease	Yes AFSPC

* Stone in renal parenchyma or cyst, with no possibility of movement into collecting system, waiver likely for trained asset.
# If flyer is a pilot, and there are any retained stones, then FC IIC and AFMSA is waiver authority.

AIMWTS review through January 2010 and revealed 532 submitted cases for stone disease. There were 13 FC I/IA cases, 294 FC II cases, 2 FC IIU cases, and 223 FC III cases. Within the total were 51 disqualification dispositions: 8 were FC I/IA, 7 were FC II, and 36 were FC III. Of the 51 disqualification cases, 21 were disqualified primarily for diagnoses other than the stone disease and 30 were primarily for the stone disorders. Included in this total were cases of recurrent stone formation, retained stones, and multiple symptomatic episodes.

IV. Information Required for Waiver Submission.

Information required for an initial waiver:
A. Complete history to include possible etiologic events; attempts to catch the stone, number and size of any stones, and complete work-up done at the time of the episode. Report any history of

episodes prior to going on flying status. Is there family history of stones or personal history of gout, low fluid intake, high animal protein intake, high salt intake, low calcium intake or use of vitamin D supplements? History of all medications used, prescription and over-the-counter, is also necessary.
B. Labs: Stone analysis; urinalysis, including urine pH and urine culture; one complete 24-hour urine assessment should be done while on patient's usual diet for urine volume, calcium, oxalate, uric acid, citrate, magnesium, phosphorus, urine sodium, and creatinine excretion; serum electrolytes, blood urea nitrogen (BUN), serum creatinine, calcium, phosphate, and uric acid; and parathyroid hormone level. Urine creatinine is measured to determine the adequacy of urine collection.
C. Imaging studies: baseline KUB required. If non-contrast CT, IVP, or ultrasound obtained, these study reports must also be submitted with the AMS.
D. Nephrology or internal medicine consult addressing prophylactic treatment.
E. Urology consult addressing treatment and if retained stones present, addressing likelihood of stone entering the collecting system. Successful pursuit of a waiver may be expedited by referring the patient early to an Air Force MTF with urology services.

Information required for <u>waiver renewal</u>:
A. Brief summary of previous stone history, work-up and prevention steps.
B. If there is an interval history of additional kidney stone(s), detailed account of episode(s), treatment and prevention steps taken (Urology consult included). Nephrology consultation if not obtained previously.
C. Radiological evidence demonstrating no new stones and no growth or movement of retained stones. A KUB is recommended for routine follow-up in the absence of symptoms during the waiver period. A CT may be necessary if the patient has a history of radiolucent stones (such as uric acid stones) or if the patient has experienced symptoms.
D. If on prevention medication or initial 24-hour urine stone risk analysis was abnormal, then annual 24-hour urine to monitor impact of intervention.

ICD 9 codes for renal stones	
592	Calculus of kidney and ureter
788.0	Renal colic

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WAIVER GUIDE
Update: Dec 07
By: Col Marc Goldhagen (ACS Chief, Professional Services) and Dr Karen Fox

CONDITION:
Retained Orthopedic Hardware and Joint Replacement (Dec 07)

I. Overview.

Fractures requiring open reduction and internal fixation (ORIF) are fairly common among our active aircrew member population. Less common are degenerative joint diseases requiring prosthetic joint implants due to the relatively young population served. This waiver guide will discuss retained orthopedic hardware and total hip and knee replacements. Fixation devices in the spine and artificial intervertebral disks are considered separately in the herniated nucleus pulposus and spinal fusion waiver guide.

RETAINED ORTHOPEDIC HARDWARE:

Retained hardware devices, except in the case of joint replacement, consist primarily of screws, plates, wires and intramedullary rods (nails). These components are placed to stabilize the fracture and allow for adequate healing. Fracture healing time depends on the nature of the fracture (amount of energy involved in creating the fracture, disruption of soft tissue around the fracture, and the particular bone involved). In the vast majority of fractures, medical standard of care no longer dictates removal of fixation devices. In some cases after adequate bone regeneration, implant removal may be indicated because of patient preference or to restore skeletal strength (usually in children). Additional removal may be required if the device causes pain (loose screw) or reduction in function.

For fractures with retained hardware, waiver is required when there is obstruction/limitation of motion or if the hardware is easily irritated/painful when hit/pressure applied in common activities. Usually to rectify these symptoms the hardware is removed, correcting the problem. Waiver is required in those cases when the device can't be removed or the individual declines removal.

JOINT REPLACEMENT:

Over 300,000 total knee arthroplasties (TKAs) are done in the US every year. The knee joint is made up of three compartments; the lateral, medial and patellofemoral. Damage to the cartilage from osteoarthritis, inflammatory arthritis, avascular necrosis, tumors or congenital deformities are the causes for the need for TKA, with the majority due to osteoarthritis and rheumatoid arthritis. TKAs are indicated in individuals who have failed conservative [activity modification, weight reduction, physical therapy, shoe insoles, nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, glucosamine and chondroitin sulfate, and/or use of assistive device (cane)] or previous surgical treatment [osteotomy, lavage and surgical debridement, cartilage preserving or restoring] for a deteriorated knee joint and continue to have persistent, debilitating pain and significant curtailment in activities of daily living. Unicompartmental knee replacement as treatment in unicompartmental, noninflammatory situations has been used as an alternative to TKA or osteotomy. TKA consist of a femoral, tibial and patella component. Designs can be either

posterior cruciate ligament sparing or not; various metal and polyethylene component combinations. Fixation techniques include cemented (both femoral and tibia), cementless or hybrid (usually femoral cemented and tibia not). The cement serves as grout between the implant and bone. Cementless technique relies on bony ingrowth into or onto porous implant surface. There is a wide choice of implants and large variation between surgeons and nations. Approximately 90 to 95% of TKAs survive to the 10-year point.[10] Complications include thromboembolism, infection, patellofemoral disorders, prosthetic fractures, peroneal nerve palsy, polyethylene wear, and aseptic failure. Risk of intraoperative infection is less than 2% after knee replacement.[17]

Over 150,000 total hip arthroplasties (THAs) are performed in the US every year. The main reason for THA is osteoarthritis of the hip; less common is for advanced rheumatoid arthritis or avascular necrosis. Over 90% of THA are working successfully, pain-free and without complication 10 to 15 years postoperatively.[5] THAs are indicated in individuals who have failed conservative [weight reduction, physical therapy, nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, glucosamine and chondroitin sulfate, and/or use of assistive device (cane)] or previous surgical treatment [core decompression, intertrochanteric osteotomy, periacetabular osteotomy, surgical dislocation and debridement, resection arthroplasty, hip arthroscopy] for a deteriorated hip joint and continue to have persistent, debilitating pain and significant curtailment in activities of daily living. All THAs consist of three parts; femoral component, acetabular component and a bearing surface. Fixation of the components to the bone is either with cement or cementless. Cementless acetabulum is the most common implant and for the femoral implant cementless is used most often in younger individuals with good bone stock. For years the standard bearing surface has been a metallic femoral head which articulates with a polyethylene acetabular liner. Other bearing surfaces developed and used include ceramic on polyethylene, ceramic on ceramic and metal on metal. "Minimally invasive" replacement procedures, such as hip resurfacing where the femoral neck is preserved thus usually requiring more acetabular side bone removal or procedures that decrease the incision size to less than 10 cm (up to 15 cm) still have extensive soft tissue trauma and require experienced orthopedic surgeons. It should be noted also that recovery times for these procedures are not necessarily shorter.

Complications of THA include heterotopic ossification, dislocation, nerve damage, fracture, infection, loosening, leg length discrepancy and thromboembolism. Dislocation remains a common and problematic complication after primary THA with rates of approximately 2% to 5%.[9] Once dislocation has occurred, the risk of redislocation is high; incidence of 33%. Most dislocations occur within the first three months after surgery. Proximal femoral fracture is a relatively common intraoperative occurrence during total hip arthroplasty (THA) with a reported incidence of 2-6%. In one study the risk factors for fractures include anterolateral approach, uncemented femoral fixation and female sex.[2] Risk of intraoperative infection is less than 1% after hip replacement.[18] In one study of 63 consecutive episodes of infection associated with hip prostheses during a 16-year-period, 29% of cases were early (less than 3 months after surgery) infections, 41% were delayed (3 to 24 months after surgery) and 30% were late (more than 24 months after surgery) infections.[18] The risk for fracture-fixation device infections is approximately 2%.[4] Femoral and acetabular loosening is the most common long-term complication and most common indication for revision.

Guidelines for acceptable activity after hip and knee replacement are not well defined. The following is from a 2002 article by Kuster who summarized the literature on exercise recommendations after total joint replacement and suggested a scientifically based guideline.[7] Physical activity is important for general health and also increases bone health which improves

prosthesis fixation and decreases early loosening. Factors such as wear, joint load, intensity and the type of prosthesis must be taken into account when recommending activity after TKA and THA. There is evidence that the reduction in wear is one of the main factors in improving long-term results after total joint replacement. Wear is dependent on load, number of steps and material properties of the prosthesis. The most important question is, whether a specific activity is performed for exercise to obtain and maintain physical fitness or whether an activity is recreational only. To maintain physical fitness an endurance activity will be performed several times per week with high intensity. Since load will influence the amount of wear exponentially, only activities with low joint loads such as swimming, cycling or possibly power walking should be recommended. If an activity is carried out on a low intensity and therefore recreational base, activities with higher joint loads such as skiing or hiking can also be performed. It is unwise to start technically demanding activities after total joint replacement, as the joint loads and the risk for injuries are generally higher for these activities in unskilled individuals.

It is important to distinguish between suitable physical activities after TKA and THA. For TKA it is important to consider both the load and the knee flexion angle of the peak load, while for THA the flexion angle does not play an important role. During activities such as hiking or jogging, high joint loads occur between 40 to 60 degrees of knee flexion where many knee designs are not conforming and high polyethylene inlay stress will occur. Regular jogging or hiking produces high inlay stress with the danger of delamination and polyethylene destruction for most current total knee prostheses. Based on these design differences between hip and knee replacements it is prudent to be more conservative after TKA than after THA for activities that exhibit high joint loads in knee flexion.

II. Aeromedical Concerns.

The chief aeromedical concern of aircrew members with retained hardware is that the underlying orthopedic diagnoses (e.g. fracture, ligament damage) have healed. Once healed, other concerns are discomfort due to the hardware, adequacy of function, soft tissue inflammation, increased risk of infection leading to osteomyelitis, all of which could lead to flight safety issues and compromise mission completion. Aeromedical concerns for THA and TKA include dislocation, fracture, leg length discrepancy and thromboembolism. History of dislocation of THA suggests that the individual's hip is unstable and will continue to be unstable or the individual is non-compliant with hip precautions; neither situation is conducive to flight safety or mission accomplishment. Parachute duty places a repeated trauma to a TKA and THA, with the risk of catastrophic failure. Ejection would be a one time occurrence in an "emergency situation only." Finally, current generation joint prosthesis have an expected life span of 10 to 15 years.

III. Waiver Considerations.

Individuals with fractures are grounded until evidence of bone healing and return of full function can be documented. For fractures with retained hardware, waiver is required when there is obstruction of motion or if easily irritated/painful when hit/pressure applied. Waiver is required for all joint replacements. For joint prosthetics an unrestricted FC II and III waiver may be considered. Joint prosthetics are not considered waiverable for FC I/IA and for parachute duties (FC III).

Table 1: Summary of Clinical Conditions and Waiver Potential

Flying Class	Condition	Waiver Potential Waiver Authority
I/IA	Retained orthopedic device with no pain or limitation of motion (able to lead physically active lifestyle)	No waiver required, medically qualified
	Retained orthopedic device with obstruction of motion or if easily irritated/painful when hit/pressure applied	Maybe AETC
	Joint replacement	No AETC
II/III	Retained orthopedic device with no pain or limitation of motion (able to lead physically active lifestyle)	No waiver required, medically qualified
	Retained orthopedic device with obstruction of motion or if easily irritated/painful when hit/pressure applied	Maybe MAJCOM
	Joint replacement, minimum four months post-op.+	Yes*† MAJCOM
Individuals with parachuting duties (not including emergency bailout)	Retained orthopedic device with no pain or limitation of motion (able to lead physically active lifestyle)	No waiver required, medically qualified
	Retained orthopedic device with obstruction of motion or if easily irritated/painful when hit/pressure applied	Maybe MAJCOM
	Joint replacement	No MAJCOM

* No waiver for untrained FC II and FC III individuals.
† If dislocation has occurred ACS review of case is required. If THA dislocation occurred within first 6 weeks then waiver more likely and will require minimum 6 months post dislocation.
+ This includes "minimally invasive" hip replacement procedures.

Additional considerations for waiver recommendation include but are not limited to: 1.) Full recovery of hip muscle strength and no history of instability or dislocation in THA. 2.) Leg circumference within 1 cm of non-operative (normal) leg (good indication of regained muscle strength) and range of motion of 5-110 degrees of flexion for TKA cases.

Review of AIMWTS through the end of July 2007 showed 22 cases of hip replacement; 19 FC II and three FC III. Twenty (91%) were granted waivers. Of the two disqualified, one was due to continued need for pain medications and use of a cane and the other was disqualified due to another medical condition (diabetes mellitus). The majority had hip replacements due to severe osteoarthritis, followed by avascular necrosis and one congenital hip dysplasia.

Review of AIMWTS through the end of July 2007 showed six cases of knee replacement; three FC II and three FC III. Five (83%) were granted waivers. The one was disqualified because the rheumatoid arthritis required nonwaiverable medications for control. Five had knee replacements due to osteoarthritis and one for rheumatoid arthritis (bilateral).

Review of AIMWTS through the end of July 2007 showed 142 cases of retained orthopedic hardware; 22 FC I/IA, 63 FC II and 57 FC III. All were granted waivers except for seven (5%). Of the seven disqualified, two were disqualified for continued pain from fractures, four were disqualified for other medical conditions (e.g. color vision deficiency, asthma, photorefractive keratectomy 6 months previously in an aircrew candidate, unexplained recurrent vertigo) and one disqualification was unclear from the available information.

IV. Information Required for Waiver Submission.

If the patient requires an initial waiver for retained orthopedic hardware, the aeromedical summary should include the following:

A. History - brief summary of trauma, surgery and recovery, complications, symptoms, current activity level, and medications.
B. Physical - addressing range of motion, muscle strength, point tenderness.
C. Operative reports.
D. X-ray documenting radiographic healing.
E. Orthopedic consult that addresses hardware, muscle strength, range of motion of proximal and distal joint, limitations in activities.
F. If functionality is reduced, include a statement of demonstrated ability (SODA) performing tasks in aircraft.

The aeromedical summary for waiver renewal for retained orthopedic hardware should include the following:

A. History – brief summary of trauma, surgery and recovery, complications, symptoms, current activity level, and medications.
B. Physical - addressing range of motion, muscle strength, point tenderness.
C. Orthopedic consult, if symptoms changed.

The aeromedical summary for initial waiver for prosthetic joint should include the following:

A. History of symptoms, limitations prior to surgery, summary of surgery and recovery, present level of activity, medications, and limitations.
B. Physical - addressing range of motion, muscle strength.
C. Orthopedic consult - range of motion, muscle strength, activity level, limitations.
D. Operative reports.
E. X-rays documenting radiographic healing.
F. Include a statement of demonstrated ability (SODA) performing tasks in aircraft.
G. Medical evaluation board (MEB) results.

The aeromedical summary for waiver renewal for prosthetic joint should include the following:

A. History and physical – to include summary of surgery and recovery, present level of activity, medications, and limitations.
B. Orthopedic consult
C. X-rays results.

Waiver guide reviewed by the AF/SG Consultant for Orthopedics, Lt Col James A. Keeney.

ICD-9-CM for joint replacement
81.5 Joint replacement of lower extremity
81.51 Total hip replacement
81.52 Partial hip replacement
81.53 Revision of hip replacement, not otherwise specified
81.54 Total knee replacement
81.55 Revision of knee replacement, not otherwise specified

ICD-9-CM for retained orthopedic hardware
79.8 Open reduction of dislocation
79.9 Unspecified operation of bone injury

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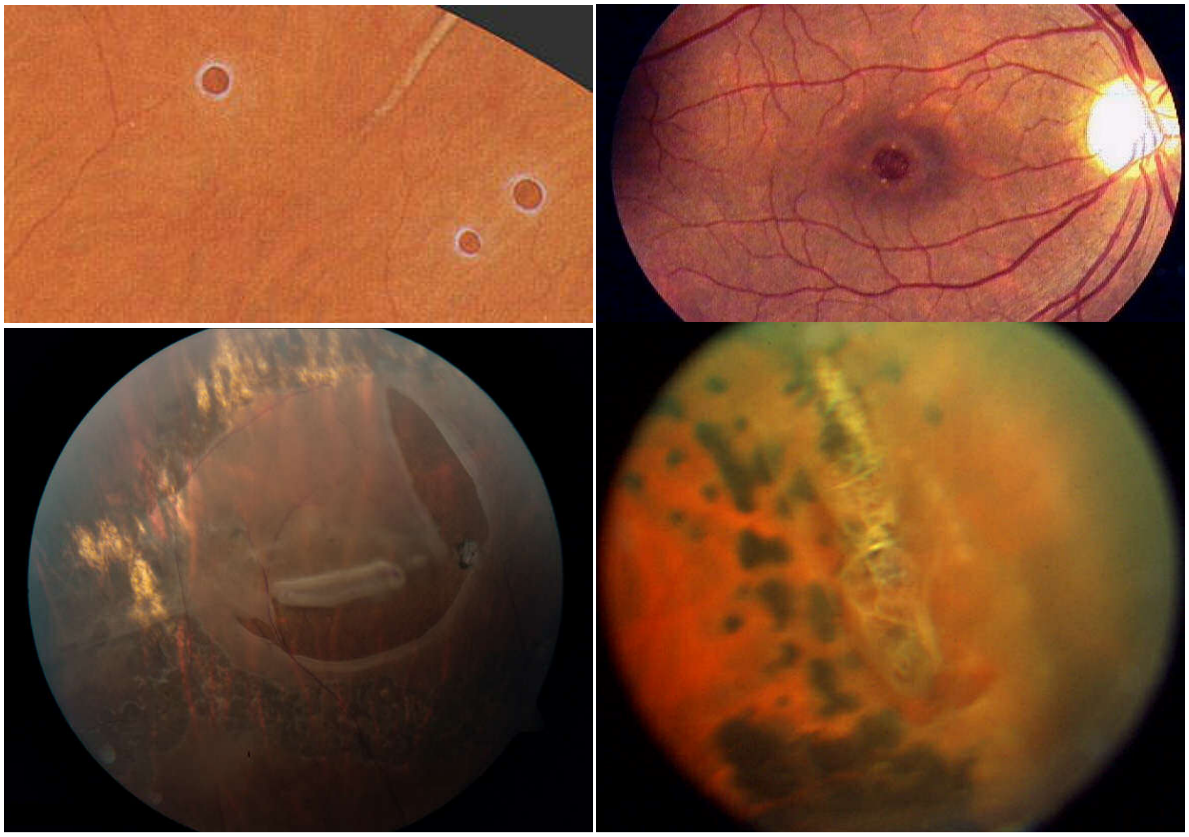
WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Jan 2007
By: Capt J. Ryan Brewer (ACS Ophthalmology branch) and Dr. Dan Van Syoc
Reviewed by Col John Gooch, Chief, Aerospace Ophthalmology Branch of the ACS.

CONDITION:
Peripheral Retinal Breaks (Holes & Tears), Retinal Detachment & Retinoschisis Mar 11)

I. Overview.

A retinal break is any full thickness defect in the neurosensory retina.[1-2] Retinal breaks may be classified as holes (operculated, atrophic, macular), tears (horseshoe or flap), or dialyses. Classification aims to predict retinal breaks that are not likely to cause severe visual sequelae from those that are more likely to lead to visual loss and retinal detachment. Operculated holes are round defects in the neural retina with an overlying operculum of retinal tissue, caused by vitreous traction that has been relieved of its tension.[1-2] These are considered low risk retinal breaks and almost never require treatment. Atrophic holes occur due to retinal thinning and are often associated with lattice degeneration, a common condition that exists in 6%-10% of the general population.[2] Atrophic holes or tears at the edge of the lattice that are associated with vitreo-retinal traction or sub-retinal fluid predispose to a relatively higher risk of retinal detachment. Tears in the peripheral retina are typically horseshoe shaped resulting from vitreo-retinal traction and represent the highest risk for progression to retinal detachment. The stimulus produced by active vitreo-retinal traction often manifests as photopsias and may be exacerbated with eye movement.[1] Lastly, dialyses are linear retinal breaks that occur peripherally along the ora serrata. Although most dialyses are associated with blunt ocular trauma, they can also occur spontaneously. Dialyses also impart intermediate risk for retinal detachment and necessitate treatment. Macular hole is a term used to describe many different macular vitreoretinal disturbances. Idiopathic macular holes typically occur in the sixth to eighth decades of life and are thought to be caused by tractional forces of perifoveal vitreous detachments.[1] Idiopathic macular holes have the potential to greatly affect central vision and often warrant posterior vitrectomy surgery. Their potential to cause retinal detachment is small but other sequelae such as epiretinal membrane formation are often observed.

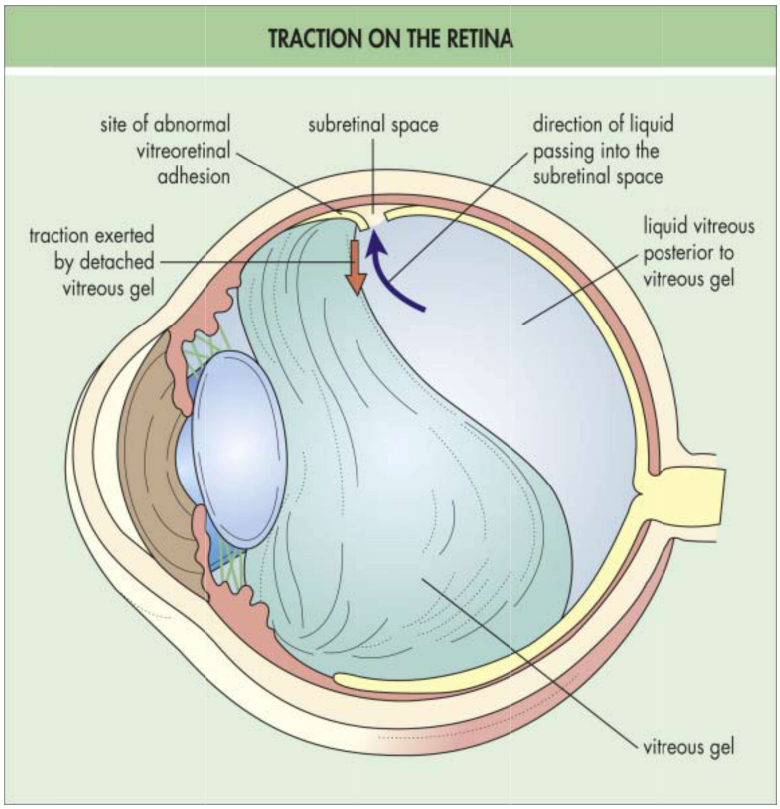


Top Left: Peripheral retinal holes, Top right: idiopathic macular hole, Bottom Left: large retinal horseshoe tear, Bottom Right: peripheral lattice degeneration

Retinal detachment is a separation of the neurosensory retina from the underlying retinal pigment epithelium (RPE), resulting in loss of the corresponding visual field in the affected eye. If the detachment involves the macula, central visual acuity will be compromised. Visual field disturbance and/or new onset of "flashes and floaters" are common presenting complaints. Of the three classifications for retinal detachments, *rhegmatogenous* type is the most common. The essential conditions necessary for a rhegmatogenous retinal detachment are a full thickness retinal break and vitreous liquefaction. Vitreous syneresis is the natural history of vitreous liquification over time and initially results in symptoms of floaters. As the vitreous liquefies, it separates from areas of the retina where it is not firmly attached resulting in a posterior vitreous detachment (PVD) or what is commonly noted by patients as an acute "new" floater. Posterior vitreous detachments typically occur in patients between the ages of 50 and 75 years of age. Autopsy studies demonstrate PVD in less than 10% of patients under 50 years of age but were present in 63% of those over the age of 70 years.[1] Additionally, the tractional forces generated during the evolution of a PVD can result in a retinal tear. Approximately 50% of patients who develop full thickness horse shoe retinal tears in the setting of a symptomatic PVD will develop a rhegmatogenous retinal detachment secondary to liquefied vitreous entering the tear and dissecting between the neurosensory retina and the RPE. Additionally, severe ocular trauma is believed to be responsible for 10-15% of retinal detachments, and half of patients who have a diagnosis of cytomegalovirus retinitis develop a rhegmatogenous retinal detachment within one year. Risk of occurrence in the fellow eye is significantly increased, provided that additional acquired risk factors are comparable. The annual incidence of retinal detachment is approximately 1 in 10,000.[5] Advanced age, previous intra-ocular surgery, high myopia, lattice degeneration, and trauma increase the lifetime risk of developing retinal detachment. Myopic patients with over -5.0 diopters of error have a lifetime risk of 2.2%.[3]

In individuals that have myopia exceeding -5.0 diopters and associated lattice, the lifetime risk for retinal detachment increases to 35.9%.[6] Retinal detachment incidence tends to be bimodal, peaking in the third decade of life and then again in the 5th to 6th decades. The rate of progression of the retinal detachment depends on size of the retinal break, location of the break and movements of the eye. Symptoms, such as loss of visual field in the form of a descending veil or curtain, increase as the detachment enlarges and may affect central visual acuity when the macula is involved. However, if high risk retinal breaks are detected before progression to retinal detachment, laser retinopexy or cryopexy therapy can be employed and are over 95% effective in preventing progression of a retinal tear to rhegmatogenous retinal detachment.

Once a retinal detachment has developed, surgical reattachment of the retina requires relief of vitreoretinal traction, closing of retinal tears and holes, and removing subretinal fluid. Scleral buckling techniques achieve a rate of reattachment of over 90%.[9] An alternative or concomitant procedure is posterior vitrectomy which relieves vitreoretinal traction by removing the vitreous. Reattachment may also be aided by incisional drainage of subretinal fluid, and using expansile gases or silicone oil to tamponade the retina into place. Although surgical treatment can result in 90% anatomical cure (permanent reattachment), visual outcomes can vary based on the etiology, length of time of detachment, and involvement of the macula. Normal visual acuity is often maintained if the macula is spared.



The process of PVD formation leading to retinal tears and eventual rhegmatogenous retinal detachment.[2]

Conversely, a *tractional* retinal detachment usually results from an ongoing or previous inflammatory, infectious, or surgical process, such as proliferative diabetic retinopathy, retinopathy of prematurity, sickle cell retinopathy, or penetrating trauma which causes the development of

fibrous vitreo-retinal bands. Over time these bands contract, generating enough mechanical force to pull the retina away from the underlying RPE. Treatment requires surgical lysis of the intraocular fibrous tissue by vitrectomy. Visual outcomes are generally poor due to co-existing ocular pathologies.

Serous or *exudative* retinal detachment is typically the result of an associated systemic process (acute hypertension, inflammation, neoplasm, etc.) that damages either retinal blood vessels or the RPE allowing fluid to pass into the subretinal space. In exudative retinal detachment, patients do not have a full thickness retinal break. Exudative retinal detachment are gravity dependent and have a smooth border. The subretinal fluid will respond to the force of gravity and shift the location of the retinal detachment depending on the patient's position.[1] Traditional retinal reattachment surgeries are not effective. Treatment requires addressing the underlying disease process. If the underlying medical condition is successfully treated, visual outcomes can be very good.

Degenerative retinoschisis is a splitting of the retina but is asymptomatic in most cases. Bullous retinoschisis may imitate retinal detachment in clinical appearance and can progress to retinal detachment when holes exist in the outer layers of the schisis.[8] In the *typical* form, splitting occurs in the outer plexiform layer and is seen as smooth, oval elevation. *Reticular* retinoschisis occurs in the nerve fiber layer and often extends posteriorly toward the equator. Both forms of retinoschisis can cause an absolute scotoma (dense visual field defect) in the visual field when progression of the schisis cavity extends posterior toward the equator, whereas, retinal detachments cause a relative scotoma (most commonly a curtain or veil-like effect) in the visual field. Studies have shown a linkage between retinal detachments and retinoschisis, with an incidence of 2.5% of degenerative retinoschisis in rhegmatogenous retinal detachments.[7-8] Treatment for retinoschisis should be limited to patients who develop symptomatic, progressive retinoschisis leading to retinal detachments.[8]

II. Aeromedical Concerns.

Retinal holes and tears can lead to retinal detachment. Retinal detachment can result in loss of visual acuity, loss of stereopsis, visual distortion, visual field loss, relative night blindness, reduced color vision, and lowered contrast sensitivity. The specific visual impact depends on the area and extent of the retina involved and the success of any reattachment surgery. Consideration must also be given to the risk of progression, recurrence or involvement of the fellow eye based on the mechanism of retinal pathology, or type of retinal detachment. Although routine exposure to G-forces has not been shown to increase the risk of retinal detachment, the risk is increased with pre-existing vitreoretinal abnormalities, especially in the case of tractional retinal detachment, and this should be considered in the case of unrestricted waivers. All patients with documented retinal holes or breaks should have their manifest refractions included in the Aeromedical Consultation Service (ACS) referrals (these should be pre-corneal refractive surgery measurements if applicable). All retinal breaks need careful examination to identify the types of holes present and to determine if active vitreo-retinal traction or other signs of impending retinal detachment are present. This is best accomplished by a vitreo-retinal subspecialist but should also be reviewed by the ACS once the underlying disease process has stabilized.

III. Waiver Consideration.

These retinal defects are all disqualifying for Flying Classes I/IA, II, IIU, and III. Although not listed specifically for ATC/GBC and SMOD duties as disqualifying, most significant retinal defects are disqualifying for retention purposes and will therefore require a waiver for continued ATC/GBC and SMOD duties.

Table 1: Waiver potential for retinal holes, retinal detachment, and retinoschisis

Flying Class	Retinal holes	Retinal tears	Retinal detachment	Retinoschisis	Waiver Authority	Required ACS evaluation/review
I/IA, initial FC II and III	Yes, if low risk*	Maybe if successful treatment and low risk*	No	Maybe, if small and isolated in far peripheral retina and low risk*	AETC	ACS review/evaluation
II/IIU#	Yes	Yes	Yes	Yes	MAJCOM	ACS review/evaluation for initial waiver
III	Yes	Yes	Yes	Yes	MAJCOM	ACS review for initial waiver
ATC/ GBC	N/A^	N/A^	Yes	N/A^	MAJCOM	ACS review for initial waiver
SMOD	N/A^	N/A^	Yes	N/A^	AFSPC or GSC	ACS review at discretion of the waiver authority

* Low risk features for retinal detachment are defined as absence of symptoms (flashes or floaters), no prior history of retinal detachment, no subretinal fluid, myopia less than -5.50 diopters, and no evidence of vitreo-retinal traction. In addition, there should be no retinal breaks at the edge or outside the area of lattice degeneration, except in the case of operculated peripheral retinal hole.
# Waiver authority for FC IIU is AFMSA.
^ Not disqualifying if treated and/or determined to be stable by a vitreo-retina specialist

AIMWITS search in Feb 2011 revealed a total of 289 individuals with an aeromedical summary containing the diagnosis of retinal hole, retinal detachment or retinoschisis. There were 36 total disqualifications. Breakdown of cases was as follows: 45 FC I/IA (16 disqualifications); 149 FC II (5 disqualifications); 86 FC III (15 disqualifications); 1 FC IIU; 4 ATC/GBC; and 4 SMOD. The latter three categories had no disqualified individuals. The vast majority of the disqualified cases were related to the retinal problem, particularly if the waiver was for an initial certification case.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. For retinal holes, tears, retinal detachment and retinoschisis, initial

waiver submission should be accompanied by a bilateral peripheral retina examination note by a retinal specialist. If the retinal specialist determines surgical treatment is required then waiver submission should occur after adequate recovery time without complications (three month minimum). If the retinal specialist determines no treatment is required then the 3 month waiting period prior to waiver submission is not required. All initial waivers (or recurrence of retinal tear or detachment) require an ACS evaluation/review.

The aeromedical summary for the initial waiver for retinal hole, retinal detachment, and retinoschisis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete aeromedical history to include pertinent negatives (trauma, myopia, lattice degeneration, etc.).
C. Retinal specialist consultation to include: history, positive risk factors, exam findings to include manifest refraction (prior to any corneal refractive surgery), treatment(s), and surgical outcome.

The aeromedical summary for waiver renewal for retinal hole, retinal detachment, and retinoschisis should include the following:
A. Interval history to include presence or absence of current visual symptoms and operational impact of condition.
B. Results of interval ophthalmology exams.
C. Summary of any medical or surgical treatments.

ICD 9 codes for retinal hole, retinal detachment, and retinoschisis	
361.3 361.31	Retinal Holes
361.0 361.2 361.8 361.9	Retinal Detachment
361.1	Retinoschisis

V. References.

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7. Williams, GA Chapter 8.5 – Scleral Buckling Surgery. *Ophthalmology*, Ed by Yanoff, M, et al. Mosby, 1999.

WAIVER GUIDE
Updated: Oct 2011
Supersedes Waiver Guide of Jan 2008
By: LtCol Laura Brodhag (RAM 12) and Dr Dan Van Syoc
Waiver Guide reviewed by the AF/SG Consultant for Rheumatology, Col William E Venanzi

CONDITION:
Rheumatoid Arthritis (Oct 11)

I. Overview.

Rheumatoid arthritis (RA) is a systemic disease that characteristically manifests in the joints as articular inflammation and destruction. The typical untreated presentation is one of progressive, symmetric arthritis beginning in peripheral joints with subsequent proximal spread. RA leads to erosion of cartilage and bone; if uncontrolled, such destruction is usually apparent radiographically within a matter of months, and may result in physical disability within a decade.[1]

RA is a common disease. Prevalence is about 1% in Caucasians, with a lower risk in Africans, but much higher (~5%) in certain Native American populations. Females are affected 2-3 times as frequently as males.[1] Peak age of onset is 30-55 years.

While RA may present in several ways, the classic pattern consists of pain, swelling, and stiffness of small peripheral joints in a symmetric pattern, beginning insidiously, and associated with morning stiffness lasting over one hour[1]. The onset of disease may occasionally be one of episodic and migratory involvement of one or several joints, lasting from hours to days, interspersed with symptom-free periods of days to months.[2] Such "palindromic rheumatism" is not specific to RA; however, in some studies progression to rheumatic disease was 35%.[3,4] Occasionally, RA may be heralded by monoarticular involvement of a large joint, with polyarthritis developing days to weeks later. Rarely, extra-articular disease is the initial manifestation.

Axial and central joints are eventually involved in up to 50% of patients.[5] Discovertebral disease with osteochondral destruction may lead to atlanto-axial and/or subaxial subluxation. Abnormal anterior movement of the atlas on the axis is the most common type of subluxation. Clinical myelopathy is uncommon, but asymptomatic subluxation is not. Radiographic evaluation of the cervical spine in patients with disease present for 20 years has found evidence of anterior subluxation in 23 %.[6,7,8] Individuals with severe asymptomatic subluxation are at risk of serious cord injury from trivial insults, such as minor whiplash and even endotracheal intubation.[9] Serious spinal cord injury at the C1-2 level is commonly fatal. Whether more aggressive disease-modifying therapy reduces the incidence of this complication is unclear. However, two studies over 2-5 years showed significant reduction in cervical subluxation in RA patients treated with multiple disease-modifying agents as opposed to placebo.[10, 11]

Extra-articular features of RA may be due to elaboration of inflammatory mediators, commonly resulting in fatigue, anemia, and osteopenia.[12,13] Other organs may be directly involved by the disease process, including skin (rheumatoid nodules), eye (scleritis, episcleritis), lung (pleuritis, interstitial fibrosis, bronchiolitis), heart (pericarditis, myocarditis), blood vessels (vasculitis, peripheral artery disease), exocrine glands (Sjögren's syndrome), and peripheral nervous system (peripheral neuropathy).[14-20]

The diagnosis of RA is based on a constellation of symptoms and abnormalities, and may be difficult to confirm, especially early in the course of disease.[21] Symmetric arthritis involving the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints is the most characteristic feature of early disease, and while not pathognomonic, such a finding strongly supports the diagnosis.[21,22] (Note that while symmetric, the arthritis need not involve joints in mirror-image fashion; thus, if one or more MCP joints are involved on one side, then it is likely that there will be involvement of some MCP joints on the other side.) Joint stiffness typically follows any prolonged period of inactivity, especially sleep. While stiffness is common to all arthropathies, prolonged stiffness suggests an inflammatory arthropathy, and morning stiffness of over an hour strongly suggests RA. Radiographic detection of typical cartilaginous and periarticular bony erosions is relatively specific for RA, but since that process is what disease-modifying therapy is designed to prevent, it can hardly be considered an early finding. Erosions in the MCP and PIP joints occur in 15-30% in the first year of disease activity. With disease duration exceeding two years, 90% will show such erosions.[5, 23, 24] Magnetic resonance imaging (MRI) is more sensitive for detecting early erosions, but the specificity of such MRI-detected lesions is unknown.[25] The finding of rheumatoid nodules is highly specific for RA, but of little diagnostic utility; only about a third of RA patients will develop nodules, and when they do develop it is usually late enough in the course of the disease that the diagnosis is well established.[14]

A number of biologic markers are employed in the evaluation of RA, both for purposes of diagnosis and monitoring. Rheumatoid factors (RF) are autoantibodies directed against IgG. About 70-80% of RA patients will have a positive RF titer at some point in their disease.[26] Except for high-titer IgM RF, specificity of a positive RF in a patient with arthritis is relatively weak. In addition to being found frequently in systemic lupus erythematous and primary Sjögren's syndrome, a positive RF may be found in 5-10% of normal (usually elderly) individuals.[26, 27] The primary value of RF seems to be prognostic, since persistently positive assays have been associated with more aggressive disease.[28-31] For diagnostic purposes, the presence of antibodies to cyclic citrullinated peptide (anti-CCP) appears to have greater specificity than RF. In several studies, specificity of anti-CCP ranged from 90-96%, with sensitivity ranging from 47-76%.[30] Like RF, the presence of anti-CCP has been associated with a greater risk of disease progression.[29] Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are inflammatory markers of little diagnostic specificity, though they may help to sort out individuals with non-inflammatory arthralgias such as from degenerative osteoarthritis and pain syndromes. They are primarily useful as markers of disease activity.[32, 33, 34] Of the two assays, CRP is less affected by confounding factors, such as anemia.[26]

Treatment of RA is based on identifying active disease at an early stage and intervening to suppress the inflammatory process. Joint damage begins early in the course of the disease, with the majority of patients developing radiographic erosions in the second year. Before the availability of effective disease-modifying therapy, morbidity was high; in one study of long-term outcome published in 1987, after twenty years' follow-up about 80% of patients were severely disabled.[24] Since joint destruction is essentially irreversible, it is important to identify those individuals with early disease and intervene to prevent serious morbidity.[35-39] On the other hand, treatment is in most cases life long, and is also associated with significant potential morbidity, and thus the diagnosis of RA needs to be firm before committing the patient to a disease-modifying regimen.

The choice of therapy is determined in large part by disease severity.[39] Mild disease typically consists of 3-5 inflamed joints, with negative plain radiographs and no extra-articular disease. Moderate disease is characterized by 6-20 inflamed joints, evidence of early changes on plain radiographs, and usually no extra-articular disease. Severe disease consists of those with >20 inflamed joints, rapid progression of erosions and loss of cartilage on plain radiographs, and typically extra-articular disease. The last group usually demonstrates systemic signs of inflammation, including anemia and hypoalbuminemia. Laboratory evaluation is not particularly helpful in categorizing disease severity. ESR and CRP are usually elevated in all patients; although determining the degree of elevation may be useful.[40] The presence of RF and/or anti-CCP doesn't correlate well with severity, though patients with negative titers often have milder disease, while a high-titer RF is typical of more severe disease and poorer prognosis.[29, 31, 34]

Treatment of most patients includes maximal doses of nonsteroidal anti-inflammatory drugs (NSAIDs). Representative daily regimens would include 3200 mg of ibuprofen or 1000 mg of naproxen, both in divided doses. These drugs are useful for pain control, and do suppress some features of inflammation.[41] However, in the great majority (~90%) of patients on NSAIDs alone, disease activity continues, and without additional therapy leads to joint erosion. For mild disease, the addition of disease-modifying antirheumatic drugs (DMARDs) with minor risk of serious toxicity is usually enough to control disease. Studies have indicated significant improvement in morbidity in patients with early rheumatoid arthritis who are initiated on disease-modifying antirheumatic drugs (DMARD) therapy within 3 months.[38,42] Evidence is such that some experts recommend DMARD therapy be initiated on all patients diagnosed with Rheumatoid Arthritis, regardless of disease severity.[38,39,41,42] Hydroxychloroquine (Plaquenil®) at a dose of 200 mg b.i.d. (for a body weight over 61 kg) has been standard therapy for decades. Onset of action is relatively slow, with maximum clinical improvement requiring up to 4-6 months. Salicylazosulfapyridine or sulfasalazine (Azulfidine®), at a dose of 1000 mg b.i.d. or t.i.d. shows a faster response, with maximum benefit in 1-2 months. Minocycline has shown minor benefit, but is not considered standard therapy.[43] Methotrexate and anticytokine (including etanercept) therapy should be avoided for mild disease, since toxicities are known to be considerable for the former, and incompletely understood in the case of the latter.[44]

For moderate disease, in addition to full-dose NSAIDs, DMARD therapy is mandatory, and patients are rarely brought under control without the use of methotrexate or an anticytokine.[1, 39, 40] Treatment with either drug should be considered to be of indefinite duration; cessation of methotrexate usually results in a flare within 3-6 weeks, and while there is much less clinical experience with anticytokine therapy, in most clinical series cessation of therapy has resulted in return of disease activity.[44] In addition, low-dose glucocorticoids may also be used for the first six months to gain rapid control of inflammation pending a clinical response to a DMARD agent.[45] This is particularly true of methotrexate, which has a slow onset of action; one advantage of anticytokine therapy is that clinical response is relatively brisk.

Tumor necrosis factor alpha (TNF-α) is considered to be a pivotal cytokine in the pathogenesis of RA.[46] Described as a "fire alarm," TNF-α calls in more inflammatory cells and induces the release of other inflammatory cytokines, such as interleukins and interferon. TNF-α has been shown to be elevated in the synovial fluid of RA individuals and higher synovial fluid concentrations have been shown to correlate to bony erosions. Etanercept (Enbrel®) is a dimeric fusion protein with two copies of the TNF receptor protein fused to an immunoglobulin base. It shows a high affinity for TNF-α, competitively binding the cytokine and preventing its interaction with the cell surface

receptor. Etanercept induces a quicker response than methotrexate, as well as somewhat greater efficacy and lower toxicity; still, on average, treatment only results in 50% improvement in 50% of individuals.[47, 48] Although etanercept may be administered at a dose of 25 mg twice a week, a dosage schedule of 50 mg once a week has shown similar efficacy and simplifies the regimen, particularly with the autoinjector dosage form. The drug is given in rotating fashion over the subcutaneous tissue of the thighs. Etanercept must be kept refrigerated between 36° to 46°F, for it degrades rapidly even at room temperature.[49] Currently, adalimumab (Humira®), another commonly used TNF agent, is not approved for use in Air Force aircrew.

II. Aeromedical Concerns.

RA must be controlled to reduce chronic morbidity and perhaps mortality. (While there is little argument about the increased mortality associated with RA, evidence that treatment reduces mortality is slim.) With the exception of etanercept, the agents required to control moderate disease are incompatible with Air Force aviation. While patients may certainly refuse medical treatment, uncontrolled or poorly controlled RA is also disqualifying, so flying considerations should not enter into such treatment decisions.

With active synovitis, joint pain is both distracting and impairing. While morning stiffness represents the classic "gel phenomenon", stiffness tends to occur after any period of immobility, such as in the cockpit. While clinical myelopathy is uncommon in RA, discovertebral disease is common. Though there is a dearth of direct data, relatively minor degrees of cervical subluxation are likely to pose a risk in the event of severe cervical motion, such as that seen with sustained acceleration or ejection.

NSAID therapy is waiverable. Of available DMARD agents, hydroxychloroquine, sulfasalazine and etanercept are potentially waiverable. The principal toxicity of concern with hydroxychloroquine is retinopathy, which is related to cumulative dose; while of obvious aeromedical concern, it is possible to monitor for the development of this complication. Sulfasalazine toxicity consists of dose-related adverse effects, and a number of more serious hypersensitivity reactions primarily related to the sulfa moiety. (Unlike in inflammatory bowel disease, where 5-ASA is the active agent, it appears that the utility of the drug in RA is related to the sulfapyridine component, and thus the potential for sulfa-related adverse effects is unavoidable.) Methotrexate, while considered a gold standard for the treatment of RA, because of serious toxicity involving multiple organs (e.g., lung and liver), is not waiverable. Of the toxicities associated with anticytokine therapy, those related to immunosuppression have been of greatest concern.[49] The increased risk of developing demyelinating disease appears to be well within aeromedical standards. The same is true of lymphoma, and the latter would be unlikely to be of particular aeromedical concern. There is inconclusive evidence of possible increased risk for congestive heart failure in anticytokine therapy. Etanercept-treated RA is associated with a significant risk of serious infections at about 4% per year. These infections have been primarily bacterial infections of the joint, bone, and soft tissue, and re-activation of latent pulmonary infections. While clinically serious, these are very unlikely to result in an aeromedical complication that involves flight safety. Individuals on anti-TNF therapy appear to be at greater risk of granulomatous infections, although etanercept has been associated with less risk than infliximab.[50] Before etanercept therapy is begun, chest radiography and testing with intermediate strength PPD are required; tuberculin reactivity of 10 mm or more should be interpreted as a positive response, and antituberculous prophylaxis begun.[39] Recommendations regarding duration of INH prophylaxis before beginning etanercept

have been inconsistent. Anticytokine therapy is incompatible with deployment, due to the need for expedited work-up of infectious symptoms and for rapid treatment of suspected infections; it is also incompatible with live attenuated vaccines (such as smallpox, yellow fever, or intranasal influenza). Also, etanercept must be kept at 36° to 46° F, thus the instability of the drug not only affects deployment, but largely rules out any TDY of longer than a week's duration. Systemic steroid therapy is occasionally employed to obtain symptomatic relief while waiting for a longer-acting DMARD to control the disease process. Waiver is not recommended while on steroids. If the individual is controllable on waiverable medications after the course of steroids is finished, waiver could be considered after the pituitary axis has returned to normal function (based on Cortrosyn® stimulation testing; see waiver guide – systemic glucocorticoid (steroid) treatment).

III. Waiver Consideration.

Rheumatoid arthritis is disqualifying for all flying classes and in addition a diagnosis of rheumatoid arthritis requires a medical evaluation board (MEB). All aviators with RA or suspected RA should be referred to the ACS, initially and at time of renewal. ACS evaluation will be performed in conjunction with rheumatology consultation at Wright Patterson AFB (or at the nearest military treatment facility) to confirm the diagnosis, to assess disease severity, and to determine the degree of therapy necessary to suppress disease activity. In those cases where control can be achieved with NSAIDs and hydroxychloroquine or sulfasalazine, FC IIB and FC IIU waiver can be favorably considered (for pilots). In those cases where control can be achieved with NSAIDs and etanercept, FC IIC (no deployment and no ejection aircraft) and FC IIU waiver can be favorably considered. Waiver initially for etanercept will only be for one year, thereafter usually three years. Individuals granted waivers will be required to follow-up with the ACS for waiver renewal. If disease activity is such that another anticytokine or methotrexate therapy is required, disqualification will be recommended. The aviator may elect to forego such therapy, but disqualification would nonetheless be recommended for inadequately controlled disease.

Table 1: Waiver potential for

Flying Class (FC)	Medication Required for Control of RA	Waiver Potential Waiver Authority
I/IA	Any medication	No AETC
II/IIU	NSAIDs,hydroxychloroquine, and/or sulfasalazine	Yes FC IIB* AFMSA
	Etanercept^	Yes, FCIIC*! $ & AFMSA
	Other immunomodulators (other anticytokines, methotrexate, etc)	No AFMSA
III	NSAIDs,hydroxychloroquine and/or sulfasalazine	Yes*+ MAJCOM
	Etanercept^	Yes*! # & MAJCOM
	Other immunomodulators (other anticytokines, methotrexate, etc)	No MAJCOM
ATC/GBC	NSAIDs,hydroxychloroquine and/or sulfasalazine	Yes* MAJCOM
	Etanercept^	Yes*& MAJCOM
	Other immunomodulators (other anticytokines, methotrexate, etc)	No MAJCOM
SMOD	NSAIDs,hydroxychloroquine and/or sulfasalazine	Yes* AFSPC or GSC
	Etanercept^	Yes*& AFSPC or GSC
	Other immunomodulators (other anticytokines, methotrexate, etc)	No AFSPC or GSC

* Waiver will not be granted for untrained FC II and III.
^ If individual started on etanercept and responds, then after two months submit waiver (needs to be on therapy three months before seen at ACS).
! Initial waiver will be granted for only one year, thereafter usually three years.
+ FC III needs to be restricted from ejection seat aircraft.

FC III needs to be restricted from ejection seat aircraft, deployment, and TDY requires access to transport and refrigeration of etanercept.
$ FC IIC (limited to non ejection aircraft, TDY requires access to transport and refrigeration of etanercept, not worldwide qualified)
& Needs to be restricted from deployments and TDY requires access to transport and refrigeration of etanercept.

Review of AIMWITS in Aug 2011 revealed 41 cases of rheumatoid arthritis. There was 1 FC I/A case (0 disqualifications); 19 FC II cases (8 disqualifications); 12 FC III cases (5 disqualifications); 3 SMOD cases (1 disqualification); and 6 ATC/GBC cases (1 disqualification). Of the 15 disqualified cases, all but two were related to the diagnosis of RA or the treatment necessary to control the disease.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for rheumatoid arthritis should include the following:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete discussion of the history of rheumatoid arthritis to include onset, time course, joints involved, gel phenomenon, and extra-articular involvement.
C. Physical exam: thorough exam with specific details of deformity, strength, range of motion, and synovitis for joints involved.
D. Pharmacologic treatment: subjective and objective disease response.
E. Consultation from a Rheumatologist.
F. Labs: RF, anti-CCP, ESR, C-Reactive Protein, CBC, Renal and Hepatic Panels.
G. Imaging: Baseline hand and foot plain films, C-spine films in flexion and extension to assess subluxation, plain films of all other involved joints, and CXR results **(**if on Etanercept**).**
H. IPPD (if on Etanercept).
I. Medical Evaluation Board results.

The aeromedical summary for waiver renewal for rheumatoid arthritis should include the following:
A. Interval history with updates on joints involved, gel phenomenon, extra-articular involvement, subjective and objective evidence of progression, and treatment side effects/changes since last waiver submission.
B. Physical exam: thorough exam with specific details of deformity, strength and synovitis for joints involved.
C. All applicable labs as in the initial aeromedical summary.
D. All applicable imaging as in the initial aeromedical summary.
E. Consultation from Rheumatology.

ICD-9-CM codes for rheumatoid arthritis	
714.0	Rheumatoid arthritis (RA)
714.1	Felty's syndrome (RA with splenomegaly and leukopenia)
714.2	Other rheumatoid arthritis with visceral or systemic involvement
714.3	Juvenile chronic polyarthritis

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WAIVER GUIDE
Updated: Oct 09
Supersedes Waiver Guide of Sep 06
By: Dr William Kruyer and Dr. Dan Van Syoc

CONDITION:
Right Bundle Branch Block and Fascicular Blocks (Oct 09)

I. Overview.

This waiver guide previously discussed complete right bundle branch block (RBBB) and left anterior and posterior fascicular block (LAFB, LPFB, also called hemiblock), including criteria and instructions for waiver submission. With the release of the new AFI 48-123, 24 Sep 2009, these ECG findings are still disqualifying, but do not require waiver action if local evaluation as directed and reviewed by the ECG Library (at the Aeromedical Consultation Service) demonstrates no underlying structural disease. The following are quoted from the updated Oct 09 Disposition Of ECG Findings In USAF Aircrew:

Right Bundle Branch Block:
This recommendation includes new complete right bundle branch block or complete right bundle branch block that has progressed from previous incomplete right bundle branch block. An echocardiogram is required for evaluation. If a previous echocardiogram is on file at the ACS, it may be acceptable per judgment of the ECG Library physician. The aviator does not need to be DNIF during this evaluation. RBBB is disqualifying pending ECG Library review of the local evaluation and subsequent official aeromedical recommendation, but waiver is no longer required per AFI 48-123, 24 Sep 2009, section 6G, 6.44.17.1.13. which states "Any other resting 12-lead ECG findings considered to be borderline or abnormal by ECG Library review, or known to be serial changes from previous records, unless a cardiac evaluation as directed and reviewed by the ACS/ECG Library reveals no underlying disqualifying disease." Reminder - incomplete right bundle branch block alone is a normal variant and does not require evaluation."

Fascicular blocks and Left Axis Deviation:
Fascicular blocks and left axis deviation may be markers of underlying organic heart disease, particularly coronary artery disease. But they may also be present without underlying organic heart disease and may then be considered acceptable findings. Left axis deviation may be associated with left ventricular hypertrophy, coronary artery disease and increasing age. Required evaluation depends on the age of the aviator/aircrew. For age less than or equal to 35 years, remain on flying status (no DNIF), local echocardiogram (if a previous screening echocardiogram is on file at the ACS, it may be acceptable per judgment of the ECG Library physician. For age greater than 35 years, remain on flying status (no DNIF), local echocardiogram and local treadmill. Left axis deviation and left anterior/posterior fascicular block are disqualifying pending ECG Library review of the local evaluation and subsequent official aeromedical recommendation, but waiver is no longer required per AFI 48-123, 24 Sep 2009, section 6G, 6.44.17.1.13. which states "Any other resting 12-lead ECG findings considered to be borderline or abnormal by ECG Library review, or known to be serial changes from previous records, unless a cardiac evaluation as directed and reviewed by the ACS/ECG Library reveals no underlying disqualifying disease."

Asymptomatic USAF aviators with new RBBB were previously evaluated with graded exercise testing, echocardiography and 24-hour ambulatory ECG monitoring. A review of such evaluations of 134 USAF aviators with new RBBB demonstrated limited yield. The vast majority (80-90%) of all three studies were normal or normal variant. Further assessment of abnormal findings often did not lead to disqualification or restriction of flying duties. And some discovered abnormalities, such as mitral valve prolapse, would be considered incidental findings unrelated to the RBBB. Due to the infrequency of pertinent findings, only echocardiography is currently performed for RBBB. For LAFB, LPFB and bifascicular block, local evaluation is determined by aviator age and will include echocardiography or treadmill and echocardiography as noted below.

II. Aeromedical Concerns.

Two aeromedical concerns are pertinent for conduction system disturbances. One, is there an increased risk for progressive conduction system disease? And two, is the finding predictive of current or future underlying cardiac disease? LBBB is associated with an increased risk of coronary artery disease and dilated cardiomyopathy. In contrast RBBB, LAFB, LPFB and bifascicular block may also be associated with organic disease, but may more commonly be normal variants. In the absence of underlying heart disease at initial noninvasive evaluation, they do not appear to present any increased risk of future cardiac events or disease development. Accordingly, these findings are now do not require waiver unless there is underlying cardiac structural disease.

III. Waiver considerations.

RBBB, LAFB and LPFB no longer require waiver for any class of flying duties if local evaluation specified by the ECG Library discloses no structural heart disease.

IV. Information Required for Waiver Submission.

None, unless cardiac structural disease is found on noninvasive testing. In those cases, refer to the applicable waiver guide.

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WAIVER GUIDE
Updated: Jun 2012
Supersedes: Waiver Guide of Apr 2008
By: LtCol Dan Mirski (RAM 12) and Dr. Dan Van Syoc
Reviewed by LtCol LaKeisha Henry, AF/SG Consultant for Otolaryngology

CONDITION:
Salivary Gland Disorders (Jun 12)

I. Overview.

Three major paired salivary glands exist: the parotid, submandibular and sublingual. They collectively serve to secrete saliva, through a ductal system, for the purpose of moistening food for chewing and swallowing. Saliva from the parotid is released adjacent to the maxillary molars through Stensen's duct. Saliva from the submandibular gland (and portions of the sublingual gland) empties into the floor of the mouth via Wharton's duct, whose orifice lies adjacent to the lingual frenulum. There are also numerous minor salivary glands scattered throughout the oral cavity and generally named based on co-location to various anatomic structures (e.g. labial, buccal, etc). The saliva released from these salivary structures is a protein-rich hypotonic fluid controlled by sympathetic and parasympathetic stimulation. Pharmacologic agents with positive muscarinic activity (agonists) will result in increased saliva production. Any condition or treatment which diminishes salivary production can lead to xerostomia (dry mouth). This in turn can contribute to a variety of oral conditions such as candidiasis and tooth decay from dental carries. The leading cause of xerostomia is pharmacological agents such as anticholinergics, tricyclic antidepressants, neuroleptics, and monoamine oxidase inhibitors.[1] Previous exposure to radiation of the head and neck as well as systemic diseases such as Sjögren's syndrome, sarcoidosis and amyloidosis can also cause xerostomia. Individuals with xerostomia complain of dry mouth and throat and can have associated difficulty with mastication and swallowing. More severe cases may experience difficulty with speech.

A. Salivary Gland Disorders - Non-Tumor

Non-tumor salivary gland disorders can be divided into either an inflammatory or traumatic etiology. Although uncommon, traumatic enlargement of salivary glands can result from either penetrating or blunt trauma or from iatrogenic causes such as radiation therapy. Penetrating trauma is the primary cause of salivary gland injuries and is best managed with surgical exploration and repair as indicated. Blunt trauma resulting in the formation of hematomas or seromas can be managed by observation and/or needle aspiration or drainage as necessary. Injuries that cause disruption to the submandibular and parotid glands have a higher likelihood of associated vascular and skeletal injury. Mucoceles (known as ranulas if they involve the floor of the mouth) usually result from trauma to minor salivary gland excretory ducts and are caused by the accumulation of saliva into the surrounding tissue. They frequently present as painless smooth swellings with a bluish hue and their treatment of choice is surgical marsupialization. (Occasionally the associated salivary gland is removed to prevent recurrence). Ranulas in the floor of the mouth are more commonly associated with the submandibular gland or possibly the sublingual gland. They can enlarge and result from obstruction of the associated gland. Ranulas may have non-traumatic etiologies and often require excision including the associated gland to prevent recurrence. Necrotizing sialometaplasia is a benign condition which typically affects the palate and other sites

containing salivary glands. The etiology is believed to be secondary to local trauma or focal vascular compromise which results in necrosis. This condition should be observed, and usually heals spontaneously in 6-10 weeks.[2] The challenge, however, is that it tends to mimic malignancy both in appearance and microscopically; potentially leading to an erroneous diagnosis and subsequent unnecessary surgical and radiation therapy.

Inflammatory disorders include viral and bacterial infections, granulomatous and other noninfectious disorders. Viral infections (e.g. mumps, HIV, and cytomegalovirus) are generally managed with supportive and symptomatic care. Acute suppurative sialadenitis is a bacterial infection with involvement of the parotid gland being the most common. It is usually associated with post surgical and medically debilitated individuals. Less frequently it can occur in patients who are chronically dehydrated without immune deficiency. It is caused by retrograde bacterial contamination of the salivary gland due to stasis of saliva as a result of dehydration or significant hemorrhage. All of the bacterial conditions require anti-microbial therapy, hydration, culture and possible incision and drainage if there is any abscess formation.[3] Parotid abscess often has overlying cellulitic skin appearance with associated pitting edema.

Sialolithiasis, the presence of stones or calculi in the salivary glands or ducts, is a relatively common condition which typically presents with a painful and swollen major salivary gland.[4] The pain is usually proportional to the degree of ductal obstruction. Acute episodes are often precipitated by eating or even just the anticipation of eating. Entrapment of salivary fluid within the encapsulated gland generates the pain. The involved gland is typically enlarged and tender to palpation. Complications from sialoliths include fistula formation, acute sialadenitis, stricture, mucus retention cyst (obstructive sialadenitis) and ductal dilatation. The submandibular gland is the most common site where 80-90% of all sialoliths occur. The parotid gland account 5-15% and the remaining 2-5% occur in the sublingual gland.[4] The high frequency of submandibular involvement is believed to be secondary to the torturous course of Wharton's duct, higher levels of calcium and phosphate, and the relative dependent position of the gland, thus facilitating stasis and stone formation. The actual etiology of sialolith formation remains a mystery despite many suspected contributing factors; such as inflammation, irregular duct system, irritants, medications, and salivary organic material acting as a nidus for subsequent calcification. Recurrence rate is approximately 20%.[4] Stones are primarily crystalline in nature composed of mostly hydroxyapatite (calcium phosphate and carbon, with trace amounts of magnesium, potassium chloride and ammonium). Approximately half of parotid gland stones, and roughly 20% of submandibular stones are poorly calcified and therefore radiolucent. Gout and nephrolithiasis have been associated with sialolithiasis.[4] An occlusal view plain radiograph will identify most radiopaque submandibular stones, and an anteroposterior facial view will facilitate parotid stone identification. CT is approximately ten-fold more sensitive in the detection of sialoliths than is plain-film imaging.[5] Acute management is generally supportive such as remain well hydrated, suck on tart candy (e.g. lemon drops) to promote salivary flow, moist heat to gland, massage the gland, pain control, and antibiotics, if infection suspected.[4] Surgical intervention is required in pronounced cases, however, lithotripsy has become increasingly popular as a noninvasive treatment option. Ultrasound for stone detection, followed by extracorporeal lithotripsy may also be performed. Sialoendoscopy (endoscopic evaluation and salivary duct cannulation with 1.0 mm optical fibers) is increasing in popularity and associated with diagnostic and therapeutic options.

Siladenosis occurs when one or both parotid glands are diffusely enlarged, soft and nontender, and are not associated with salivary hypofunction. This occurs in both males and females equally at 20-

60 years of age. Biopsy shows enlarged (twice normal) laminar cells with granules-packed cytoplasm. The exact cause is unknown, but inappropriate autonomic nervous system stimuli is thought; about half the individuals with this disorder have endocrine disorders such as diabetes, nutritional disorders or have taken drugs such as guanethidine, thioridazine or isoprenaline. No treatment is usually necessary, although partial parotidectomy may be used for cosmetic purposes.

Granulomatous disease is managed according to etiology, such as anti-tuberculin medications for mycobacterium or surgical excision for atypical mycobacterium. Other infectious granulomaous etiologies include actinomycosis, cat scratch disease, and toxoplasmosis. Sarcoid is generally managed symptomatically. Autoimmune/noninfectious conditions include benign lymphoepithelial disease and Sjögren's syndrome; both of which are managed medically and symptomatically. Sjögren's syndrome is a chronic inflammatory disorder characterized by diminished lacrimal and salivary gland function and includes a vast constellation of symptoms including xerostomia, dry eyes (sicca), dry nasal or vaginal mucosa.[6] Miscellaneous chronic salivary gland conditions include systemic diagnoses of cystic fibrosis, chronic allergies and can also be drug induced. Tissue samples are often required for definitive diagnosis, particularly when a systemic condition such as Sjögren's syndrome or amyloidosis is suspected; in which case a minor salivary gland (e.g. labial) is sampled for histologic examination. When tissue is required from a major salivary gland, fine-needle aspiration is the method of choice.[7] Certain serologic studies (e.g., ANA, RF, ESR, immunoglobulins, etc) are helpful in the diagnosis of many systemic conditions (Sjögren's syndrome), as is the elevation of amylase isoenzymes in order to differentiate between pancreatic and salivary sources.[6] Benign parotid cysts can be present in the parotid gland and are often a centimeter or smaller in size, numerous and oftent bilateral. They can be associated with autoimmune disorders. Testing for HIV should be considered in the setting of multiple benign or bilateral benign appearing parotid cysts. CT of the neck with contrast is helpful in delineating extend and confirming cyst characteristics. They may be incidental in the absence of autoimmune disease and are often observed. Aspiration generally is not helpful. Parotidectomy is rarely indicated.

B. Salivary Gland Tumors

Tumors of the salivary glands typically present as asymptomatic masses. Salivary gland tumors are rare, making up 6-8% of head and neck tumors.[8] Benign salivary gland tumors include the following: 1) mixed tumor (pleomorphic adenoma), monomorphic adenomas (basal cell adenomas, canalicular adenomas, myoepithelioma, oncocytic tumors, and sebaceous adenomas), and 2) ductal papillomas (inverted ductal papillomas, sialadenoma papilliferum, and intraductal papilloma). These tumors may arise from any of the major or minor salivary glands, with the vast majority arising from epithelial originated tissue. The frequency of gland involvement/percent malignant is as follows: 65% parotid/25% malignant, 10% submandibular/40% malignant, <1 % sublingual/90% malignant and 25% minor salivary gland/50% malignant.[9] Generally, the smaller the salivary gland of origin, the more likely it is to be malignant.[11] There are two major classification systems for salivary gland pathology, one from the World Health Organization and the other from Armed Forces Institute of Pathology (AFIP). Both of these systems are very detailed and differ somewhat in their malignant tumor classifications.

The mixed tumor (pleomorphic adenoma) is the most common tumor of the salivary glands; the vast majority (85%) arising in the parotid gland. Submandibular involvement accounts for approximately 8% of cases and the remaining 7% are distributed amongst the minor salivary glands.

Mixed tumors tend to present between the fourth and sixth decades, with a slight predilection for males. Those involving minor salivary glands may be located on the palate, followed by upper lip and buccal mucosa. Treatment is through surgical excision, by means of excision of the involved salivary gland such as a superficial parotidectomy (with facial nerve preservation) or submandibular gland excision. Lesions involving the palate may require adjacent bone removal. Failure to completely remove mixed tumors in major salivary glands frequently results in recurrence. Additionally, 25% of these lesions undergo malignant transformation over a period of many years.

Most monomorphic adenomas are rare and exhibit benign growth characteristics. Approximately 70% of basal cell adenomas occur within the parotid gland. Canalicular adenomas, however, occur almost exclusively within the oral cavity, frequently on the upper lip. Again, treatment consists of surgical excision with narrow clear margins. Myoepitheliomas most commonly arise from the parotid gland, and while epithelial in origin, they appear more as smooth muscle. Treatment is the same as for mixed tumors. Oncocytomas are rare lesions which typically arise from the parotid gland, with superficial parotidectomy being the treatment of choice. Warthin's tumor (papillary cystadenoma lymphomatosum) arises mostly from the parotid gland and has been linked to tobacco use. In older patients especially smokers, they may be bilateral. Sebaceous adenomas are rare lesions, occurring most commonly in the submandibular and parotid glands. Parotidectomy or local excision is the treatment of choice. Ductal papillomas are rare lesions which arise from the ductal structures of the salivary gland involved.

Malignant neoplasms of the salivary glands typically exhibit rapid growth, ulceration, lack of encapsulation, are fixed and may have associated facial palsy and potential for metastasis. Approximately 10-15% of salivary malignancies present with pain. As opposed to the benign lesions discussed above, which are generally cured with excision of the involved gland or simple local excision for minor salivary gland tumors, these lesions require wider resection and are frequently followed up with radiation therapy. Some malignant salivary neoplasms are associated with ipsilateral neck dissection (removal of lymph nodes in various anterior, anterio-lateral, and/or posterior neck compartments). In general, salivary gland neoplasms respond poorly to chemotherapy as sole treatment and chemotherapy has often been considered for palliation. However, newer chemoradiotherapy protocols show promise in treatment of some salivary malignancies. Chemotherapy may also be considered for unresectable or recurrent cases. A malignancy which presents with pain often indicates nerve involvement, and as such, a poorer prognosis. Documenting facial nerve function is particularly important, as associated facial paralysis is a harbinger of malignancy; as are multiple palpable masses, fixed mass, and the presence of cervical lymphadenopathy.

Malignant salivary gland tumors are a heterogeneous group of tumors with a great diversity in histologic appearance and biologic behavior.[11] The American Joint Committee on Cancer (AJCC) TNM staging system is used for parotid, submandibular and sublingual glands. Tumors arising from the smaller salivary glands are classified and staged based on site of origin. T categories are based on size and extension of the tumor; N categories are based on lymph node involvement; and M is based on presence or absence of distant metastasis. The following tumors may present as low-grade lesions: mucoepidermoid carcinoma, polymorphous low-grade adenocarcinoma, acinic cell carcinoma, clear cell carcinoma, malignant mixed tumor, carcinoma ex-pleomorphic adenoma, myoepithelial carcinoma, and basal cell adenocarcinoma. Low-grade lesions typically may have a good to excellent prognosis. Mucoepidermoid carcinoma is unique in that it is the most common salivary gland malignancy with growth properties ranging from low-grade to very high-grade. They

are also the most common salivary gland malignancy in children. Most arise from the parotid gland. The most common intraoral site is the palate. The following tumors demonstrate intermediate-grade malignancy: mucoepidermoid carcinoma, myoepithelial carcinoma, and adenocarcinoma. High-grade malignancies include mucoepidermoid carcinoma, adenoid cystic carcinoma, carcinoma ex-mixed tumor, malignant mixed tumor, salivary duct carcinoma, squamous cell carcinoma, myepithelial carcinoma, epidermoid carcioma, salivary sarcoma, and oncocytic adenocarcinoma.[7] There is controversy regarding use of a two versus three tiered grading system (low/high grade versus low/intermediate/high grade) for some of the rare salivary malignancy such as myoepithelial, malignant mixed carcinoma and other epitheliod subtypes. Five-year survival rate for various malignant tumors range from mucoepidermoid (75-95%); adenoid cystic (40-80%); adenocarcinoma (20-75%); malignant mixed tumor (35-75%); and squamous cell carcinoma (25-60%).[9]

A variety of imaging techniques are utilized to diagnose salivary gland disorders, including plain-film radiography, sialography, ultrasonography (U/S), radionucleotide imaging, magnetic resonance imaging (MRI), and computed tomography (CT).[2,9] Standard dental imaging is often sufficient in the initial evaluation of local pain and swelling of the salivary gland, particularly those associated with larger radiopaque sialoliths. Sialography via retrograde instillation of contrast material provides a clear image of the ductal system and will readily identify obstructions from stones and strictures; and is the imaging modality of choice in the initial evaluation of acute pain and swelling of a single salivary gland. Sialography can be performed for the evaluation of submandibular and parotid glands, but should not be performed if infection is suspected due to increased risk of additional irritation and the potential for gland and/or duct rupture (However, ultrasonography or CT imaging of the salivary gland is performed as is in sialolith evaluation as sialography may not be as quickly or readily available). Neoplastic lesions are best imaged with CT or MRI. Adjacent bony destruction, often associated with malignant lesions, may be evident on initial plain films in some cases. Furthermore, CT and MRI most accurately detail gland pathology, surrounding structures, and the proximity to, or actual involvement of the facial nerve. U/S is particularly useful in the identification of more superficial lesions in the submandibular and parotid glands, and is especially useful in differentiating between intra- and extra-glandular masses and determining whether the lesion is solid or cystic in nature; with benign lesions typically appearing as solid and well-circumscribed hypoechoic intraglandular masses. U/S is also well suited for identifying abscess formations and sialoliths. Radionucleotide imaging typically involves scintigraphy with technetium 99m (Tc99m) pertechnetate, and is the only modality capable of providing information regarding the salivary glands' functional capability as evidenced by abnormal gland uptake and/or excretion.

II. Aeromedical Concerns.

Most salivary gland disorders would generally not be considered to pose an immediate risk to flight; at least relative to the risk for sudden incapacitation in flight from a known or yet to be diagnosed condition. Certainly a salivary stone may cause pain during flight (especially following a meal) but this does not generally produce incapacitating levels of discomfort such as those frequently associated with renal stones. As such, most aeromedical concerns relate to the identification of conditions which might interfere with clear speech, wear of the oxygen mask, or require acute medical intervention such as antibiotic or anti-inflammatory medication use.

III. Waiver Considerations.

Recurrent calculi of the salivary glands or ducts, and salivary fistulas are disqualifying for all flying classes. Furthermore, any anatomic or functional anomaly of head or neck structures, which interfere with normal speech, ventilation of the middle ear, breathing, mastication, swallowing or wear of aviation or other military equipment is disqualifying. Specifically, xerostomia (dry mouth) from whatever cause, if significant enough to interfere with mastication and swallowing would be grounds for disqualification, as would any condition which interferes with the wearing of the aviator oxygen mask as might occur with certain conditions involving swelling of the parotid and/or submandibular glands. The low humidity cockpit environment can also exacerbate xerostomia. Of course, malignancies of any sort are disqualifying for continued flying duty. Benign tumors are considered disqualifying only if they interfere with the function or ability to wear required life support equipment or if they are likely to enlarge or be subjected to trauma during routine military service or have high malignant transformation potential. Chronic systemic conditions which may involve salivary gland structures or function are addressed under the specific condition identified (e.g., Sjögren's syndrome, diabetes mellitus, sarcoidosis).

Due to the relative infrequency of salivary gland disorders in the flying population and wide variability, a case-by-case approach to waiver consideration is used. The summary below should serve as a general guide for waiver submission, keeping in mind that any salivary gland disorder presenting in a younger population such as with any initial FC I/IA physical are in and of themselves quite unusual cases.

Table 1. Waiver Considerations for Salivary Gland Disorders

Flying Class (FC)	Disqualifying Condition	Waiver Potential Waiver Authority	Aeromedical Consultation Service (ACS) Review/Eval
FC I/IA	Recurrent salivary stones	Maybe+ AETC	No
	Salivary fistula	Maybe+ AETC	No
	Impaired speech or mastication or condition which precludes wear of life support equipment	No AETC	No
	Benign tumor	Maybe+ AETC	Yes
	Malignant tumor	No AETC	No
FC II/III	Recurrent salivary stones	Yes# MAJCOM	No
	Salivary fistula	Yes# MAJCOM	No
	Impaired speech or mastication or condition which precludes wear of life support equipment	No MAJCOM	No
	Benign tumor	Yes+ MAJCOM	Yes
	Malignant tumor	Maybe*† MAJCOM	Yes

* Waiver for untrained FC II and FC III unlikely.
\+ Consideration for waiver is dependent upon severity of presentation, and any associated complications and/or frequency of recurrence.
\# Waiver consideration for untrained FC II/III is dependent upon severity of presentation and any associated complications and/or frequency of recurrence.
† Waiver consideration requires at least six months has elapsed from completion of treatment (three months if excision only required) and is dependant on tumor type, staging, complications, and likelihood of recurrence.

A query of the AIMWTS database was performed through January of 2012. A total of four entries were identified for flying personnel; three waivers were granted and one was disqualified. The DQ was a FC III member with a malignant adenoid cystic carcinoma of the parotid gland complicated by perineural invasion despite surgical resection and further complicated by peripheral nerve

radiation myelopathy. In regards to the 3 granted waivers, one was a pilot with history of submandibular sialoadenitis from sialolithiasis in which ENT removed the stone which was located within the right submandibular gland ductule system. Another was a FC III member who had a benign pleomorphic adenoma of the left parotid gland surgically resected (total parotidectomy) without further complications. (His presenting symptom was swelling of his face.) The last acceptable waiver was for a FC III member with an acinic cell adenocarcinoma of the parotid gland who underwent a complete/total left parotidectomy; no residual carcinoma found and negative lymph nodes.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for waiver of **recurrent salivary stones or fistula** should include:
A. History, physical (thorough head and neck examination), medical evaluation and treatment for all episodes; to include complete description of presenting symptoms.
B. Reference to all laboratory and imaging studies obtained.
C. Otolaryngology/oral-maxillary consultation; with specific reference to likelihood of recurrence.
D. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment.

The AMS for an initial waiver for **impaired speech or mastication or other condition which precludes wear of life support equipment** should include:

A. History, physical, medical evaluation and treatment; to include complete description of presenting symptoms.
B. Reference to all laboratory and imaging studies obtained.
C. Operative notes, if applicable.
D. Histology report, if applicable.
E. Otolaryngology/oral-maxillary consultation; with specific reference to likelihood of recurrence and/or malignant transformation and need for on-going surveillance.
F. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment.

The AMS for a waiver for a **benign tumor** should include:
A. History, physical, medical evaluation and treatment; to include complete description of presenting symptoms and any residual symptoms after treatment.
B. Reference to all laboratory and imaging studies obtained.
C. Operative notes (initial waiver only).
D. Histology report (initial waiver only). (For rare cell types, an AFIP report required.)
E. Otolaryngology/oral-maxillary consultation; with specific reference to likelihood of recurrence and/or malignant transformation and need for on-going surveillance.
F. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment.

The AMS for a waiver for a **malignant tumor** should include:

A. History, physical, medical evaluation and treatment; to include complete description of presenting symptoms any residual symptoms after treatment.
B. Reference to all laboratory and imaging studies obtained.
C. Operative notes (initial waiver only).
D. Histology report (to include AFIP report) (initial waiver only).
E. Medical evaluation board summary recommendations (initial waiver only).
F. Otolaryngology/oral-maxillary and oncology consultation; with specific reference to likelihood of local recurrence or metastasis and detailed description of recommended surveillance regimen.
G. Statement regarding ability to speak clearly and to adequately fit aviator oxygen mask and other required life support equipment

List of Relevant ICD9 Codes Associated with Salivary Gland Disorders

ICD9 Code	**Non-neoplasm Salivary Gland Conditions**
527.5	Sialolithiasis
527.6	Mucucoele
527.7	Disturbance of salivary secretion, to include hyposecretion, ptyalism, sialorrhea, and xerostomia
527.8	Other specified diseases of the salivary glands (benign lymphoepithelial lesions, sialectasia, sialosis, stenosis of the salivary duct, stricture of the salivary duct)
710.2	Sicca syndrome (Sjögren's syndrome, keratoconjunctivitis sicca)
750.23	Atresia, salivary gland
750.24	Congenital fistula of the salivary gland

ICD9 Code	**Salivary Gland Neoplasms**
142.0	Parotid gland, malignant neoplasms
142.1	Submandibular gland, malignant neoplasms
142.2	Sublingual gland, malignant neoplasms
142.8	Other major salivary glands, malignant neoplasms
142.9	Salivary gland, unspecified, malignant neoplasms
210.2	Major salivary glands, benign neoplasm
230.0	Lip, oral cavity, and pharynx, carcinoma in situ
235.0	Major salivary gland, neoplasm of uncertain behavior

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WAIVER GUIDE
Updated: Nov 2011
Supersedes Waiver Guide of Jul 2008
By: Dr Dan Van Syoc
Reviewed by Maj Joshua Sill, ACS Pulmonologist

CONDITION:
Sarcoidosis (Nov 11)

I. Overview.

Sarcoidosis is a multisystem disorder characterized by the presence of discrete, compact, noncaseating epithelioid granulomata. The typical sarcoid granuloma is found in the lung, distributed along lymphatic chains, but can be found in virtually any organ. Though the precise etiology is unknown, recent evidence demonstrating T-cell lymphocytes layering around the granuloma suggests an immunological reaction in genetically susceptible individuals who are exposed to specific environmental agents.[1-4] The true incidence is unknown; in view of the large proportion of cases that are discovered serendipitously on chest radiographs, it is estimated that only around 20% of sarcoidosis cases are ever found.[2, 5, 6] Sarcoidosis was once thought to be rare in North America, but beginning in the 1940s increasingly large numbers of cases were identified by chest x-ray (CXR) screening, particularly by the military.[2, 7] The disease most often arises in the third to fourth decades of life, and shows an increased predilection for African-Americans, Caribbeans, Japanese, Scandinavians, and those of Irish descent. The condition tends to wax and wane in its course, with marked variability in the pattern of organ involvement.[2, 3, 5, 8, 9, 10]

Most commonly, sarcoidosis presents in one of three ways: as an asymptomatic finding on chest X-ray; with nonspecific constitutional symptoms; or with organ-specific complaints.[2] In various series, 30% to 60% of clinical presentations are asymptomatic and incidentally found, typically with radiographic findings of bilateral hilar adenopathy (BHA) with or without parenchymal opacities.[10] Nonspecific symptoms may include fever, weight loss, fatigue, or muscle weakness. Organ-specific presentations are protean, and may manifest with dermatologic lesions, dyspnea on exertion, cough, changes in vision or eye pain, cranial or peripheral nerve palsies, seizures, arthralgia, cardiac conduction block or even sudden cardiac death. Due to the variability of symptoms, delay in diagnosis is not uncommon.

The onset of symptoms may be acute. This type of presentation is more common in Caucasians than in African-Americans or Japanese, and may present as Löfgren's syndrome with BHA, ankle arthritis, erythema nodosum or generalized constitutional symptoms. An acute presentation portends the best prognosis, often resulting in spontaneous remission within two years.

Chronic sarcoidosis, common in African-Americans, often presents with pulmonary symptoms. Constitutional symptoms are less common with the chronic form. This type is often relapsing, with a protracted course and a less favorable prognosis.[2]

Pulmonary involvement: Pulmonary sarcoidosis is a predominantly interstitial lung disease, with symptoms and radiographic findings similar to other fibrotic lung diseases.[11] Prominent symptoms are dyspnea, dry persistent cough, and chest pain. Significant interstitial disease may lead to abnormal pulmonary function and oxygen diffusion capacity.[12] However, in contrast with other

interstitial lung diseases such as idiopathic pulmonary fibrosis, profuse radiographic changes are often associated with minimal physiologic alterations in lung function. The granulomatous inflammation, which favors the upper lung fields, tends toward a peribronchial distribution, which helps explain two additional clinical phenomena that are unusual with other interstitial lung diseases: transbronchial biopsy is usually successful in establishing a histologic diagnosis, and some patients (roughly 15%) experience bronchospasm as a complication of the disease.[1] Sarcoidosis has rarely presented with tracheal or laryngeal involvement, hemoptysis, unilateral involvement, pleural effusion, pneumothorax, pleural thickening, cavity formation, calcification of lymph nodes or clubbing.[13, 14]

Even when patients initially present with extrapulmonary manifestations, over 90% have radiographically evident pulmonary involvement.[10] Because pulmonary involvement is nearly ubiquitous, and is the most common cause of sarcoid-related morbidity, staging of sarcoidosis is based on radiological progression of the chest x-ray (CXR).[11, 15] The following are the various stages and remission rates:[1, 2, 16]

- Stage 0 disease has a normal CXR (which implies extrapulmonary disease is the presenting manifestation or that the disease has remitted).
- Stage I disease is defined as the presence of hilar and/or paratracheal adenopathy without parenchymal infiltrates. This form typically remits in 55-90 % of cases, and is often completely asymptomatic.
- Stage II disease is defined as hilar adenopathy with infiltrates and remits in 40-70% of cases. Patients may have mild to moderate symptoms of cough, dyspnea, fever, and/or fatigue.
- Stage III disease is defined as infiltrates without nodal involvement, or with resolving hilar adenopathy, and remits in 10-20% of cases.
- Stage IV is characterized as pulmonary fibrosis. CXR reveals reticular opacities often with volume loss predominantly distributed in the upper lung zones. Remission occurs in 0-5% of individuals with this stage. Conglomerated masses with marked bronchiectasis, calcification or cystic structures may also be seen.

Cardiac involvement: Roughly 5% develop clinically evident cardiac involvement, though autopsy studies of sarcoid patients have reported granulomatous infiltration of the myocardium in 13 to 30% of patients. (It should be borne in mind that, with the exception of cardiac and severe pulmonary disease, sarcoidosis is rarely fatal, and thus myocardial sarcoidosis is almost certainly over-represented in autopsy series.)[17-19] The left ventricle and interventricular septum are most often involved.[20] In a well known study of 250 patients with cardiac sarcoidosis who were followed for several years, the following complications were noted: complete heart block (49), premature ventricular contractions and ventricular tachycardia (48), myocardial disease (43), sudden death (37), bundle branch block (33), supraventricular arrhythmia (23), valvular lesions (21), and pericarditis (6).[21] Other subtle findings may be premature atrial and ventricular contractions, and QT dispersion by ECG.[22] Heart block is most likely due to disease of the AV node or the bundle of His.[18] Since healed myocardial granulomata may become foci for abnormal automaticity leading to arrhythmias, patients in remission who have had myocardial involvement remain at risk for sudden death. Before the advent of implantable cardiac defibrillators, several studies of cardiac sarcoid reported a risk of sudden death of 33-67%.[17, 21, 23, 24, 25, 26]

Dermatologic involvement: Cutaneous manifestations of sarcoid involve approximately one-third of patients, and can be variable. The classic panniculitis of erythema nodosum is a common

presentation of acute sarcoidosis in Caucasian, Puerto Rican, and Mexican patients and is the least beneficial lesion to biopsy.[2, 11] Other dermatologic lesions include small purplish papules, plaques, or subcutaneous nodules. While these are less distinctive on physical examination, biopsy will often yield a histologic diagnosis of noncaseating granulomata. Small pink maculopapular eruptions may wax and wane, may present as scarring sarcoidosis, and may cause alopecia. Sarcoid lesions may invade old scars. On blanching with a glass slide, dermal sarcoid lesions often reveal an "apple jelly" yellowish brown color.[27] As a rule, sarcoid lesions do not itch, ulcerate, or cause pain.[1]

Ocular involvement: In most series ocular involvement occurs in 25-33% of individuals. As with other granulomatous disorders, sarcoidosis can affect any part of the eye and involvement may or may not be symptomatic. Anterior uveitis is the most common manifestation, often presenting with ocular pain, redness or changes in vision. Posterior chronic uveitis may be occult and may over time lead to secondary glaucoma, cataracts, or blindness.[2] Other eye lesions include conjunctival follicles, dacryocystitis, and retinal vasculitis.[1]

Nervous system involvement: Neurological manifestations can occur up to 5 to 10% of cases, though one series found neural involvement in 26% of sarcoid patients.[28] Neurosarcoidosis favors the base of the brain, and may present as a cranial nerve palsy (especially facial nerve palsy), panhypopituitarism, fulminant delirium, hydrocephalus or chronic meningitis.[29-32] Seizures have been reported in 5%-22% of neurosarcoidosis patients, but are rarely the presenting symptom.[33] Granulomatous involvement of the hypothalamus may result in defective release of vasopressin, adrenocorticotropic hormone, and glucagon; in particular the defect in vasopressin may lead to diabetes insipidus.[29] These lesions are typically early findings and respond well to treatment.[1] On the other hand, space occupying lesions, seizures, peripheral nerve lesions, and neuromuscular involvement tend to occur as a late manifestation, and most likely indicate chronic disease.[2] Cerebral spinal fluid (CSF) findings are nonspecific, and may include lymphocytosis, increased protein, and/or elevated angiotensin-converting enzyme (ACE) levels, lysozymes, increased CD4/CD8 ratios and β-2 macroglobulins. The triad of facial nerve palsy, parotiditis, and anterior uveitis is called the Heerfordt syndrome and, unlike most neural involvement, suggests a favorable prognosis.[1]

Musculoskeletal involvement: It has been estimated that joint pains occur in 25-39% of sarcoid patients, although deforming arthritis is rare. Acute polyarthritis (especially in the ankles) usually occurs in the presence of anterior uveitis or erythema nodosum. Chronic arthritis may mimic rheumatologic disease, even to the extent of causing a false positive test for rheumatoid factor.[16] Muscular involvement may affect up to 10% of sarcoidosis patients. Proximal muscle weakness, muscle wasting, diaphragmatic weakness, and quadriceps weakness have been described in the literature.[34] Respiratory muscle involvement has very rarely led to respiratory failure.[35, 36]

Lymphatic involvement: Extrathoracic lymphadenopathy is commonly found in the cervical, axillary, epitrochlear, and inguinal chains. Such nodes are typically non-tender and patients are usually unaware of them; their importance is primarily as an easy site for diagnostic biopsy.[1] At the time of autopsy the spleen is involved in 40-80%, but clinically important manifestations of hypersplenism such as anemia or spontaneous rupture are rare.[2]

Gastrointestinal involvement: Although liver biopsy will show sarcoid granulomata in 70% of cases, altered liver function due to granulomatous hepatitis or portal hypertension is rare.[2, 9] (Due to the lack of specificity of hepatic granulomata, the liver is not generally recommended as a biopsy

site.) Clinically symptomatic gastrointestinal involvement, which may mimic infectious gastroenteritis, inflammatory bowel disease, tuberculosis, fungal infection or pancreatic neoplasm, affects less than 1% of patients.[1]

Osseous involvement: Lytic or sclerotic bone lesions are present in 10% of cases and are almost always accompanied by chronic skin findings.[2] Bone resorption secondary to endocrine abnormalities with vitamin D, noted below, is integral to the pathogenesis of hypercalciuria.

Endocrine/renal involvement: Disordered calcium metabolism, due to conversion of vitamin D to the active form within granulomata, often results in hypercalciuria with the attendant risk of nephrolithiasis; hypercalcemia is much less common (2-10%).

Quality of life/Emotional implications: One study of 111 sarcoid individuals revealed up to 66% had experienced depression (worse while on steroid treatment) and 55% had increased stress when compared to the average study population without sarcoidosis. These levels are comparable to patients with symptomatic AIDS, end-stage renal disease, and moderate to severe COPD.[37]

The pulmonary literature has vacillated about the need for histologic confirmation of sarcoidosis in the most typical presentation, that of an individual with asymptomatic BHA found on CXR. Since this is a relatively uncommon presentation for lymphoma, some have argued in favor of clinical follow-up rather than proceeding to biopsy. However, current consensus is that histologic confirmation is advisable to confirm sarcoidosis, and to rule out lymphoma and infections such as tuberculosis. (For aviators, "watchful waiting" is even more problematic, since it would require grounding for up to twelve months.) If physical examination demonstrates involvement of superficial lymph nodes, skin (except erythema nodosum), conjunctivae, or salivary glands, then biopsy should be directed toward that site. CT scan may prove to be useful for extent of involvement, particularly to delineate mediastinal adenopathy. Transbronchial biopsy has a high yield in Stage 1 and higher disease; even when the disease process appears to be limited to hilar nodes, biopsy of lung tissue is usually positive for non-caseating granulomata. Bronchoalveolar lavage, on the other hand, is nonspecific and of no prognostic value, other than to exclude alternative diagnoses.[2] As noted earlier, liver biopsy is not recommended, and the Kveim test and blind scalene lymph node or fat pad biopsies are obsolete. The ACE level is elevated in 40-90% of individuals with active sarcoidosis; however, a high ACE level is not specific for sarcoidosis, and the magnitude of an initial elevation has no prognostic significance.[8] As cardiac involvement is typically patchy infiltration, cardiac biopsy has low sensitivity (about 20% in one study) and is not recommended even when there is a high suspicion for myocardial involvement.[18, 38] (In general, disease which is isolated to the heart, brain, or eye is not biopsied. In the first two cases the correct diagnosis is not likely to be suspected, and such involvement is not recommended for waiver anyway. Idiopathic granulomatous uveitis must be evaluated at the ACS, and is generally waiverable only once quiescent; see uveitis waiver guide.)

In the minority of sarcoidosis patients who actually require therapy, the standard treatment is a prolonged course of oral prednisone, but recommended dosages vary widely. Corticosteroids accelerate clearance of symptoms, physiologic disturbances, and x-ray changes, but it is not clear that long-term prognosis is altered by such therapy. Treatment is indicated for patients with progressive pulmonary disease, cardiac involvement, CNS disease, uveitis, or hypercalcemia. For the 10% who fail to respond to corticosteroids, chlorambucil, azathioprine, hydroxychloroquine, TNF-inhibitors and methotrexate are alternative medications.

More than 85% of remissions occur within the first two years. Failure to regress spontaneously within 2 years forebodes a chronic or persistent course.[1, 2] Only about 2-8% of those individuals who spontaneously remit or stabilize will relapse at a later date.[3, 7] Corticosteroid-induced remissions, on the other hand, have a high rate of relapse, ranging from 14-74%, although one study showed no relapses if individuals remained asymptomatic for three years after prednisone withdrawal.[1, 2]

II. Aeromedical Concerns.

The most common aeromedical concerns are typically cardiac and pulmonary, though ophthalmologic and neurologic involvement may also prove to be a hindrance to flight crew duties. Myocardial involvement may present as arrhythmias, conduction block, and syncope leading to sudden incapacitation during flight. Restrictive pulmonary disease is itself an aeromedical concern, particularly if blood gases are affected or airway hyper-reactivity is present. A crewmember with stage II or III sarcoidosis may have altered oxygen diffusion, thus exacerbating or accelerating symptoms of hypoxia and reduced decision making abilities at altitude.[12] Reductions in FVC and FEV1 may accompany sarcoidosis even with optimized medical management.[3]

CNS disease (e.g., cranial nerve palsies, encephalopathy, seizures), depression, ocular complications (e.g., uveitis, iritis, chorioretinitis), and renal calculi all have direct aeromedical implications. Neuromuscular involvement, especially of proximal muscle groups (and the predilection towards quadriceps muscle group involvement), have important implications for rudder control and anti G-straining maneuvers.

No individual should fly while undergoing treatment. Steroid treatment itself has a variety of metabolic, psychiatric, and CNS effects which may make flying hazardous.[10]

III. Waiver Consideration.

Sarcoidosis is disqualifying for all flying classes (FC I/IA, II, IIU, and III). For ATC/GBC and SMOD personnel, AFI 48-123 does not list sarcoidosis as a disqualifying diagnosis, but for retention, sarcoidosis, progressive, with severe or multiple organ involvement and not responsive to therapy is disqualifying. Therefore, for symptomatic cases, a waiver is necessary for these personnel.

History of cardiac or CNS involvement will not be recommended for a waiver. Also sarcoidosis causing hypercalcemia is not compatible with waiver. Please consult Uveitis Waiver Guide if ophthalmologic sarcoidosis is present.

Table 1: Waiver potential for sarcoidosis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	History of sarcoidosis (asymptomatic or symptomatic) with disease resolution.	Maybe*† AETC	Yes
II/IIU/III/SMOD/ATC-GBC Trained**	Sarcoidosis that is asymptomatic, stable, no treatment required, and no functional impairment.	Yes#† MAJCOM	Yes, initial waiver or if relapse
	Sarcoidosis treated with steroids and now asymptomatic, stable and no functional impairment.‡	Yes‡† MAJCOM	Yes, initial waiver or if relapse
II/IIU/III/SMOD/ATC-GBC** Untrained	History of sarcoidosis (asymptomatic or symptomatic) with disease resolution. ‡	Maybe*† MAJCOM	Yes

† History of cardiac or CNS involvement is typically not waiverable.
* Waiver considered only if asymptomatic, no functional impairment and remission without treatment for at least 3 years duration.
** Waiver authority for SMOD is AFSPC or GSC; for FC IIU it is AFMSA.
# Waiver for trained aviators requires three-month follow-up to assure stability of newly diagnosed (histologically proven) disease prior to waiver submission.
‡ If systemic corticosteroid therapy results in remission, then waiver may be submitted after six months off medication if asymptomatic, no evidence of recrudescence and pituitary-adrenal axis has returned to normal function (see Glucocorticoid Replacement Waiver Guide).

AIMWITS search in Sep 2011 revealed a total of 37 cases with the diagnosis of sarcoidosis. Breakdown showed no FC I/IA cases, 19 FC II cases (1 disqualification), no FC IIU cases, 17 FC III cases (4 disqualifications), 1 ATC case (0 disqualifications), and no SMOD cases. All but one of the disqualified cases was so dispositioned due to the disease itself; the other case was for a mental health condition.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for sarcoidosis for initial waiver or waiver for recurrent (relapsed) sarcoidosis should include the following:
A. History – occupational (silicates, beryllium) and environmental (moldy hay, birds, TB, coccidioidomycosis, histoplasmosis) exposures, signs and symptoms (including negative, covering

all organ systems), activity level, medications/treatment (if treated with corticosteroids within the year then Cortrosyn® stimulation test [see glucocorticoid waiver guide]
B. Complete physical with emphasis on lung, skin, eye, liver and heart, and *thorough* neurologic examination.
C. Internal medicine or pulmonologist consultation.
D. Testing: Chest x-ray, biopsy results, Spirometry, 12-lead ECG and 24-hour Holter monitor test.
E. Laboratories – complete blood count (CBC), calcium, liver function tests, creatinine, blood urea nitrogen (BUN), urinalysis, and 24 hr urine calcium.
F. TB skin test.
G. Ophthalmology/optometry exam, to include slit lamp.
H. Neurology consultation if symptoms or signs indicate possible involvement.

The AMS for <u>waiver renewal</u> of individuals in continued remission should include the following:
A. History – brief summary of previous signs symptoms and treatment, current signs or symptoms (include negative), activity level, and medications.
B. Physical – complete physical, addressing lung, skin, eye, liver, heart and CNS.
C. Testing: Chest x-ray, Spirometry.
D. Laboratories – complete blood count (CBC), calcium, liver function tests, creatinine, blood urea nitrogen (BUN), urinalysis, and 24 hr urine calcium if previous symptoms or current findings indicate systemic involvement.
E. Ophthalmology consultation if previous symptoms or current findings indicate involvement.
F. Neurologic or cardiac evaluation if current findings indicate involvement

ICD 9 code for Sarcoidosis	
135	Sarcoidosis

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WAIVER GUIDE
Updated: Jul 09
Supersedes Waiver Guide of Mar 06
By Dr. Dan Van Syoc
Reviewed by Dr. Stephen McGuire, ACS Neurologist.

CONDITION:
Seizures/Epilepsy/Abnormal EEG (Jul 09)

I. Overview.

A seizure is a brief disturbance of cerebral function that lasts from seconds to a few minutes and is caused by an abnormal electrical discharge. Epilepsy is defined as recurrent (two or more) seizures not caused by a temporary condition (therefore, unprovoked)[1]. Epilepsy is unequivocally disqualifying for all flying duties. A single unprovoked convulsion will be as damaging to an aviator's flying career as is the diagnosis of a seizure disorder. No flying waivers have been granted for epilepsy or unprovoked seizure disorders to date regardless of treatment, of the passage of time, or of the normalcy of the EEG.

An initial, isolated convulsive and/or altered consciousness event may be due to a number of causes – some of these causes may lend themselves to a recurrence (especially if unprovoked), while others may not (especially if provoked). Those causes that do not tend to create recurrent events may be eligible for waiver. Common examples of isolated events of transient loss of consciousness that may not be epilepsy include those associated with fever as a child (simple febrile seizure), vasovagal syncope (convulsive syncope), head trauma, and acceleration induced (G-LOC)[2]. Complex febrile seizures however are associated with an increased risk of epilepsy[3].

The prevalence of epilepsy in the US is 1.1% to 2.2% and most patients (57%) who present with a first seizure are younger than 25 years old, with 58% of first seizure patients being male[2]. Of significant importance to the flight surgeon is the risk of seizure recurrence after a first unprovoked seizure. About 35% of patients with a first seizure can be expected to have a second seizure within 3-5 years; this varies depending on the clinical characteristics of the specific cases. For patients who go on to have a second seizure, their risk of yet another seizure increases to 73% at four years after the second seizure[4, 5]. The statistics are slightly different for children. Children with a nonfebrile unprovoked seizure and a normal EEG have a five year recurrence rate of about 21% and recurrences after that time frame are not common[6]. Absence seizures have a repeat seizure rate of 42% over the next 25 years (to include other types of seizures) and are therefore permanently disqualifying[7].

The two main seizure types are generalized and partial seizures. Generalized seizures affect both sides of the brain simultaneously and include absence and generalized tonic-clonic seizures. Generalized seizures are not usually associated with cerebral pathology. Partial seizures, by comparison, arise from a localized area of the cerebral cortex and are more commonly associated with an underlying lesion[8]. A first seizure is twice as likely to be a generalized seizure as a partial seizure, and of all the causes of seizures, new-onset epilepsy is the most common cause of a first seizure[2].

Diagnosis is based on a neurologist's evaluation, complete with detailed history, exam, diagnosis, treatment, and prognosis. The history is crucial and the provider needs to first establish that a seizure actually occurred. Details of the patient's behavior during the event, history of trauma or symptoms of infection can be very helpful as is medication, illicit drug and alcohol use history. Work-up during the initial evaluation often involves laboratory tests and imaging studies. Glucose testing and serum electrolytes are commonly ordered as hypoglycemia and hyponatremia can lead to seizure-like activity[2]. Some recent studies are recommending serum prolactin assays if the test can be drawn acutely (within 20-30 minutes after the event) and can help differentiate generalized seizures from psychogenic nonepileptic events. The overall utility of this methodology has not been finalized[9]. Imaging may be considered to rule out life-threatening conditions such as hemorrhage, brain swelling or mass effect, and in those cases, an unenhanced CT scan would be the preferable test. An MRI scan will show intracerebral structures better and will most likely be ordered on a less urgent basis[10].

The EEG does not prove or disprove the diagnosis of epilepsy although an unequivocally abnormal EEG with a good history of seizure does support the diagnosis. However, the EEG can be completely normal in someone with frank epilepsy. Until about twenty years ago, most applicants to UPT in the Air Force had an EEG performed as part of their initial flight physical. This was done in an effort to eliminate those with a recognizable seizure focus on testing from the pool of future pilots. What was determined is that the prognostic significance of spike wave patterns in a population without a history of epilepsy is not known. Statistically, the test in such a population has a low positive predictive value and a high false positive value, so it was eliminated from the testing protocol. The US Navy kept the test for a few years longer than did the USAF, but also stopped it by the late 1980s. At this time, only the Netherlands, France and Germany continue to use the EEG as a screening tool for pilot training applicants[11-18].

Treatment in many cases after a first unprovoked seizure may just be observation given that only 1 in 3 will go on to have a second seizure within 3-5 years. If medication is indicated, particularly if subsequent seizures occur, there are many choices. Prior to about 1994, there were only six antiepileptic drug (AED) options. These were carbamazepine, phenytoin, phenobarbital, primidone, valproic acid, and ethosuximide. There are now an additional seven AEDs available for use and their major benefits are safety and tolerability, with an efficacy similar to the older medications. Their use, combinations and dosages are dependent on the nature of the seizure and other medical conditions of the patients[19].

II. Aeromedical Concerns.

The risk of seizure in flight is obvious; it leads to incapacitation. The incapacitation is in most cases sudden, unpredictable, unavoidable, and potentially more frequent in the stressful flying environment. Seizures constitute a direct threat to the health and safety of self, others, and the success of the mission. Medication therapy for seizure prevention is also not compatible with aviation duty due to numerous side effects of these drugs and the fact that many of the patients can have a seizure while on therapeutic doses of their AED.

Some specific types of seizures such as concussive convulsion, febrile seizure, or convulsive syncope may be considered for a waiver after a thorough neurological evaluation and review by the ACS.

III. Waiver Consideration.

Air Force standards address seizure disorders in several places. Medical standards for appointment, enlistment and induction states that epilepsy occurring beyond the 6th birthday, unless the applicant has been free of seizures for a period of 5 years while taking no medication for seizure control, and has a normal electroencephalogram (EEG) is disqualifying. All such applicants shall have a current neurology consultation with current EEG results. Concerning aviation duties and a history of post-traumatic seizures, our standards state that post-traumatic seizures are disqualifying, but that seizures at the time of injury are not necessarily disqualifying. For FC I/IA, childhood seizures are addressed by stating that "seizures associated with febrile illness before 5 years of age may be acceptable with waiver if recent neurological evaluation, MRI, and EEG including awake and sleep samples are normal." For more information on post-traumatic seizures, consult the waiver guide on head injury. Regarding EEG abnormalities, it needs to be noted that "truly epileptiform abnormalities to include generalized, lateralized, or focal spikes, sharp waves, spike-wave complexes, and sharp and slow wave complexes during alertness, drowsiness, or sleep are disqualifying. Benign transients such as Small Sharp Spikes (SSS) or Benign Epileptiform Transients of Sleep (BETS), wicket spikes, 6 Hertz (Hz) (phantom) spike and wave, rhythmic temporal theta of drowsiness (psychomotor variant), and 14 and 6Hz positive spikes are not disqualifying." Furthermore, "generalized, lateralized, or focal continuous polymorphic delta activity or intermittent rhythmic delta activity (FIRDA or OIRDA) during the alert state is disqualifying, unless the etiology of the abnormality has been identified and determined not to be a disqualifying disorder." Only if the risk of recurrence of a seizure approaches that of the general population will a waiver be given serious consideration[20]. To date, no aviator with a documented history of epilepsy has received a waiver.

Table 1: Waiver potential for Seizures and Epilepsy

Flying Class	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Febrile seizures prior to age 5	Yes AETC	Yes
	Provoked Seizure	Yes* AETC	Yes
	Unprovoked Seizure	No AETC	Perhaps#
II	Provoked Seizure	Yes MAJCOM	Yes
	Unprovoked Seizure	No MAJCOM	Perhaps#
III	Provoked Seizure	Yes MAJCOM	Yes
	Unprovoked Seizure	No MAJCOM	Perhaps#

ACS review can be requested by the waiver authority in questionable cases.

AIMWTS review in April 2009 revealed a total of 86 submitted cases with a history of seizure. There were 18 FC I/IA cases, 35 FC II cases and 33 FC III cases. A total of 47 received a disqualification decision from the waiver authority. For the FC I/IA category, 5 of the 18 cases were disqualified; the waived cases were all childhood seizures that were provoked, mostly by fever. One of the disqualified cases received an Exception to Policy to attend UPT. In the FC II category, 26 of the 35 cases were disqualified, most for unprovoked or unexplained seizure activity. In the FC III category, 16 of the 33 cases were disqualified for unprovoked or unexplained seizure activity.

IV. Information Required for Waiver Submission.

Every effort must be made to try and reconstruct what happened before and after a suspected seizure event. Special attention should be paid to the clinical notes made by anyone that had contact with the patient, for example; medical technicians, paramedics, nurses, emergency department personnel, and providers. The medical history should address the relevant period preceding and during the suspected event and include a review of travel, sleep, diet, work and all medications, whether prescription or over-the-counter. Accounts from witnesses must be included in the medical record, either as a written statement from the eyewitness, or as an account documented by a provider. If written accounts were not accomplished initially, than every effort should be made to identify possible witnesses and include their accounts. A witness's account should not be excluded because there are concerns about the reliability of that witness. Instead, include the account with a statement addressing why there are concerns about the reliability of the witness.

Neurological consultation is essential. Investigation is necessary to improve the certainty of diagnosis, to find a precipitating cause in case treatment is necessary, and to identify the seizure type so that appropriate maintenance therapy can be given. The investigation of a first seizure will usually include EEG and CT scan (to rule out stroke, intracranial bleeding, infection, or a mass lesion); further evaluation will likely include an MRI scan. MEB is required for an unprovoked seizure and should precede an ACS evaluation and waiver submission. ACS evaluation may also be necessary.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Information required for an <u>initial waiver</u> for seizures and epilepsy should include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. For a simple febrile seizure, all that is required is the original medical records at the time of the event for review at the ACS. All other cases require the following:
C. Complete history to include all event chronologies and any possible triggers that led to the episode in question.
D. Exam: complete neurological exam by a neurologist to include current EEG and all prior EEGs.
E. Imaging results: CT scans and MRI scans – results of all that have been performed.
F. Neurology consultation report.
G. All medications; current treatment doses, formulations, and documentation of therapeutic effect (reminder that all anti-epileptic medications are disqualifying).

H. MEB results if completed.

The following information will be required for waiver renewal every three years (if any abnormalities surface in the interim, they will need to be addressed appropriately):
A. Interim history.
B. Updated exam, EEG studies, and any imaging tests since last waiver.
C. Neurology consultation report.

ICD 9 code for seizures	
345	Epilepsy
780.3	Convulsions

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WAIVER GUIDE
Updated: Nov 2010
Supersedes Waiver Guide of Mar 2007
By: LtCol Rob Craig-Gray (RAM XI) and Dr. Dan Van Syoc
Waiver Guide reviewed by LtCol Erika J. Struble, AF/SG consultant in Hematology/Oncology

CONDITION:
Sickle Cell Disease/Trait (Nov 10)

I. Overview.

Sickle cell disease (SCD) and sickle cell trait (SCT) are two relatively infrequently encountered conditions which may cause pathophysiologic changes in-vivo due to altered hemoglobin structure and composition. In certain populations, these changes result in the formation of Hemoglobin S which is an abnormal form of hemoglobin which predominates in human blood in these two conditions. It results from the substitution of a valine for glutamic acid as the sixth amino acid of the beta globin chain, which produces a hemoglobin tetramer (alpha2/beta S2) that is poorly soluble when deoxygenated.[1, 2,3] Common varieties of sickle cell disease are inherited as homozygosity for beta S globin chain, called sickle cell anemia (Hb SS) or as compound heterozygosity of the beta S globin chain with another mutant beta globin: sickle cell – beta 0 thalassemia (Hb S-β° thal), sickle cell-Hb C disease (Hb SC disease) and sickle cell – beta + thalassemia (Hb S-β+ thal).[2] These changes in hemoglobin membrane structure result in altered red membrane function, disordered cell volume control, and increased adherence to vascular endothelium which play an important role in subsequent pathophysiology of SCD and SCT to a lesser extent in affected individuals.[3] Clinically disease manifestations are most severe in patients with sickle cell anemia, Hb SS versus Hb AS found in sickle cell trait.

Sickle cell anemia and Hb S-β° thal are characterized by a severe hemolytic anemia with intermittent painful vaso-occlusive crises. In these individuals the polymerization of deoxy hemoglobin (Hb S) is essential to vaso-occlusive phenomena.[3] Typical acute complications of sickle cell disease (SCD) include anemia, focal infarction of the spleen, kidneys, lungs, bone, retina, or brain, sudden extensive sequestration of blood in the spleen or liver, or overwhelming infection with encapsulated bacteria.[4] Hb S-β+ thal and Hb SC are also characterized by rare crises and aseptic necrosis. In most cases, red cell sickling is believed to occur when the PO_2 falls below 60 mmHg, similar to the PO_2 at standard cabin altitudes.[5] However hemoglobin S beta globin chain polymerization alone does not account for the pathophysiology of sickle cell disease. In addition a causal relationship has been documented between decreased hydration, hypoxia, and/or strenuous exercise and increased sickling episodes in individual with SCD and SCT.[6] Thus, sickle cell disease itself is almost always clearly incompatible with all military service particularly careers involving aviation.

In contrast, sickle cell trait (SCT) carried predominately (Hb AS) and normal Hb A components and is a relatively benign condition carrying a better clinical and prognostic course. In healthy individuals without either condition, blood consists of 96-98% Hb A, 2-3% Hb A2, and <1% Hb F while in most documented cases of SCT approximately 20-45% of hemoglobin exists as Hb S. Lower levels of abnormal hemoglobin in SCT result in less association with anemia, changes in red blood cell survival, or life expectancy alterations commonly seen in SCD. Although isolated cases of red cell sickling in patients with SCT have been reported at altitudes as low as 9,000 feet; the

majority of patients with SCT are unlikely to sickle below 21,000 feet.[7] SCT is generally regarded as clinically normal however there have been rare associations of sickle cell trait with acute medical issues. Acute conditions include splenic infarction at high altitude with exercise or hypoxemia, hematuria secondary to renal papillary necrosis, fatal exertional heat illness with exercise, sudden idiopathic death with exercise, glaucoma or recurrent hyphema following a first episode of hyphema, hyposthenuria (an inability to fully concentrate urine), bacteriuria in women, bacteriuria or pyelonephritis associated with pregnancy, renal medullary carcinoma in young people (ages 11 to 39 years), early onset of end stage renal disease from autosomal dominant polycystic kidney disease, and priapism.[8, 9]

Sickle cell disease/trait occurs often in sub-Saharan African populations and sporadically within these populations. Commonly between 7 and 9% of African Americans in the US have sickle cell trait (SCT). However it should be noted that the genetic defect that produces sickle cell also occurs in Caucasians and that, in Europe, carriers can be physically indistinguishable from normal non carriers in the general population. Due to this, US military routine screens all applicants and screening is not limited to recruits of African-American, Mediterranean, Middle Eastern, or Indian decent. Until 1982, individuals with sickle cell trait were restricted from entering military flight training, aircrew duties, and barred from attendance at the US Air Force Academy due to the rare occurrences of sickle crises in stressed individuals with sickle cell trait. In 1985, the Secretary of Defense ordered that "all military occupational restrictions on sickle cell trait be removed." Studies amongst US Army recruits in 1988 have not shown increased risk of sickling crises among physically stressed new recruits and also show similar improvements in variables of physical conditioning such as peak power, VO_2 peak, O_2 pulse as compared to normal recruits.[6] This suggests that although the presence of HbS represents a theoretic potential hazard under stressful environmental conditions; a majority of individuals with SCT will remain asymptomatic in comparison to normal military members.

Currently, all individuals are tested for sickle cell disease/trait prior to accession into the US Armed Services. Positive results for sickle cell carriers are then submitted for hemoglobin electrophoresis to determine the percentage of Hb S and to evaluate for other co-existing hemoglobinopathies which may be present. Current Air Force guidance allows enlistment/commission with Hb S levels of up to 45% (AFI 48-123 4A/5B 5.3.8.17). Individuals with Hb S levels higher than 45% represent an increased risk for SCD and/or Sickle-beta thal variants and are barred from service due to the risk of adverse clinical outcomes. The following table summarizes common electrophoretic patterns in hemoglobinopathies.[10]

Table 1: Hemoglobinopathy patterns

Condition	Hb A	Hb S	Hb C	Hb F	Hb A2
Normal	95-98*	0	0	<1	<3.5
Sickle cell trait (HbAS)	50-60	35-45†	0	1-3	<3.5
Sickle-beta + thal (Hb S-β+ thal)	5-30	65-90	0	2-10	>3.5
Sickle-beta 0 thal (Hb S-β° thal)	0	80-92	0	2-15	>3.5
Sickle-Hb C disease (Hb SC)	0	45-50	45-80	1-8	<3.5
Homozygous sickle cell disease (Hb SS)	0	85-90	0	2-15	<3.5

* Numbers indicate the percent of total hemoglobin for an untransfused adult patient. Ranges are approximate and may vary depending upon the particular laboratory and method of determination.
† Percent Hb S can be as low as 21 percent in patients with sickle cell trait in conjunction with alpha thalassemia.

II. Aeromedical Concerns.

As previously noted, individuals with sickle cell disease have a severe risk of acute disease including splenic infarct and other vaso-occlusive episodes involving the abdomen, lungs or nervous system. Episodes can be precipitated by exposure to hypoxia, infection, dehydration, altitude or exposure to extremes of heat and cold and require acute and timely medical interventions to prevent death and/or disability. In the current operational environment especially, such settings can be expected to be routinely encountered by military personnel while performing duty in various environments worldwide. Thus sickle cell disease remains incompatible with aviation as well as normal military duties per AFI 48-123. Sickle cell trait except for rare occasions is not associated with increased events/crises and poses little aeromedical risk.

III. Waiver Considerations.

SCD is disqualifying for all flying and special operational duties. Symptomatic SCT is disqualifying only for FC I/IA, FC II, and FC III duties. All initial flying class physicals require documented Sickledex™ results and if positive hemoglobin electrophoresis is required. Asymptomatic sickle cell trait (Hb AS) confirmed on hemoglobin electrophoresis does not require a waiver and Hb AS, with Hb S up to 45 % is acceptable for flying duties. Symptomatic sickle cell trait and sickle cell diseases (Hb SS and other heterozygous sickling disorders other than trait) are disqualifying. Anemia is not associated with sickle cell trait and therefore should not be attributed to the sickle cell trait

Table 2: Waiver potential for Sickle Cell Trait

Flying Class	Condition	Waiver Potential Waiver Authority
I/IA	Asymptomatic sickle cell trait	N/A*
	Symptomatic sickle cell trait cell trait (Hb S ≤45%)	No AETC#
	Hb SS, Hb SC, Hb S +thal, Hb S 0thal	No AETC#
II and III**	Asymptomatic sickle cell trait	N/A†
	Symptomatic sickle cell trait cell trait (Hb S ≤45%)	No MAJCOM#
	Hb SS, Hb SC, Hb S +thal, Hb S 0thal	No AFMSA/MAJCOM#
IIU	Sickle cell trait	N/A-not disqualifying
SMOD	Sickle cell trait	N/A-not disqualifying
ATC/GBC	Sickle cell trait	N/A-not disqualifying

*Positive test results are annotated on initial flying class (I/IA, II/ IIU and III) physicals via PEPP. A one-time initial certification, by the proper certification authority is required for all flying personnel and flying training applicants with sickle cell trait after evaluation as outlined in the aircrew waiver guide.
**Initial FC II and FC III exams are treated exactly like FC I/IA.
† Hemoglobin S levels of up to 44% as documented in AIMWTS have been waivered as long as there is no history of anemia or other sequelae.
#Symptomatic sickle cell trait and sickle cell diseases (Hb SS and other heterozygous sickling disorders other than trait) are disqualifying.

Review of the AIMWTS waiver file through July 2010 revealed 31 waivers approved for the diagnosis of SCT. Further breakdown and analysis revealed the following: 1 FC I/IA, 6 FC II/IIA, 18 FC III, and 6 SMOD/Special Operational Flying Duties ultimately approved. A total of 5 cases were disqualified from flying duties after further review. Of those denied flying status, 1 was for a combination sickle cell trait/α-thalassemia with anemia; 1 applicant had underlying asthma, 2 others had other additional disqualifying medical conditions (hepatitis C and H-3 hearing with hearing aids), and 1 had priapism of unclear etiology. At the time of this review, no aviators have been disqualified for a sole diagnosis of sickle cell trait (SCT).

IV. Information Required for Waiver Submission.

Aeromedical waiver requests should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The following information is required for initial waiver for sickle cell trait:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history of symptoms with report of any symptomatic vaso-occlusive or negative episodes included.
C. Lab testing to include CBC, Sickledex™ testing, and hemoglobin electrophoresis.
D. Consultation report from a hematologist.

The following information is required for renewal waivers for sickle cell trait:
A. Updated history and any changes in condition or treatment.
B. Lab testing to include CBC, Sickledex™ testing, and hemoglobin electrophoresis.
C. Consultation report from a hematologist or from the primary care provider.

ICD 9 codes Sickle Cell Disease	
282	Sickle Cell
282.5	Sickle Cell Trait
282.6	Sickle Cell Disease

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WAIVER GUIDE
Updated: Mar 2012
Supersedes Waiver Guide of Sep 2008
By: LtCol Manoj Ravi (RAM 12) and Dr Dan Van Syoc
Reviewed by LtCol LaKeisha Henry, AF/SG consultant in Otolaryngology

CONDITION:
Sinusitis, Hypertrophic Sinus Tissue, & Nasal Polyps (Mar 2012)

I. Overview.

There are four paired (paranasal) sinuses in the human skull: frontal, sphenoid, ethmoid, and maxillary, named for the region of the skull which they inhabit. The maxillary and ethmoid sinuses are present at birth, the frontal sinuses develop by the age of 5 or 6 years and the sphenoid sinuses are the last to develop by age 8-9 years. The presence of these sinuses decreases the weight of the skull, and facilitates trapping of viruses, bacteria and foreign material for removal. Additionally they help to moisten the air entering the nasal cavity, and can act as a "crumple zone" in trauma to the skull like the bumper of an automobile. They also act to add resonance to the human voice.[1]

The paranasal sinuses are lined with ciliated respiratory epithelium and this epithelium is innervated and vascular. Mucus is moved by the ciliary component of the respiratory epithelium to the ostia or "windows" by which these paranasal sinuses communicate with the nasal cavity. These ostia interact and communicate with the nasal cavity through an important structure called the osteomeatal complex. Structural abnormalities, inflammation, or nasal polyps may interfere with proper nasal mucociliary clearance mechanisms at the osteomeatal complex and lead to the development of infection or rhinosinusitis. Air should flow freely between these paranasal sinuses and the nasal cavity. This is especially important in atmospheric pressure changes such as those generated in flying and diving situations.[1, 2, 3]

Inflammation of the nose and paranasal sinuses is called rhinosinusitis. The causes of rhinosinusitis are many and include viral, bacterial, fungal, allergic, chemical, trauma, anatomic abnormalities (e.g. foreign bodies, nasal polyps), and systemic diseases (e.g., immunologic deficiencies, cystic fibrosis). The most common variety of rhinosinusitis is viral and is seen at an extremely high rate. Gastroesophageal reflux is also a cause of rhinosinusitis.[1, 3, 4]

Rhinosinusitis is defined as acute if it lasts less than four weeks.[1] The most common etiologic agents of acute bacterial rhinosinusitis are *Streptococcus pneumoniae* and *Haemophilus influenza* in adults. Should acute bacterial rhinosinusitis last longer than four weeks, but less than 12 weeks, it is called acute or subacute refractory rhinosinusitis.[1, 5] The term recurrent acute rhinosinusitis is used for individuals experiencing at least four episodes a year with symptom free intervals.[1, 3] Infections lasting longer than three months are classified as chronic rhinosinusitis (CRS).[1, 3, 5] CRS may be further divided into chronic persistent and chronic recurrent varieties, the latter of which often requires numerous antibiotic courses to help manage it.[1, 6, 7, 8]

CRS symptoms include nasal obstruction (81-95%), facial congestion-pressure-fullness (70-85%), discolored nasal discharge (1-83%) and hyposmia (61-69%).[1, 4] The symptoms of CRS and acute rhinosinusitis are similar, distinction is based on duration. The presence of two or more signs or symptoms persisting beyond 12 weeks is highly sensitive for CRS but relatively nonspecific. Both

aerobes and anaerobes have been implicated in CRS. CRS requires that inflammation be documented in addition to persistent symptoms.[5] Computerized tomography of the paranasal sinuses is the radiography of choice and should be obtained in diagnosing or evaluating CRS or recurrent acute rhinosinusitis (for recurrent acute rhinosinusitis not during an acute episode). The prevalence of allergic rhinitis is 40-84% in adults with CRS and 25-31% in young adults with acute maxillary sinustitis.[1,3,4]

The "gold standard" for diagnosis of acute bacterial rhinosinusitis is the sinus puncture with aerobic and anaerobic cultures. This procedure is costly, not available in most offices, and thus is not practical.[8] Plain film-radiography (Water's, Caldwell, and lateral views) has a sensitivity and specificity of 76 and 79% respectively but the false negative rate can be upwards of 40%. Computed tomography (CT) has even higher sensitivity but may cause a large false positive rate in diagnosing rhinosinusitis.[4,9,10] The use of CT scans should probably be reserved for those patients not responding to proper therapy and for those for who surgery is being considered as a treatment option.[11,12]

Nasal polyps or hypertrophic tissues are commonly associated with chronic rhinosinusitis, asthma, and aspirin sensitivity. In addition some individuals have concomitant allergic rhinitis or allergic fungal sinusitis. In children nasal polyps are often associated with cystic fibrosis. It is thought that chronic inflammation causes the pathogenesis of nasal polyps by causing exvagination of the normal nasal or sinus mucosa. Nasal polyps can obstruct the normal flow of air and mucus through the osteomeatal complex and thus lead to the development of rhinosinusitis.[13] Other symptoms of nasal polyps are nasal congestion, thick discharge and anosmia.

Treatment: Of all the acute rhinosinusitis present, only one-half to two percent is complicated by bacterial involvement.[12] The predominant cause is, as previously mentioned, viral in nature.[1,11] Despite this, the vast majority of patients have historically received an antibiotic prescription from a well-meaning physician in an attempt to "cure" what is most likely acute viral rhinosinusitis.[7] This has been, for the vast majority of patients, useless, enormously expensive, and has caused an ever-increasing amount of antibiotic resistance in the commensal bacteria that inhabit the paranasal sinuses.[3,7]

Randomized clinical trials have shown there to be a benefit to prescribing antibiotics only for those acute rhinosinusitis episodes that meet three out of four criteria as described above.[10] The vast majority of acute rhinosinusitis can be managed using decongestants such as topical oxymetazoline or systemic medications such as pseudoephedrine (alpha constrictors) which act to shrink the nasal mucosa thus aiding in mucociliary clearance. Mucolytic agents such as guaifenesin or saline nasal irrigations act to decrease the viscosity of sinus secretions and likewise aid, by this different mechanism, to help proper mucociliary clearance occur. Analgesic medications, such as acetaminophen help with the discomfort confronted by individuals with this disorder. It may be difficult distinguishing acute viral rhinosinusitis (AVRS) from acute bacterial rhinosinusitis (ABRS) in the first week to ten days of illness. Both conditions may resolve spontaneously in the first ten days and thereby antibiotics may not be necessary. Antibiotics may be reserved for those who show no improvement after ten days of illness or worsen after initial improvement (double sickening).[3,10,11,14]

Antihistamines, while helpful for seasonal allergic rhinitis, can actually worsen acute rhinosinusitis by causing thickening of sinus secretions leading to inspissation of the secretions behind the

osteomeatal complex.[10, 15] When provided with nasal saline or nasal lavage/rinse in the setting of pre-existing allergic rhinitis they may provide improvement in rhinorrhea or symptomatic relief. Antihistamines may lead to inspissation of secretions which may lead to acute bacterial rhinosinusitis. Nasal corticosteroids, also helpful for seasonal allergic rhinitis, may not be helpful or curative for acute bacterial rhinosinusitis.[14 ,15]

Symptomatic medications can be prescribed for most sinusitis patients and the use of antibiotics in a "delayed" fashion or only when the patient's condition worsens has been shown to be of great benefit in preventing antibiotic resistance.[10, 16] Should antibiotics be considered for the management of acute bacterial rhinosinusitis, the selection can be guided by using first-line or second-line agents. For the individual who has not had a recent antibiotic and who lives in a community with lesser levels of antibiotic resistance, a first-line drug is appropriate such as 10 to 14 days of amoxicillin or amoxicillin with clavulanate (Augmentin®). For the beta-lactam allergic patient, the choice of clindamycin, trimethoprim-sulfamethoxazole, clarithromycin, or azithromycin is also appropriate.[10 ,12, 17]

For individuals who live in communities with higher levels of antibiotic resistance profiles, or who have recently been given antibiotics for any reason, or who have failed a recent course of antibiotics for their rhinosinusitis, the use of a second-line agent is appropriate such as amoxicillin with clavulanate, the newer flouroquinolones, cefpodoxime, or cefuroxime.[4, 10, 12] Should an individual fail a second-line agent, the individual should be given "maximum medical treatment." This consists of six weeks duration of a broad-spectrum antibiotic (one of the second-line agents), oral decongestants, mucolytic agents, and saline nasal sprays and or irrigations. The bacteria likely to cause this condition are *Staphylococcus aureus*, bacterioides species, and gram negative enteric organisms.[10 ,16, 17]

Chronic rhinosinusitis (CRS) is a multi-factorial inflammatory disorder rather than a persistent bacterial infection. Local inflammation and swelling impairs sinus drainage and may be the consequence of chronic exposure to irritants, allergens, chronic infection or impaired mucociliary function. Three different varieties of CRS have been described: CRS with nasal polyposis, CRS without nasal polyposis and Allergic fungal rhinosinusitis. Management goals for CRS should include mucosal swelling control, drainage promotion and eradication of infection.[9, 10].

Topical nasal steroids may decrease inflammation in CRS or recurrent acute rhinosinusitis individuals with allergic rhinitis. Consideration of use of antihistamines should be given in individuals with allergic rhinitis as well. If allergic rhinitis appears to be involved then referral to allergist may be indicated.[9, 10]

In CRS, the microbiology may evolve to include aerobes such as *Staphylococcus aureus* including *MRSA, Pseudomonas or Klebsiella.* Anaerobes such as *Fusobacterium nucleatum, Prevotella and Peptostreptococcus* have been described after cultures in some patients. Fungi may be involved causing allergic fungal rhinosinusitis (AFRS) or invasive fungal sinusitis. Typically this involves an immunocompromised host. Another cause is odontogenic sinusitis: this is believed to be a factor in 10-12% of all cases of maxillary sinusitis. The organisms may be polymicrobial.[3, 10, 12]

Should this medical management fail, a CT scan should be performed as well as the consultation of an otolaryngologist. The otolaryngologist will determine if surgery is indicated (most commonly in cases of CRS and recurrent acute rhinosinusitis), usually due to abnormalities in the osteomeatal

complex (OMC) or other sinus anatomic variations leading to sinus obstruction and disease.[18] If present, the most common surgical procedure is functional endoscopic sinus surgery (FESS), where sinus abnormalities such as OMC obstruction can be corrected leading to proper mucociliary clearance. In aviators, over 98% have returned to flying following FESS surgery and 92% have continued flying duties without recurrent barosinusitis symptoms.[13, 19, 20]

Tumors may also cause sinus dysfunction. Intranasal topical corticosteroids have minimal side effects and can sometimes suppress polypoid disease or prevent further polyps. Antihistamines may be helpful in cases associated with allergic rhinitis. Surgery for hypertrophic sinus tissue or nasal polyps is often beneficial but recurrence is fairly common.[13, 20]

II. Aeromedical Concerns.

Acute and chronic sinusitis and nasal polyps may only be minimally symptomatic at ground level. However, these conditions can block the air flow in and out of the sinus cavities and changes in atmospheric pressure, as seen in the aviator or scuba diver, may cause barotraumatic sinusitis, sinus "block" or "squeeze," resulting in sudden, incapacitating pain. These symptoms in aviators normally occur on descent but rarely have been described on ascent. Should that event occur immediately prior to or during landing procedures, it could lead to sudden incapacitation and an aircraft mishap. There is no quick test to ensure the OMC is patent; being able to Valsalva does not ensure aeration of the sinus cavities. One method of ensuring patency after treatment is to expose the aviator to an altitude chamber ride up to 8-10,000ft. Another is if the operating surgeon can visualize the ostia of the affected sinuses or a recent post-op CT shows them to be patent. A literature review showed that only 2 of 26 aviators failed the chamber test after surgery; one had it too soon after surgery and the other was an aviator who had incomplete surgery due to excessive bleeding.[13, 20] Oral steroids may be used in the peri-operative period in setting of sinonasal polyposis. Medications used for management may not be compatible with aviation duties: refer to the latest edition of the approved aircrew medication list.

III. Waiver Consideration.

A viral URI or episode of acute bacterial rhinosinusitis requires no waiver but is grounding for flyers until resolution. However, chronic rhinosinusitis and nasal polyps are disqualifying and require a waiver for FC I/IA, II and III. Also any surgical procedure for sinusitis, polyposis or hyperplastic tissue is disqualifying for FC I/IA. For FC IIU, GBC/ATC, and SMOD personnel, conditions that interfere with enunciation or clear voice communication are disqualifying. For retention purposes, any case of sinusitis which is severe and chronic and which is suppurative, complicated by polyps, or does not respond to therapy is disqualifying.

Table 1: Waiver potential for chronic sinusitis, nasal polyps and/or surgery for same

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA/untrained II/III	Nasal polyps controlled with nasal steroids and/or approved oral antihistamines.	Yes* AETC
	Chronic sinusitis controlled with nasal steroids and/or approved oral antihistamines.	Maybe* AETC
	Chronic sinusitis, nasal polyps or hyperplasic tissue treated with surgery.	Maybe# AETC
II/IIU/III	Nasal polyps controlled with or without nasal steroids and/or approved oral antihistamines.	Yes* MAJCOM
	Chronic sinusitis controlled with nasal steroids and/or approved oral antihistamines.	Yes*+ MAJCOM
	Chronic sinusitis, nasal polyps or hyperplasic tissue treated with surgery.	Yes*+ MAJCOM
ATC/GBC SMOD	Disease severe enough to interfere with enunciation or clear voice communication, or disease that is not responsive to therapy	No MAJCOM$

Waiver may be considered if at least 12 months after surgery and symptoms entirely resolved.
* Waiver in any untrained candidate requires at least 12 months of symptoms controlled on medication before waiver.
+ Altitude chamber ride up to 8-10,000ft with rapid decompression is required. If treated with surgery altitude chamber ride no earlier than 6 weeks after surgery or when cleared by ENT physician (whichever is later). Exception: a chamber ride is not necessary if the ENT can visualize the ostia of the affected sinuses or a recent CT shows them to be patent
$ Waiver authority for SMOD personnel is AFSPC or GSC.

AIMWTS search in January 2012 revealed 284 cases with the diagnosis of nasal polyps, chronic sinusitis and/or surgery for the same. Breakdown of cases were as follows: There were 43 FC I/IA cases (7 disqualifications), 151 FC II cases (12 disqualifications), 80 FC III cases (25 disqualifications), 2 FC IIU cases (1 disqualification), 7 ATC/GBC cases (3 disqualifications), and 1 SMOD case (0 disqualifications). Of the 48 disqualified cases, 26 were disqualified for chronic sinusitis that was not controlled by either medication or surgery and three were disqualified for chronic sinusitis and asthma. The other 22 were disqualified for other medical conditions.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for **nasal polyps** should include the following:
A. History – symptoms (flying and on ground), duration, and treatment.
B. Physical – HEENT.
C. ENT consult.

The aeromedical summary for initial waiver **for chronic sinusitis and/or surgery** should include the following:
A. History - symptoms (flying and on ground) with duration and frequency, exacerbating factors, and treatment.
B. Physical – HEENT.
C. ENT consult.
D. CT scan, showing sinus disease or obstructed anatomy.
E. Allergy consult, if symptoms indicate allergic rhinitis component not controlled with topical nasal steroids or approved oral antihistamines.
F. Altitude chamber flight, unless ENT can visualize the ostia of the affected sinuses or a recent CT shows them to be patent.

The aeromedical summary for waiver renewal of **chronic sinusitis, nasal polyps and/or surgery** should include the following:
A. History – symptoms (flying and on ground), treatment, exacerbations since last waiver.
B. Physical – HEENT.
C. ENT and/or allergy consultation (if symptoms have recurred).

ICD9 Code for Sinusitis, Nasal Polyps and Surgery	
473.9	Unspecified chronic sinusitis
471.9	Unspecified nasal polyps
22.5	Other nasal sinusotomy

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WAIVER GUIDE
Updated: Mar 2012
Supersedes Waiver Guide of Sep 2008
By: LtCol Yvette Guzman (RAM 12) and Dr Dan Van Syoc
Reviewed by Maj Josh Sill, ACS Pulmonologist

CONDITION:
Sleep Disorders (Mar 2012)

I. Overview.

The common thread running through most sleep disorders is insufficient quantity or quality of sleep, which leads to excessive daytime sleepiness and diurnal impairment of alertness and cognitive function. While pathologic sleep disorders command the greatest attention, the commonest causes of excessive sleepiness are actually physiologic, such as poor sleep hygiene and circadian shifting. Chronic sleep deprivation for physiologic reasons may cause as much debility as a pathologic disorder. While the definition of sufficient sleep varies, one should generally not work up a complaint of hypersomnolence unless the individual is attempting, on a reasonably regular schedule, to get six to eight hours of sleep per twenty-four hour period. Careful attention must also be paid to alcohol use, since heavy use may disrupt sleep patterns, and may induce or worsen sleep disorders.

In civilian practice, insomnia is the commonest sleep complaint. The pattern of disturbance is usually helpful for diagnosis; chronic difficulty initiating sleep is most often associated with anxiety or stress, while early morning awakenings suggest depression. Frequent brief awakenings throughout the night are more suggestive of pathologic sleep disorders, and is a feature of both sleep apnea and narcolepsy.

Narcolepsy
Narcolepsy was the classic sleep disturbance, the first description dating back to 1880. Although it is considered to be the second commonest cause of pathologic hypersomnolence, it is considerably less common than obstructive sleep apnea. The typical age of onset is from late adolescence through the early twenties (Because poor sleep hygiene is markedly common in this period of life, and because narcolepsy is permanently disqualifying, it is vital to rule out physiologic sleep disruptions in aviators thought to have narcolepsy). Narcolepsy is an exception to the rule noted above; narcoleptics commonly have a disrupted pattern of sleep, but the hypersomnolence is not simply related to sleep deprivation. Instead, narcolepsy is a neurologic disorder of sleep-state boundaries, characterized by the inability to keep sleep and its manifestations confined to the normal sleeping period. Researchers believe that low levels of a protein called hypocretin may be an underlying cause of narcolepsy. Hypocretin (orexin) is released by neurons in the lateral hypothalamus. These neurons excite multiple monoaminergic and cholinergic wake promoting neurons, including histaminergic cells of the tuberomammillary nucleus (TMN). Histamine levels in the CSF of animals were reported to be higher during wakefulness compared with rest. In humans, histaminergic transmission may also fluctuate according to sleep pressure and decrease in the presence of Excessive Daytime sleepiness (EDS). The pathophysiology of decreased histaminergic transmission in patients is unclear. In patients with narcolepsy, lower CSF histamine could reflect the loss of hypocretin neurons, which densely innervate and activate histaminergic neurons in the TMN.[1]

The intrusion of rapid eye movement (REM) patterns into different parts of the sleep-wake cycle may lead to manifestations such as hypnagogic (predormital) and hypnopompic (postdormital) hallucinations, sleep paralysis, and cataplexy, the last characterized by loss of postural control (e.g., head drooping, knees buckling, even falling) associated with strong emotional stimulus (e.g., laughter, anger, surprise). The hypersomnolence of narcolepsy typically manifests as sudden sleepiness requiring a brief nap; after a nap as short as 10-20 minutes, the individual usually awakens feeling refreshed. The combination of hallucinations, sleep paralysis, and cataplexy with diurnal hypersomnolence is classic for narcolepsy, but only about a third will have the complete tetrad. While the first two manifestations will sporadically manifest in normal individuals, true cataplexy is all but diagnostic for narcolepsy. Narcoleptics may also experience episodic lapses of conscious awareness typified by automatic behavior and amnesia (Such behavior may also be seen in any individual with sufficient sleep deprivation). Narcolepsy is usually treated by medications and prescribed napping periods, but control is rarely if ever complete. Neither the disease nor the medications are waiverable for military aviation.

Obstructive sleep apnea

Obstructive sleep apnea (OSA) is the most common pathologic sleep disorder. The best available estimates of prevalence suggest that, among American adults ages 30 to 60, 4% of males and 2% of females are affected.[2, 3] Prevalence among military aviators is unknown, but because obesity is less common in that population, the rate is likely to be lower. The key to OSA lies in the pattern of muscle activity that occurs in different stages of sleep. While diaphragmatic activity is largely unaffected by sleep stage, muscle tone in the upper airway is substantially depressed during sleep, especially during REM periods. This loss of muscle tone leads to increased resistance to airflow through the upper airway during inspiration; in expiration, on the other hand, positive intraluminal pressure tends to stent the pharynx open.

The STOP-BANG (Snoring, Tiredness during daytime, Observed apnea, high blood Pressure, Body mass index, Age, Neck circumference, Gender) questionnaire was validated as a screening modality for OSA in the preoperative setting.[4] This instrument is a concise, self-administered, and easy-to use questionnaire that consists of 8 yes-or-no questions. Patients were classified as being at high risk for OSA if their STOP-BANG score was 3 or more and were classified as being at low risk if their score was less than 3. In this study, *obesity* was defined as a body mass index (calculated as weight in kilograms divided by height in meters squared) of greater than 30. The outcome of the study was that patients at high risk of OSA had a higher risk of pulmonary or cardiac complications and had an increase length of stay in the hospital. The STOP-BANG questionnaire is concise and easy to administer in a preoperative setting. It has been validated in surgical patients and has a high sensitivity to identify most patients with OSA, especially moderate and severe OSA.[4]

A modest amount of obstruction results in turbulent airflow in the pharynx, with consequent vibration of the soft palate (snoring). A greater amount of obstruction may lead to hypopnea (>50% reduction of airflow for >10 seconds with a drop in oxygen saturation of at least 4%) or apnea (total or near-total cessation of airflow for >10 seconds). This can result in significant arterial hypoxemia. Reductions in airflow that do not meet criteria for hypopnea or apnea, but that result in arousal to the awake state, are classified as respiratory event related arousals (RERAs). This disruption causes fragmented sleep and poor sleep quality

The predominant symptom is typically daytime sleepiness. The correlation of hypersomnolence to the degree of sleep disruption is remarkably variable from one individual to another, but in general, the greater the degree of sleep apnea, the more likely the individual is to fall asleep. As with sleepiness due to any cause, the more boring or repetitious the activity, the greater the difficulty staying awake. He or she may feel an urge to nap, but unlike in narcolepsy these naps are usually not refreshing, since disordered breathing disrupts the nap as well. Sleep apnea may be associated with restless nocturnal behavior, choking sensations (which typically resolve immediately upon awakening), recurring dreams of strangulation/drowning (or more commonly loss of dreaming, due to interruption of REM sleep), and morning headache, the last probably due to hypercarbia. A small group of individuals with OSA may complain of insomnia, usually because they are unable to maintain sleep due to repetitive awakenings.

In addition to obesity (body-mass index >30), large neck circumference (>17.5 inches) is associated with OSA. In fact, neck circumference is a better predictor of OSA than BMI.[5] Recent development or worsening of symptoms is frequently due to weight gain. Hypothyroidism may cause or exacerbate OSA. One should also pay particular attention to drug and alcohol history; heavy alcohol use and sedating medications can cause sleep-disordered breathing that will disappear if the individual is abstinent for a polysomnogram.

Obstructive sleep apnea (OSA) is a secondary cause of hypertension, with prevalence estimated to be between 38% and 82%.[6, 7, 8] This is double what would be expected in a population of middle-aged Caucasians, even when obesity is accounted for. Despite the high prevalence, evidence of target-organ damage, and increased markers of atherosclerosis, OSA remains largely underdiagnosed and, consequently, undertreated in clinical practice.[9, 10, 11, 12]

Though incompletely understood, the increased incidence of hypertension is thought to be due to sympathetic overstimulation from multiple arousals. Nocturnal hypoxia may occasionally result in cardiac arrhythmias, including ventricular tachycardia, though the latter is unlikely in the absence of underlying heart disease. Those with severe sleep apnea may develop diurnal hypoxia and hypercarbia, with pulmonary hypertension and right-sided congestive heart failure.

Various neuropsychologic deficits are associated with OSA, mainly in the areas of memory, attention, and executive tasks that require planning, shifting or constructive abilities. Individuals with OSA have decreased ability to initiate new mental processes and to inhibit automatic ones, in conjunction with a tendency for preservative errors. They are also affected with deficits of verbal and visual learning abilities and reduced memory spans.[13] As is true of symptoms, neurocognitive deficits vary considerably from one individual to another. In the ACS experience, impairment is very rare with mild to moderate OSA, but is more common with severe sleep-disordered breathing. Depressive symptoms are common in OSA, with prevalence as high as 24-45%.[14]

Diagnosis of pathologic sleep disorders requires polysomnography (PSG) at a sleep disorders laboratory. This involves monitoring at least one night's sleep with electroencephalography, submental electromyography, electro-oculography, measurements of airflow and thoracic/abdominal excursion, and oximetry. Usually electrocardiography and video monitoring are performed as well. If the history suggests narcolepsy and the polysomnogram shows no evidence of an alternative diagnosis, such as sleep apnea, the patient should have 2 weeks of a sleep diary with actigraphy monitoring, followed by overnight polysomnography and a multiple sleep latency test (MSLT) the following day. MSLT measures the amount of time required to fall asleep, and is

performed by having the individual lie down in a darkened room and instructed to try to fall asleep. This is repeated three or four more times at two hour intervals, with each trial lasting 20 minutes if sleep does not occur. Normal individuals usually show mean sleep latency (MSL) of at least 8 minutes, with no sleep onset REM periods (SOREMPs) evident during any trial. A MSL less than 8 minutes, with two or more SOREMPs is considered strong evidence of narcolepsy, if a physiologic sleep disorder has been ruled out. The maintenance of wakefulness test (MWT) is a measure of the volitional ability to stay awake. The individual is seated in a quiet, dimly lit room and instructed to remain awake; a total of four 40-minute trials are conducted at 2-hour intervals. Based on statistical analysis of normative data, a MSL of less than 8 minutes on the 40-minute MWT is abnormal.[15] A MSL of 40 is considered normal, while MSL values between 8 and 40 minutes are considered equivocal. However, it is important to note than in several studies of patients with OSA, performance on driving simulators improved significantly in patients with MSLs greater than 30-34.[16, 17]

The overwhelming problem with sleep laboratories is the huge degree of variability of results. Even accreditation is no guarantee, because standards for interpretation have been difficult to establish. As mentioned earlier, nocturnal polysomnography is the criterion standard for the diagnosis of OSA.[18] While home sleep testing has also been gaining increasing acceptance and has the advantage of convenience and cost, it is not sufficiently sensitive for the purpose of aeromedical disposition. It is important to note that neither procedure has been used extensively in the preoperative assessment settings. Therefore, most preoperative patients with undiagnosed OSA have not had their conditions evaluated, raising the potential increased postoperative morbidity.[19, 20] Unlike the waiver evaluation, USAF policy does not require that a work-up to establish or rule out a sleep disorder in an aviator must occur at a particular site. However, if at all feasible, it is strongly recommended that the initial diagnostic evaluation be arranged at a sleep laboratory in an academic facility (defined as an institution with a sleep fellowship program) to ensure consistency.

While multiple treatment options usually exist for sleep apnea, not all are compatible with unrestricted worldwide duty. In the majority of patients, OSA pathology develops as weight increases, the typical history revealing a progression of heroic snoring, observed apneas, and hypersomnolence as mass has progressively increased. Weight loss is the preferred approach in such patients, with health benefits extending well beyond OSA treatment. The relationship between weight loss and decrease in number of apnea and hypopneas is not linear; 10% weight loss can decrease apneas events by 50%.[21] Although obtaining weight loss is often discouraging in the clinical population, flying status can be a powerful motivator. Positional therapy is likely to be helpful when a significant positional component is identified during the sleep study. Medications have largely been ineffective for OSA, and those that have been tried would not have been suitable for waiver in any event.

Oral appliances, which attach to the teeth to advance the mandible, are frequently effective in reducing sleep-disordered breathing, are usually readily tolerated, and are waiverable without restriction. Nasal continuous positive airway pressure (CPAP), which acts as a pneumatic stent to maintain airway patency, is usually effective for any degree of sleep apnea, though compliance with long-term use can be a problem. In the most favorable data, only 50-80% of individuals have continued use over the long term, and of those, the average use was <50 %.[22] However, most of the newer CPAP machines have the ability to record and store usage (compliance) data, making it very easy for practitioners to determine how compliant their patients have been. For active duty personnel, the more immediate problem is that the use of CPAP is incompatible with unrestricted

worldwide qualification; the device needs a continuous power supply, and a reasonably dust-free environment to avoid overwhelming the filtering system. Under current guidelines, use of CPAP usually results in an assignment limitation code with a C-1 stratification.

Several surgical options are available for OSA, including such procedures as uvulopalatopharyngoplasty (UPPP) and maxillary-mandibular advancement (MMA). UPPP is popular, and as a treatment for heroic snoring, it has a high degree of success, at least in the short term. However, for OSA it is only modestly effective, with success in only about 45% of patients, with success defined as a 50% reduction in sleep-disordered breathing, rather than abolition of apneas or control of the clinical manifestations. MMA, a technically more complicated operation, is effective in 90-95% of patients.[5]

Sleepwalking (Somnambulism)
A sleepwalking episode occurs at least once in 10-30% of children, and 2-3% sleepwalk often. The prevalence of sleep walking disorder is much lower, at 1-5%. Episodes first occur most commonly between 4 to 8 years, with the incidence peaking at age 12, and usually disappear spontaneously by age 15 years.[23] A family history of sleepwalking is seen in up to 80% of sleepwalking individuals; sleepwalking increases to up to 60% in children if both parents have a history of sleepwalking disorder. Sleepwalking disorder typically occurs during stages 3 and 4 of non-REM sleep, during the first 1-2 hours of sleep, and is seldom remembered by the individual. During the episode the individual has reduced alertness and responsiveness, a blank stare and relative unresponsiveness to others and to efforts to awake him or her. If awakened during a sleepwalking episode the individual is usually confused for several minutes before exhibiting normal wakefulness.

II. Aeromedical Concerns.

With the exception of somnambulism, any of the sleep disorders above may result in excessive daytime sleepiness and an inability to maintain the alertness necessary for safety while flying. Cognitive function and neuromuscular coordination may both be affected by the sleep disorder and/or the treatment modalities used. When called upon to perform in operational situations with less than optimal sleep, those with OSA are already sleep deprived. Furthermore, normal individuals when faced with sleep deprivation typically respond by altering sleep patterns, e.g., going into REM early or even immediately, which is likely a physiologic response; in the individual with OSA those deeper stages of sleep are fragmented by disordered breathing. Persons with a sleep disorder may have more than the usual difficulty in adjusting to the circadian rhythm disruption which occurs with travel across time zones. This would present an additional hazard to a flyer who may deploy several time zones away and would still be expected to perform flying duties.

Individuals can injure themselves during sleepwalking, by bumping into objects, walking on stairs, going outside, and even walking out of windows. The risks from somnambulism in a combat environment are obvious, and constitute a danger to the member and to others.

If an aviator is diagnosed with OSA, it is reasonable to treat him or her with weight loss and an oral appliance, or with CPAP, as a secondary choice, to try to control the problem prior to the waiver evaluation. However, given the extreme variability in local sleep studies, it is difficult to make the same recommendation concerning surgery. If the aviator does not have symptoms clearly associated with the diagnosis, the Aeromedical Consultation Service (ACS) recommends that the disorder be confirmed at an academic sleep center such as Wilford Hall Medical Center or the 88th

Medical Group at Wright-Patterson AFB before considering a surgical procedure. The neurocognitive deficits associated with OSA can, for the most part, be mitigated with treatment, such as CPAP therapy.[24, 25] However, it is important to note that in one study of patients with sleep apnea and neurocognitive deficits, nearly all the improvement seen with CPAP use was lost after just one night without therapy.[26]

If narcolepsy is diagnosed by an outside sleep laboratory, the aviator should be referred to the ACS for confirmation of the diagnosis. Although this diagnosis, if confirmed, will result in permanent disqualification, the ACS has seen multiple instances of aviators who were improperly diagnosed as narcoleptic.

III. Waiver Consideration.

Narcolepsy, obstructive sleep apnea and other sleeping disorders are disqualifying for all flying classes (FC I/IA, II and III). History of sleepwalking after age 12 is disqualifying for all flying classes (primarily an accession issue). Sleep apnea requiring CPAP is disqualifying for retention standards which means that ATC/GBC and SMOD personnel in this category will require a waiver as well.

As noted earlier, the initial diagnostic workup need not be performed at Wilford Hall or the 88th MDG, although this is certainly encouraged where geographically practical. If at all feasible, the initial polysomnogram should be performed at an academic laboratory. In a recent review of ACS experience with OSA, academic laboratory values were concordant with our reference laboratory in 89% of cases, whereas non-academic laboratories were concordant in only 24% of cases. Any FC II aviator other than flight surgeons, with a documented sleep disorder will require an ACS evaluation prior to returning to flying status. FC III individuals and flight surgeons will be seen on a case-by-case basis at the ACS at MAJCOM request (this pertains almost exclusively to air battle managers).

For a waiver to be recommended, the patient must 1) be using a form of therapy that has been documented to be effective on polysomnography testing (repeat PSG showing RDI of <5 with dental orthotic, weight loss, or CPAP), 2) have resolution of sleep-related symptoms, and 3) demonstrate excellent compliance (CPAP usage on 90% of nights for at least 5 hours per night, on average). All those utilizing CPAP therapy MUST submit a copy of their compliance data for the last 3 months along with their waiver package. At the ACS, maintenance of wakefulness testing will be performed on all cases, while neuropsychological testing will be performed on those with severe sleep apnea. Neither of these tests need to be performed locally prior to waiver submission.

Table 1: Waiver potential for various sleep disorders.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	History of sleep walking after age 12	Maybe+ AETC	No
	Narcolepsy, obstructive sleep apnea and other sleep disorders	No AETC	No
II (other than FS) IIU**	History of sleep walking after age 12	Maybe+ MAJCOM	No
	Narcolepsy	No MAJCOM	Yes#
	Obstructive sleep apnea controlled on CPAP	Yes*† AFMSA	Yes#
	Obstructive sleep apnea not on CPAP	Yes*† MAJCOM	Yes#
	Other sleep disorders	Maybe MAJCOM	Yes#
III and FS	History of sleep walking after age 12	Maybe+ MAJCOM	No
	Narcolepsy	No MAJCOM	Yes, probable review only
	Obstructive sleep apnea	Yes*†& MAJCOM	Maybe
	Other sleep disorders	Maybe MAJCOM	Yes, probable review only
ATC/GBC SMOD***	History of sleep walking after age 12	Maybe+ MAJCOM	No
	Narcolepsy	No MAJCOM	No
	Obstructive sleep apnea	Yes& MAJCOM	No
	Other sleep disorders	Maybe MAJCOM	No

+ Last episode of sleepwalking must be at least three years previously and normal psych evaluation.
* Mild or moderate OSA documented at ACS with resolved symptoms, good compliance, and normal MWT is waiverable. Severe OSA may also be waiverable, but must also demonstrate normal neuropsych testing.
** Waiver authority for FC IIU is AFMSA.
*** Waiver authority for SMOD personnel is AFSPC or GSC.
# ACS evaluation includes polysomnography, actigraphy and multiple sleep latency testing (for narcolepsy) or maintenance of wakefulness testing (for OSA) at Wright-Patterson Medical Center Sleep Disorders Laboratory, and may include neuropsychologic testing to evaluate cognitive function.
& The only FC III cases seen routinely at the ACS will be Air Battle Managers for the evaluation of possible obstructive sleep apnea. Other FC III aviators and flight surgeons do not require ACS review unless requested by the waiver authority.
† Indefinite waivers will not be granted for OSA.

Review of AIMWTS in March 2012 showed 9 cases of Narcolepsy, all disqualified. The breakdown of cases was as follows: 1 FC I case, 2 FC III cases, 2 ATC cases, and 4 SMOD cases.

Review of AIMWTS showed 18 cases of Sleep Walking. Breakdown was as follows: 9 FC I cases (0 disqualifications), 3 FC II cases (1 disqualification), 2 FC III cases (1 disqualification), 2 ATC/GBC cases (1 disqualification), and 1 SMOD case (1 disqualification). There was a total of 4 cases resulting in a disposition of disqualify, the major reason for the disqualification was required medication use.

Review of AIMWTS for OSA or other sleep disorders showed 623 cases (not including sleep walking and narcolepsy). Breakdown was as follows: 4 FC I/A cases (3 disqualifications), 249 FC II cases (50 disqualifications), 242 FC III cases (56 disqualifications), 2 FC IIU cases (0 disqualifications), 61 ATC/GBC cases (13 disqualifications), and 65 SMOD cases (11 disqualifications).

IV. Information Required for Waiver Submission.

The aeromedical summary <u>for initial waiver</u> for sleep disorders other than sleep walking should include the following:
A. History – history of weight since reaching adulthood, symptoms (including pertinent negatives), treatment and effectiveness, documentation of resolution of symptoms, if applicable.
B. Physical – height and weight, blood pressure, neck circumference, and ear, nose and throat, cardiovascular, and pulmonary exam.
C. Polysomnography results, including repeat polysomnogram on-therapy.
D. Medical evaluation board results, if completed.
E. CPAP usage (compliance) data from last 3 months.

The aeromedical summary for <u>waiver renewal</u> for sleep disorders other than sleepwalking should include the following:
A. History – brief summary of initial symptoms, weight and findings at ACS evaluation, current symptoms, current treatment, and weight history since previous waiver granted.
B. Physical – weight, blood pressure, neck circumference, and ear, nose and throat, cardiovascular, and pulmonary exam.

C. Polysomnography results. Note: Polysomnography does not need to be accomplished if ACS evaluation is required, will be done during ACS evaluation.
D. CPAP usage (compliance) data from last 3 months.

The aeromedical summary for waiver for history of sleepwalking should include the following:
A. History – age on onset, frequency, last episode, activities during sleepwalking, family history.
B. Psychology/psychiatric consult.

ICD 9 code(s) for sleep disorders	
307.4	Sleepwalking
327.42	Primary insomnia
347	Narcolepsy (with or without cataplexy)
780.57	Unspecified sleep apnea

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WAIVER GUIDE
Updated: Apr 2010
Supersedes Waiver Guide of Feb 2002
By: Dr Dan Van Syoc
Reviewed by Col (sel) Kent McDonald, psychiatrist and chief of the neuropsychiatry branch at the ACS.

CONDITION:
Somatoform and Factitious Disorders/Malingering (Apr 10)

I. Overview.

The common feature of the somatoform disorders is the presence of physical symptoms that suggest a general medical condition but are not fully explained by a general medical condition, by the direct effects of a substance, or by another medical/psychiatric disorder such as panic disorder. The somatoform disorders include: somatization disorder, conversion disorder, pain disorder, hypochondriasis, body dysmorphic disorder, undifferentiated somatoform disorder, and somatoform disorder NOS. There are three required clinical criteria common to each of these disorders: The physical symptoms (1) cannot be fully explained by a general medical condition, another mental disorder, or the effects of a substance; (2) are not the result of factitious disorder or malingering; and (3) cause significant impairment in social, occupational, or other functioning system.[1] Somatoform disorders are differentiated from malingering and factitious disorder because symptoms in somatoform disorders are not seen as intentional, voluntary, or consciously produced.[2] There are two significant negative consequences to somatoform disorders. First is the excess health care costs resulting from frequent health care visits, diagnostic testing, invasive procedures, and hospitalizations. Second is the adverse impact on the doctor-patient relationship that is common in this setting.[3] Somatoform disorders impact duty performance through the time they take away from duty, multiple profiles limiting effectiveness while on duty, and a preoccupation with the physical symptoms that reduces time devoted to mission oriented tasks while present for duty.

Somatization disorder was originally termed hysteria or Briquet's syndrome; this condition has been solidly established as clinically and epidemiologically distinct. It is characterized by multiple physical symptoms that recur over a period of several years and are either unrelated to an identifiable physical disorder or grossly in excess of physical findings. The disorder is much more common in women than it is in men, and it tends to occur in those of low socioeconomic status, often nonwhite and rural, at a 1-year prevalence rate of 0.3% in the general population, even with a criterion of clinical significance. Conversion disorder is characterized primarily by loss or alteration of physical functioning that suggests physical disorder but instead is apparently an expression of psychological conflict or need. The symptom is not under voluntary control and cannot be explained by any physical disorder or known pathophysiological mechanism. Somatoform pain disorder is diagnosed when the major complaint is preoccupation with pain of at least six months duration in the absence of, or grossly in excess of, explanatory physical findings. The pain is severe enough to warrant clinical attention and to impair role function. Hypochondriasis was formerly called hypochondriacal neurosis. A "hypochondriac" is a person who complains about minor physical problems, worries unrealistically about serious illness, persistently seeks professional care, and consumes multiple over-the-counter remedies. DSM-IV identifies the predominant feature of hypochondriasis as a preoccupation with the fear or belief that one has a serious, undiagnosed disease. Body dysmorphic disorder involves the preoccupation with

an imagined defect in appearance in a person whose actual appearance is unremarkable. If a slight abnormality is present, the individual's concern is out of proportion to the defect. The diagnostic criteria for somatization disorder are quite restrictive, and most chronic somatizing patients in medical practice do not cross this stringent threshold. In an attempt to provide a diagnostic home for such patients, DSM-IV-TR now includes the entity undifferentiated somatoform disorder. This diagnosis requires one or more physical symptoms that persist for at least six months and are medically unexplained. Finally, somatoform disorder not otherwise specified is a psychiatric diagnosis used for conditions that do not meet the full criteria for the other somatoform disorders, but have physical symptoms that are misinterpreted or exaggerated with resultant impairment.[1, 4, 5]

Somatoform disorders or symptoms represent difficult forms of fear of flying. These are chronic physical or physiologic symptoms, presented by the flier (sometimes preceded by the words, "I'd like to fly, but…") as incompatible with continuing to fly. This presents a striking contrast to the attitude of most fliers that insist on flying in spite of their symptoms. A reluctant flier's symptoms can arise from an unconscious conflict between anxiety about flying and a greater anxiety about giving up the role of the aviator. "Involuntary" grounding for physical reasons beyond the flier's conscious control offers an acceptable way out of the conflict. As an example, with an unconscious conflict presenting as a conversion disorder, the aviator has no conscious anxiety about flying, and therefore responds to any question concerning apprehension in flight with denial because the question represents a challenge to their defense that the symptoms offer against the intolerable but unconscious underlying anxiety. The flier may have little concern about any disease the symptoms represent, concentrating instead on being removed from flying duties in order to avoid the distress. The entire presentation of the case differs from that of the usual aviator who does not want to be grounded. Three clinical observations may help identify the unconscious aspect of the conversion symptoms. First, the flier tends to describe the symptoms in terms of their effect on flying. Second, the flier may express no particular anxiety about being significantly ill, and have little interest in specific treatment. Third, if asked, "Will you go back to flying when you are well?" the flier may equivocate or signal reluctance. Identifying the somatoform nature of the problem may allow the physician to avoid unnecessary, expensive, or invasive diagnostic procedures. Even if the psychologic nature of the problem is established, the flier is unlikely to agree with the formulation and to cooperate in necessary psychotherapy. The nature of the symptoms (headaches, various pains, sensory deficits, autonomic disturbances of the gastrointestinal tract) may preclude safe return to flying duties.[6] All the somatoform disorders may be a defense against fear of flying so it is important to evaluate for recent stressors surrounding flying duty in any of the somatoform presentations.

Treatment for the somatoform disorders depends greatly on a good clinician-patient relationship. In general, there is no specific therapy for these disorders. Any crisis needs to be handled firmly so that the multiple somatic complaints do not lead to excessive evaluation. The doctor needs to be supportive, yet realistic in his or her treatment course. Cognitive Behavior Therapy (CBT) has been found to be an effective treatment for these disorders in some settings. Once firmly established, somatic presentations of fear of flying may be quite resistant to therapy.[1, 2, 6]

Factitious disorders and malingering are both characterized by the intentional production or feigning of physical or psychological symptoms. In malingering, however, symptoms are produced because of a clear external incentive, e.g., to avoid an undesirable deployment or to obtain monetary compensation, while in factitious disorder, symptoms result only from a wish to assume the sick role. The factitious disorder patient's primary goal is to receive medical, surgical, or psychiatric

care [to feel “cared for”]; secondary motivations involve obtaining drugs or financial assistance. Malingering and factitious disorder both differ from somatoform disorders in that the former are voluntarily produced while the latter are not. Factitious disorders are divided into those with predominately physical signs and symptoms, those with predominately psychological signs and symptoms and those with combined psychological and physical signs and symptoms. Münchausen syndrome is often used interchangeably with the physical type of factitious disorder, but the classic Münchausen syndrome is reserved for the most severe and chronic form of the disorder, which is marked by the following three components: recurrent hospitalizations, travel from hospital to hospital (peregrination), and pseudologia fantastica. The more common garden-variety cases of physical predominant factitious disorder are patients who use the same physician and do not use aliases. While the majority of cases of factitious disorder involve physical symptoms, some patients primarily feign psychological symptoms. Psychological complaints (like physical ones) encompass a broad spectrum of symptoms, including depression, anxiety, psychosis, bereavement, dissociation, posttraumatic stress, and even homicidal ideation.[7, 8, 9]

No specific therapy for factitious disorder has been established. However, some consensus exists that the core management should include: treatment of self-induced medical or surgical conditions, as indicated; education of medical/surgical staff regarding illness behavior and disease dynamics, to reduce the clinician's feelings of anger, frustration, and helplessness; protecting the patient from self-harm or harmful procedures; and attempting to limit a patient's care to one primary clinician and hospital.[7]

II. Aeromedical Concerns.

These disorders (except conversion disorder, which has a slightly better prognosis) have a chronic course and patients make repeated visits to physicians due to multiple physical or somatic complaints. The attendant somatic concerns and behaviors interfere with flying availability and reliability. Because of the chronic and recurrent nature of these disorders, treatment offers only a weak hope of returning to flying status; motivation to fly, or lack thereof, significantly influences the aviator’s prognosis. These individuals are frequently not motivated for psychotherapy, and may attempt to change physicians when confronted. Therefore, consider conservative medical management and reassurance after ruling out possible organic causes for complaints. The psychotropic medications used in somatoform disorders are incompatible with aviation duties in the US Air Force.

III. Waiver Consideration.

Both somatoform disorder and factitious disorder are disqualifying for all classes of flying in the US Air Force. Consideration for a waiver will only be entertained if the aviator is successfully treated and remains off all psychotropic medication for 12 months. The diagnosis of malingering is dealt with administratively. Factitious disorder, when it significantly interferes with performance of duty, is considered an “unsuiting” condition. It is also considered an administrative condition, not a disability subject to Medical Evaluation Boards.

Before submitting the case for waiver consideration, the base-level flight surgeon must first discern whether the condition is unsuiting vs. unfitting for service. If the Airman requires a fit/unfit determination, the case needs MEB action; if the airman requires suited/unsuited determination, the

case then needs consideration of an administrative separation or discharge via the chain of command.

Table 1: Waiver potential for Somatoform and Factitious Disorders

Flying Class (FC)	Waiver Potential# Waiver Authority	ACS Evaluation/Review
I/IA	No AETC	No
II	Yes* MAJCOM	At the discretion of the MAJCOM
IIU	Yes* AFMSA	At the discretion of AFMSA
III	Yes* MAJCOM	At the discretion of the MAJCOM

*Applicants for initial training should be handled in same fashion as FC I/IA.
#No indefinite waivers.

AIMWTS search in March 2010 revealed 9 cases; all had the diagnosis of somatoform disorder. There were 4 FC II cases and 5 FC III cases, with no FC I/IA or FC IIU cases. There were a total of 6 disqualifications, 4 in the FC II category and 2 in FC III. Each of them was disqualified primarily for the somatoform diagnosis.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver request should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver for somatoform or factitious disorders should include the following:
A. History – An aeromedical summary detailing history of the disorder and all treatments administered, the current status of any social, occupational, administrative or legal problems associated with the case, and an analysis of the aeromedical implications of this particular case history.
B. Treatment – medications and therapy used for the disorder and any other psychiatric conditions.
C. Psychiatry/psychology consultation: Need all treatment notes from treating mental health professional as well as an MEB-type narrative summary of the mental health record.
D. Report of all psychological testing, if performed.
E. Letter of support from the aviator's supervisor.

The aeromedical summary for waiver renewal for somatoform or factitious disorders should include the following:
A. History – interim history since last waiver.
B. Treatment – current therapy for the condition, if any.
C. Psychiatry/psychology consultation report(s) if accomplished since last waiver request.

ICD 9 codes for Somatoform and Factitious Disorders	
300.11	Conversion Disorder
300.16	Factitious Disorder with predominately Psychological Signs and Symptoms
300.19	Factitious Disorder with predominately Physical Signs and Symptoms
300.7	Hypochondriasis
300.81	Somatization Disorder
300.82	Somatoform Disorder, Not Otherwise Specified

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WAIVER GUIDE
Updated: Nov 2011
Supersedes Waiver Guide of May 2008
By: Lt Col Natalie L. Restivo (RAM 12) and Dr Van Syoc
Reviewed by LtCol Warren Kadrmas, AF/SG consultant for orthopedic surgery

CONDITION:
Spinal Curvature, Abnormal (Kyphosis, Scoliosis, and Lordosis) (Nov 11)

I. Overview.

Abnormal spinal curvature includes kyphosis (increased convexity of the thoracic spine), scoliosis (lateral/rotational curvature of the spine) which is further divided into region of spine, e.g. thoracic or lumbar, and lordosis (anterior concavity in cervical and lumbar spine). Scoliosis, has an incidence approximating 0.1% in the U.S. population.[1] The USAF Aeromedical Consultation Service recorded in their active duty referral population approximately 4% prevalence of kyphoscoliosis, scoliosis, lordosis, or kyphosis >10°, and 0.16% prevalence of ≥25°.[2] Scoliosis curves, measured by the Cobb method on x-ray, are classified as mild (<30°) or severe (>100°).[1, 3] Reported errors of measurement include ± 2-3°, with standard deviations of ± 2.4° for orthopedists and ± 7.2° for radiologists.[4-6] Mild curves <30° tend not to progress over 40-year follow-up, and are unlikely to be associated with persistent symptoms.[7] Additionally, there is no evidence that adults with normal pulmonary function experience deterioration due to curve progression.[8] Similarly, kyphotic thoracic curves <60° have a benign prognosis.[9]

In adolescents with a Cobb angle less than or equal to 20°, the likelihood of progression is between 10 and 20%. In adolescents with immature bone status and a Cobb angle exceeding 20°, the likelihood of progression may exceed 70%.[10] The highest rate of scoliosis progression appears to be the 50-75° category, where about 30° of progression was noted in 40-year follow-up.[7] This finding is consistent with reported curve progression of adult idiopathic scoliosis approximating 10° per decade and stature reduction of about 1.5 cm per decade. Advancing age has been associated with increasing rigidity, increasing likelihood of pain, and reduced pulmonary function.[11] While back pain is the most frequent problem of adult scoliosis, there is no clear evidence that the incidence of back pain in scoliosis patients exceeds age-matched controls.[8, 12] Severe scoliosis (>100°) has been associated with reduced vital capacity which could produce lower arterial oxygen content, predisposing to pulmonary hypertension or cor pulmonale.[1, 8]

Non-surgical treatment options include basic conservative measures (physical therapy, core strengthening, stretching etc) and, in adolescents, bracing may be indicated for certain scoliotic curves. Current recommendations for bracing in the adolescent population are initiation of bracing before termination of bone growth for Cobb angles between 30° and 45°and for Cobb angles between 20° and 30° that progresses by more than 5° in 6 months. For Cobb angles exceeding 45° in adolescent patients, surgical correction and stabilization of the affected spine segment is recommended.[10] Surgical options employ current techniques of instrumented anterior, posterior or combined spinal fusions. All treatment options are designed to stop progression of the curvature and improve the deformity, thereby promoting better sagittal and coronal balance as well as potentially improving pre-operative back and/or leg pain. Treatment is usually considered during adolescence when curve progression is more likely due to skeletal immaturity (growth remaining).

In adulthood, surgical indications include sagittal and coronal imbalance, progression of the deformity, instability, radicular and/or neurogenic claudication symptoms and occasionally chronic pain.

Biomechanics of spinal curvature may predispose to an increased risk of spine fracture or other injuries during high-G exposures such as those associated with the use of ejection seats or hard landings in rotary wing aircraft.[13] Vertebral fractures frequently occur at loads exceeding the set ejection seat exposure limit of 20G, but can occur with forces as low as 10-12Gs when the spine is not entirely vertical.[13, 14] The upper body center of gravity lies anterior to the spine and increasing kyphoscoliosis shifts the center of gravity further forward or out of vertical alignment. This deviation increases the potential for flexion compression fracture.[15] Historically, entrance exam restrictions for aircrew previously proposed have ranged from a thoracic scoliosis curve maximum of 10° in 1971, to the USAF standard of 20°, which increased to 25° in 1993.[6, 16, 17]

Clinical suspicion of abnormal spinal curvature should be evaluated with plain film (AP and lateral standing 3-foot scoliosis series) radiographs to document thoracic kyphosis, lordosis, and thoracic and/or lumbar scoliosis curves by the Cobb method.[6] Referral to orthopedic specialist is indicated if any of the following criteria are present: 1) Cobb measurements exceed 20° for the lumbar curve, 25° for the thoracic curve, and/or 55° for thoracic kyphosis or lordosis; 2) the patient has excessive back pain uncontrollable with conservative measures; 3) any neurologic abnormality noted. Since kyphoscoliosis-related pulmonary hypertension or cor pulmonale is unlikely to occur with scoliosis curves <100° (well above the maximum acceptable limits for military entrance, military continuation, or air crew standards), ECG or cardiology consultation will not likely be required in these populations.[1]

II. Aeromedical Concerns.

Primary aeromedical concerns relative to kyphosis, scoliosis and lordosis involve the increased risk of fracture or other spinal injuries with increasing deviation of the spinal axis from the vertical position. Additional risks of sudden incapacitation, critically distracting symptoms, or functional limitations during flight may accompany clinically significant or progressive spinal curvatures. Finally, physical exam cannot accurately establish severity of curvature – spinal asymmetry needs radiologic curve measurement with the Cobb method.

III. Waiver Considerations.

For flying class (FC) I/IA, II and III, lumbar scoliosis >20°, thoracic scoliosis >25° and kyphosis or lordosis >55° by Cobb method and any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive is disqualifying. There are no specific standards for ATC/GBC or SMOD and therefore would have to meet retention standards for scoliosis (exceeding 30 degrees lumbar or thoracic curvature, or interfering with function or wear of military uniform or equipment) and kyphosis/lordosis (exceeding 55 degrees or interfering with function or wear of military uniform).

Table 1: Waiver potential for flying class and degree of scoliosis, kyphosis and lordosis.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Lumbar scoliosis >20°, thoracic scoliosis >25°, kyphosis or lordosis >55° or any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive.	No AETC
II/IIU**	Lumbar scoliosis >20° and <30° or thoracic scoliosis >25° and <45° and asymptomatic	Yes* MAJCOM
	Lumbar scoliosis ≥30°, thoracic scoliosis ≥45°, kyphosis or lordosis >55° and asymptomatic.	Yes, IIB# AFMOA
	Any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive.	No+ MAJCOM
III	Lumbar scoliosis >20° and <30° or thoracic scoliosis >25° and <45° and asymptomatic	Yes* MAJCOM
	Lumbar scoliosis ≥30°, thoracic scoliosis ≥45°, kyphosis or lordosis >55° and asymptomatic.	Yes, limited to non-ejection aircraft# MAJCOM
	Any abnormal curvature producing noticeable deformity when dressed, pain, interference with function, or which is progressive.	No MAJCOM

* In untrained FC II and FC III waiver is unlikely.
** Waiver authority for FC IIU is AFMSA.
# No waiver for untrained FC II and FC III.
+ If MEB required, waiver authority is AFMOA.

Review of AIMWTS through mid-July 2011 revealed 85 submitted waivers for abnormal spinal curvature; 20 FC I, 15 FC II, 45 FC III, 2 SMOD, and 2 FC IIU. Of 20 FC I waiver requests, 10 were disapproved; lumbar curves and multiple disqualifying curves were all disapproved. Of the 15 FC II waiver requests, all were approved; essentially all were trained. Of the 45 FC III waiver requests, 10 were disapproved; all disapprovals were untrained; common findings among these were pain and other disqualifying conditions. All of the SMOD (2) and FC IIU (2) waiver requests were approved.

IV. Information Required for Waiver Submission.

The aeromedical summary for initial waiver should include the following:
A. History – age when deformity first noticed, who discovered, symptoms, treatment.
B. Physical – gait, range of motion, motor and sensory testing of lower extremity, reflexes.
C. X-ray results of the spine by the Cobb method.
D. Orthopedic consult.
E. MEB/RILO is required if abnormal spinal curvature is interfering with function or causing unmilitary appearance.

The aeromedical summary for waiver renewal should include the following:
A. History – symptoms, activity level.
B. Physical – gait, range of motion, motor and sensory testing of lower extremity, reflexes.
C. Orthopedic consult – if evidence of progression or symptoms.
D. X-ray results – if symptoms (back pain, neurologic, etc) develop.

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WAIVER GUIDE
Updated: Feb 09
By: Lt Col Richard Sumrall, Col Marc Goldhagen, Dr Karen Fox, and Dr. Dan Van Syoc

CONDITION:
Spinal Fracture (Feb 09)

I. Overview.

Most reviews of spinal fractures in the aviator focus on the outcome of compression fractures sustained from ejections, helicopter hard landings, and parachuting accidents. Vertebral fractures are a common injury seen after these events and most of these fractures produce no neurological deficits[1]. The incidence of spinal fractures after ejection are about 25%, but some studies have shown that the radiographic evidence of fracture post-ejection can be as high as 30-70%[2]. A sixteen year study in the German Air Force concluded the most common severe injury post-ejection was a vertebral fracture[3]. Ejection injuries typically occur in the low thoracic and lumbar areas[2]. As most aviators tend to be very active people, vertebral fractures (all types) sustained from non-aviation trauma occur frequently. Compression fractures due to osteoporosis are not considered in this waiver guide.

The flight surgeon also must be familiar with burst fractures, transverse process fractures, mechanism of injuries, pattern of injury and sequelae. Spinal fracture may result in residual mechanical deformity, disability, or chronic pain.

Injuries to the lower cervical spine normally occur indirectly as a result of a blow to the head or from rapid head deceleration and fracture patterns depend on the vertebral alignment at the time of injury, the force vector, and the patient's physical characteristics[4]. Spinous process fractures in the cervical area tend to be stable and are seen with direct trauma to the spinous process and after motor vehicle accidents involving sudden deceleration resulting in forced neck flexion[5]. With any spinal injury, but particularly in the cervical region, one needs to have a high index of suspicion for spinal cord damage. Unless there is evidence of spinal cord injury, most cervical fractures can be managed in a closed fashion.

In the thoracic and lumbar areas, wedge or anterior compression fractures account for 50-70% of all fractures. Burst fractures comprise about 14% of all thoracolumbar fractures. Spinal cord injury from retropulsion of bony fragments into the spinal cord can occur so these patients need to be carefully evaluated[5]. These fractures can be unstable and can be associated with significant disc injury[6]. Fractures to the lower lumbar spine can be more problematic due the anatomic complexity of that area and to the increased normal mobility of the lumbosacral junction[7].

Management of spinal fractures is based on type of fracture (compression, burst), location (transverse process, thoracolumbar, cervical), number of vertebrae, presence of disk injury, presence of neurologic injury, and residual disability. For stable injuries, many spine experts advocate non-operative treatment while decompression and spinal fusion is recommended for unstable fractures (defined by presence of some level of neurological compromise). Operated patients can enter into rehabilitation sooner and be discharged home earlier than non-operated unstable fracture patients[8]. For burst fractures of the thoracolumbar spine, most experts would agree that an operative approach is best for those with a neurologic deficit[9]. Underlying disease

such as osteoporosis should not be found in this population, so if found, appropriate medical management should be initiated. The nature of spinal fractures may require multiple level surgical fusion or fixation. Most compression fractures do not require fixation or fusion.

Vertebroplasty and kyphoplasty are relatively new procedures designed for the treatment of painful vertebral compression fractures, particularly in patients with osteoporosis. Vertebroplasty is the injection of bone cement into a vertebral body and kyphoplasty is the placement of a balloon into the vertebral body, followed by an inflation/deflation sequence to create a cavity prior to cement injection. Long-term safety of these procedures has yet to be determined and the procedure is technically demanding, so the potential exists for significant complications[10].

Recovery from spinal fractures varies, and does not necessarily correlate with type, location, levels, or treatment. Neurologic defect from the injury, unless minor initially or treated within hours, usually does not improve significantly over time with treatment.

There is no literature reviewing the return to parachute duties in those who have sustained and recovered from a spinal fracture.

II. Aeromedical Concerns.

Even after healing, ejection or high Gz loading possesses the risk of repeat fracture and, more ominously, spinal cord damage. Limited mobility after cervical fracture healing, fusion, or fixation can limit lookout from the cockpit and performance under Gz loading while the neck is turned. Thoracolumbar fractures can also limit mobility or distract due to pain, but are generally not as limiting for aviation duties. A fully healed uncomplicated spinal fracture should not have trouble handling the traumatic forces in military parachuting. In the more complicated cases, the presence of hardware increases the risk of catastrophic outcomes in parachuting accidents or any event with excessive Gz loading.

III. Waiver Considerations.

Fractures or dislocations of the vertebrae is disqualifying for all US Air Force aircrew. History of fractures of the transverse processes is not disqualifying if asymptomatic." For waiver consideration, they must be asymptomatic, have a normal musculoskeletal and neurological exam, and be cleared by the treating surgeon.

Aviators with compression fractures of any level tend to do well. If the compression is less than or equal to 25%, an unrestricted waiver is appropriate. For greater than 25% compression, pilots and navigators may be considered for categorical FCIIB waiver; FCI/IA applicants will not be considered for a waiver. If the compression is associated with disability, such as chronic pain or decreased mobility, or neurological injury after adequate healing time, or other medical disease, disqualification may be appropriate. Compression fractures treated surgically normally heal well and should be granted a categorical waiver. Thoracolumbar compression fractures treated with kyphoplasty may be considered for unrestricted waiver after six months if not due to osteoporosis.

Cervical burst fractures are rare, but if not associated with neurologic deficit or range of motion defect, the case should be medically managed as a compression fracture. Thoracolumbar burst fractures have a high association with neurologic injury[6]. Return to flight duty is not appropriate, if

after adequate healing time, significant neurologic residual deficit persists. Waiver limitations should not be based on number of levels (trauma may involve multiple levels), but rather on severity of fracture. The distinction of ejection/high Gz limitation and permanence should be based on severity of fracture, time since injury, treatment, and functional status of the aviator. Timing of waiver submission is based on clearance from the treating orthopedic surgeon, but would not be less than six months. One study of US Army aviators found no correlation between type of treatment and disqualification from aviation duties[8]. Thoracolumbar burst fractures should have periodic (annual) films with the interim evaluation to ensure no progression of kyphosis until stable.

Parachuting duties in those who have fully healed from spinal fracture should not be restricted in those with small compression or uncomplicated spinal fractures treated non-surgically after one year. The presence of surgical spinal hardware contraindicates military parachuting duties.

If the fracture is associated with herniated nucleus pulposus, follow the more restrictive waiver guideline.

Table 1. Waiver potential for Spinal Fractures for FC I/IA, II and III.

Fracture Pattern & Level	**Flying Class**	**Waiver Potential Waiver Authority**	**Waiting Period**	**Required Studies**
Compression * #	FC I	No AETC	N/A	
Cervical and Thoracolumbar >25%	FC II/IIB	Yes AFMOA	3 months	Dynamic x-rays
	FC III	Yes MAJCOM	3 months	Dynamic x-rays
	Parachute &	Yes MAJCOM	1 year	Dynamic x-rays
Burst Cervical or Thoracolumbar	FC I	No AETC	N/A	
	FC II	Yes AFMOA (ACS)	6 months	Plain Film and CT if indicated
	FC IIB	Yes AFMOA	6 months	Plain Film and CT if indicated
	FC III	Yes MAJCOM	6 months	Plain Film and CT if indicated
	Parachute &	Yes MAJCOM	1 year	Plain Film and CT if indicated

* Compression fracture implies not surgically treated; <25% may not require a restricted waiver, and >25% needs a FC IIB waiver.
# TL compression fractures treated with kyphoplasty may be considered for unrestricted waiver at the six-month point.
& Any spinal fracture requiring hardware in a parachuter is disqualifying for continued parachute duties

Review of AIMWTS through Dec 08 revealed a total of 142 cases submitted with a diagnosis of spinal fracture. Of this total, 17 were FC I/IA, 60 were FC II, and 65 were FC III. In the FC I/IA category, 4 were disqualified, one for not meeting minimal height standards, one for migraine headaches and it was unclear why the other two were disqualified. In the FC II category, 6 were disqualified, mostly due to other diagnosis or persistent pain. In the FC III category, a total of 12 were disqualified, mostly for other medical conditions. There were a wide variety of injuries in all vertebral areas. Most were due to MVAs or sports injuries, but there were numerous falls, a total of 11 were from aircraft mishaps and there were 5 listed as injuries from a military parachuting incident.

IV. Information Required for Waiver Submission.

Full orthopedic/neurosurgical evaluation is required and should include being released to full unrestricted activity. Documentation of normal spinal and neurologic exam is required. Spinal exam includes inspection for deformity, percussion for pain, range of motion (flexion, extension, bending, twisting), and strength testing. The aviator should not have a duty-limiting condition secondary to the spinal injury.

The aeromedical summary for initial waiver should include the following:

A. History of injury, immediate exam results, and treatment
B. All imaging results as outlined in Table 1
C. Consult from orthopedic surgery or neurosurgery with specific activity recommendation.
D. Current activity level
E. MEB reports if applicable

The aeromedical summary for waiver renewal should include the following:

A. History of injury and interim history
B. All imaging results since last waiver (if performed) – if TL burst fracture, annual films are required
C. Updated orthopedic surgery or neurosurgery report if indicated.

ICD9 Codes for Spinal Fractures	
805	Fracture of vertebra without mention of cord injury
806	Fracture of vertebra with spinal cord injury

Reviewed by LtCol Randall McCafferty, AF/SG Consultant for Neurosurgery.

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WAIVER GUIDE
Updated: Jun 2010
Supersedes Waiver Guide of Nov 2005
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Reviewed by LtCol Erika J. Struble, AF/SG Consultant for Hematology-Oncology and Col David L. Smith, AF/SG Consultant for General Surgery

CONDITION:
Splenectomy (Jun 10)

I. Overview.

Splenic Function

The spleen is the largest lymphoid organ within the body and processes 6% of the cardiac output. The macrophage-lined sinuses of the red pulp function as filters for senescent and abnormal red blood cells and the repair or polishing of normal red blood cells. The filtering function prevents intravascular hemolysis and release of hemoglobin into the plasma. Circulating hemoglobin due to intravascular hemolysis is also filtered by splenic macrophages. Splenic macrophages process hemoglobin and iron and serve as a store for iron. The white pulp of the spleen consists of germinal centers similar to lymph nodes, but the macrophages are uniquely designed to recognize, trap and process carbohydrate antigens found on blood-borne pathogens without surface opsonins. In addition, the spleen is the major producer of antigen-specific IgM antibody which is important in the early response to infection.[1] The spleen also serves as a large reservoir for platelets, containing up to 30% of the platelet volume. Absence of these important blood and immune monitoring functions places asplenic individuals at risk for life-long infectious and thrombotic complications.[2]

Indications for Splenectomy

The National Hospital Discharge Survey indicates that 22,000 total splenectomies were performed in 2005.[3] Common reasons for splenectomy include trauma, hematologic disorders and malignancy. Appreciation for the immunologic and blood monitoring functions of the spleen has resulted in a trend toward splenic preservation in both trauma and hematologic disorders.[4] Up to 70-90% of children and 40-50% of adults with splenic injury are successfully managed non-operatively.[5] Less common conditions requiring splenectomy include splenic cysts due to parasites (hydatid disease) and splenic abscess.

Hematologic disorders

The following hematologic conditions have commonly led to splenomegaly and/or hypersplenism and a potential splenectomy: idiopathic thrombocytopenic purpura (ITP), thrombotic thrombocytopenic purpura (TTP), idiopathic autoimmune hemolytic anemia (AIHA), hereditary spherocytosis, hemoglobinopathies such as sickle cell disease and thalassemia, myelofibrosis and myeloid metaplasia, and myeloproliferative disorders such as polycythemia vera and essential thrombocythemia. The last category of patients is considered high risk for thrombotic complications (see Vascular Complications below).[5, 6]

Malignancy
Malignancies commonly leading to splenectomy include Hodgkin's disease, non-Hodgkin's lymphoma, chronic myelogenous leukemia, chronic lymphocytic leukemia and pancreatic cancer. The latter is the most common malignancy resulting in splenectomy.[5]

Complications of Splenectomy
Acute complications occur in the initial postoperative period and include hemorrhage, subphrenic abscess, pancreatic injury or fistula, and portal or mesenteric vein thrombosis. Late complications include overwhelming postsplenectomy sepsis (OPSS) and thrombosis. Other alterations in blood content and viscosity can also occur and include leukocytosis, thrombocytosis, increased lipid levels, intravascular hemolysis and endothelial dysfunction. The full effect these vascular changes on late vascular complications has not been completely studied or measured.

Overwhelming Post Splenectomy Sepsis (OPSS)
The absence of the specialized phagocytic immune functions of the spleen places asplenic patients at risk for infection and overwhelming sepsis. The most serious and most common pathogen is *S. pneumonia* which accounts for over half all infections and deaths. Other bacterial pathogens include *H. influenza*, *N. meningitides* and the less common bacteria *Capnocytophagia canimorsus* (dog and cat saliva) and *Bordetella homesii*. Severe forms of parasitic infections with malaria and babesiosis, ehrlichiosis and cytomegalovirus have also been documented. OPSS presents with fever and a short prodrome that rapidly progresses to septic shock and diffuse intravascular coagulation. Mortality can be as high as 50-80% and occur within 48 hours of hospital admission.[7, 8]

The risk for OPSS applies to all asplenic patients and extends through their lifetime. The risk is higher in children because they lack pre-existing immunity and is estimated at one per 175 patient-years. The risk for adults is estimated at one per 400-500 patient-years.[7] Risk for OPSS also varies by underlying disorder and the reason for splenectomy. Cumulative risk for OPSS after traumatic splenectomy is the lowest at 1.5%; hematologic disorders are next at 3.4% and sickle cell disease and thalassemia are the highest at 15% and 25%, respectively.[1]

The risk for OPSS can be decreased by a three tiered approach of vaccination, prophylactic antibiotics and education.[8, 9] Vaccinations should be given for pneumococcus, *H. influenza*, meningococcus and annual viral influenza. Booster is recommended for pneumococcal vaccine after five years. Meningococcal booster with the conjugate vaccine is recommended if the polysaccharide vaccine was received 3-5 years in the past. Vaccinations should be given at least fourteen days before surgery or fourteen days after surgery when not elective.[10]

Prophylactic antibiotics are given in a daily regimen or empirically for fever. A daily regimen of oral penicillin VK or amoxicillin is recommended for children until age 5 or at least 3 years following splenectomy. Daily regimens are not recommended in adults except for those who have experienced OPSS as the risk for recurrence is increased six-fold. Empiric antibiotic therapy for fever is recommended for all asplenic patients. Adult patients should have at least one dose of an anti-pneumococcal antibiotic immediately available if fever and rigors develop and proceed for emergency care without delay. Antibiotic recommendations include amoxicillin-clavulanate (875 mg BID), cefuroxime axetil (500 mg BID), levofloxacin (750 mg QD), moxifloxicin (400 mg) or gemifloxicin (320 mg QD). Prophylactic antibiotics have been shown to decrease the incidence of infection by 47% and the mortality by 88%.[7, 10]

Education is the third arm of OPSS prevention. Studies have shown an alarming lack of unawareness among asplenic patients marked by failure to comply with vaccine and antibiotic recommendations. Patients should be counseled before and after splenectomy and be encouraged to wear a medical alert bracelet. Registries for asplenic patients may increase compliance and improve outcomes.[8, 9]

Vascular Complications

Over the past 30 years, the medical literature has steadily accumulated evidence of a life-long increased risk of vascular complications after splenectomy. Vascular complications include thrombosis, thromboembolism, vascular smooth muscle remodeling, vasospasm or atherosclerosis and occur on the arterial and venous sides of the circulation. The risk appears to vary by cause for splenectomy and underlying disease states, but none are without increased risk. The highest risk is in those with underlying myeloproliferative disorders or in hematologic disorders with on-going intravascular hemolysis. Venous thromboembolism appears to be more common than arterial. Currently, there are no clear guidelines for prophylactic anti-platelet or anticoagulation medications in splenectomized patients.[3]

The pathophysiologic mechanisms for vascular complications are multifactorial and include hypercoagulability, platelet activation, endothelial activation, vascular remodeling and increased lipid levels[3] Reactive thrombocytosis may occur in up to 75% of splenectomized patients but is not consistently associated with thrombosis.[11-13] Chronic platelet activation is more likely and has been shown to be increased in splenectomized patients with pulmonary hypertension.[14] Hypercoagulability may also be related to increased cellular microparticles and damaged red blood cells that activate the vascular endothelium.[3, 15] In addition, plasma levels of hemoglobin may be increased due to intravascular hemolysis and loss of splenic hemoglobin uptake. Increased free hemoglobin has direct inflammatory and cytotoxic effects on endothelium and scavenges nitric oxide needed for vascular smooth muscle relaxation.[4, 16] Finally, splenectomy may increase lipid levels as evidenced by animal studies.[17]

Venous thromboembolism (VTE)

Portal and mesenteric vein thrombosis most commonly occurs within the first few weeks after splenectomy. The incidence may be as high as 50%, but symptomatic thrombosis occurs in approximately 5-10% of cases.[12, 18] Predisposing factors include thrombocytosis (platelet count > 650 x $10^3/\mu l$), greater spleen weight, myeloproliferative disease and possibly laparoscopic technique.[10, 18] Most patients respond to systemic anticoagulation with recannulation in 90% (18), but death can occur in 5% of cases.[11] Survivors may develop portal hypertension.[12] Prophylactic postoperative anticoagulation should be considered in patients with hematologic disorders, but intensity and duration has not been determined.[19]

Late venous thromboembolic events include deep venous thrombosis and pulmonary embolus. In two mortality studies, splenectomized patients for all reasons had increased mortality due to venous thromboembolic events (VTE). In 1996 Linet et al reported a rate of 0.31% (4/1297) and Standardized Mortality Ratios of 4.8 (1.3-12.3) in trauma patients who died more than one year after the splenectomy.[20] In 1989 Pimpl et al reported an increased mortality related to pulmonary embolus in 35.6% of splenectomized patients compared to 9.7% of controls ($p<0.001$).[21] In 2008 Schilling et al demonstrated an increased lifetime risk of venous thromboembolic events (VTE) in splenectomized HS patients as compared to unaffected controls and spleen-in HS patients (see Table 1). The incidence did not increase above controls until after 30 years of age, then increased

incrementally: 3-6% at age 30, 5-7% at age 40, 10-13% at age 50 and 19-20% at age 70.[22] Lastly, in 2005 Jaïs et al reported that 54% of splenectomized patients with pulmonary hypertension had a history of VTE at least one year after splenectomy.[13]

Arteriothrombosis

The first suggestion of increased arterial thrombotic complications was reported by Robinette and Fraumeni in 1977 who evaluated the causes of mortality in WWII veterans following traumatic splenectomy.[23] They reported an excess mortality due to ischemic heart disease compared to controls (RR 1.857, $p<0.05$). Schilling confirmed this increased risk in splenectomized HS patients in 1997 and 2008.[25] By age 70, the cumulative incidence of first arterial events (MI, stroke, coronary artery surgery, carotid artery surgery) was 32% in males and 22% in females with a hazard ratio of 7.15 (2.81-17.2, $p<0.0001$). The incidence rate did not increase above controls until after 50 years of age. Other reported arterial events in this population included acute ischemic optic neuropathy and pulmonary hypertension.[22] Linet also showed an association of older age with increased cerebrovascular events (3.7%, SMR 1.7).[20] ITP patients treated with splenectomy were found to have increased platelet activation associated with accelerated small vessel cerebrovascular disease and vascular dementia.[24]

Pulmonary hypertension

The most compelling evidence for thrombotic complications after splenectomy is the association of splenectomy with pulmonary hypertension. Splenectomy is now considered an independent risk factor for the development of chronic thromboembolic pulmonary hypertension (CTEPH)[25] Although splenectomy has been associated with CTEPH, the incidence of CTEPH after splenectomy for all causes has not been determined by prospective studies. A case-control study by Jaïs showed that CTEPH developed in a mean of 16 years after splenectomy (range 3-35 years) and another study by Hoeper showed a range of 4 to 34 years after splenectomy. CTEPH developed in patients for all causes of splenectomy. The series by Jaïs included a majority of trauma splenectomies (12/22) with a mean age of 34 years at the time of surgery. Other causes of splenectomy included ITP and HS. Selective series in thalassemia and Gaucher's disease have also showed an association of splenectomy with pulmonary hypertension. Lastly, splenectomized patients who develop CTEPH have higher surgical mortality, persistent pulmonary hypertension and show recurrent disease after transplantation.[13, 26, 27]

II. Aeromedical Concerns.

Aeromedical concerns stem from the underlying condition for which the splenectomy was performed and the lifelong risk of overwhelming sepsis and vascular complications. Aeromedical concerns of the underlying medical conditions are discussed in the appropriate waiver guide for that condition and will not be repeated here. The lifelong risk of overwhelming sepsis and vascular complications apply to all splenectomized patients regardless of cause.

OPSS can present acutely and progress rapidly even within a few hours of onset which may result in incapacitation or the need to divert the flight. The splenectomized aviator should not delay treatment with antibiotics and care in an appropriate medical facility. Aviators should carry at least one dose of prophylactic antibiotics to take if symptoms occur while in flight. The incidence of OPSS ranges from 1.5% for trauma splenectomies to 25% in hematologic disorders and is highest in the first three years after splenectomy. Vaccination, antibiotics and education is imperative to reduce the risk of OPSS in aviators to acceptably low levels.

The aeromedical impact of the lifelong risk of vascular complications is more difficult to discern because the risk has not been well-defined nor are there clear recommendations for anti-platelet or anticoagulation prophylaxis. Any venous or arterial thromboembolic event could result in sudden incapacitation such as deep venous thrombosis and pulmonary embolus (DVT/PE). Restricted movement in the cockpit on long flights could increase the risk of developing DVT/PE. The incidence of venous thromboembolic events is greatest in the early postoperative period (PVT, MVT and DVT), remains below 10% for several years and appears to increase as the patient gets older. The incidence of arterial events appears to increase after 50 years of age.[22]

Splenectomy has been strongly associated with pulmonary hypertension. Unfortunately, the overall incidence of pulmonary hypertension in splenectomized patients has not been reported, but is likely very low. It can develop as early as two years or as late as 34 years after splenectomy and may be more frequent in those patients with a history of VTE.[13, 25] By the time of presentation, damage to the pulmonary vasculature is already extensive.[28] Common symptoms include exertional dyspnea, fatigue, weakness, anginal chest pain and syncope. These symptoms are due to impaired oxygen transport and reduced cardiac output which is not compatible with aviation duties. In addition, hypoxia as may be present in the aviation environment is a potent stimulant of pulmonary vasoconstriction and may worsen the development of disease.[29] Pulmonary artery endarterectomy may be curative, but patients with splenectomy tend to have distal disease not amenable to surgery.[27] Splenectomized aviators should be evaluated regularly for any signs or symptoms of pulmonary hypertension and have further testing if pulmonary hypertension is suspected.

III. Waiver Consideration.

A history of splenectomy due to trauma or hereditary spherocytosis is not disqualifying and does not require a waiver. Other causes of splenectomy are disqualifying for flying classes I/IA, II, and III and require a waiver for return to flying duties. Splenectomy is not disqualifying for FC IIU, ATC/GBC, and SMOD duties. Issuance of a waiver requiring renewal insures that aviators are properly educated, vaccinated and receive prophylactic antibiotics for OPSS across their lifetime. Flight surgeons must routinely and vigorously educate their asplenic flyers about OPSS. Creating a waiver in AIMWTS serves to better track these patients. This practice could prevent severe complications, as studies have shown that registries for splenectomized patients are more effective in the prevention of OPSS.

Table 1: Waiver potential for flyers status post splenectomy

Flying Class (FC)	Condition	Waiver Potential[#] Waiver Authority
I/IA	Splenectomy secondary to trauma	No waiver required
	Splenectomy secondary to medical condition[*]	Yes AETC
II	Splenectomy secondary to trauma	No waiver required
	Splenectomy secondary to medical condition[*]	Yes MAJCOM
IIU	Splenectomy for any reason[*]	Yes AFMSA
III	Splenectomy for any reason[*]	N/A-not disqualifying
ATC/GBC	Splenectomy for any reason[*]	N/A-not disqualifying
SMOD	Splenectomy for any reason[*]	N/A-not disqualifying

*If the medical condition is also disqualifying, refer to the applicable AFI or waiver guide for guidance.
No indefinite waivers.

AIMWTS review in Apr 2010 revealed total of 12 waivers submitted for total splenectomy. There were 1 FC I/IA cases, 6 FC II cases, 1 FC IIU case, and 4 FC III cases. The causes for splenectomy were 3-hereditary spherocytosis, 3-ITP, 1-hypersplenism with thrombocytopenia, 1-essential thrombocythemia, 2- trauma (waiver not necessary), 1-rupture due to mononucleosis and 1-incidental to pancreatic surgery. The case of essential thrombocythemia (FC III) was disqualified due to thrombotic complications and treatment with hydroxyurea; all other cases received a waiver.

IV. Information Required for Waiver Submission.

The aeromedical summary for the initial waiver for splenectomy should include the following:
A. Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. List and fully discuss all clinical diagnoses requiring a waiver.
B. A complete history describing the cause of splenectomy, the age at splenectomy and response to splenectomy if done for therapeutic reasons (i.e. HS or ITP). The history also needs discussion of the postoperative course and must include any reports of DVT, MVT or PVT.
C. Documentation of vaccination for pneumococcus, meningococcus, *H. influenza* and viral influenza, prescription of prophylactic antibiotics, type and dose for use in the case of fever and education about the risks of OPSS must be included.
D. Labs: CBC and lipid panel.
E. Copies of all operative reports and a statement from treating physician.

The aeromedical summary for waiver renewal for splenectomy should include the following:

A. Interval history specifically noting any changes in disease course and treatments since the last waiver submission. Included should be a complete review of systems, and specifically include any signs or symptoms of VTE or pulmonary hypertension
B. Documentation of vaccination status and booster vaccinations given, renewal prescriptions for prophylactic antibiotics and refresher education on the risks of OPSS must be included. Physical examination for VTE and pulmonary hypertension should be done.
C. Labs: CBC and lipid panel.
D. Statement of patient condition from treating physician.

ICD-9/CPT codes for splenectomy	
41.5	Operations on bone marrow and spleen; total splenectomy
41.43	Operations on bone marrow and spleen; excision or destruction of lesion or tissue of spleen; partial splenectomy

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WAIVER GUIDE
Updated: May 2012
Supersedes Waiver Guide of Aug 2008
By: Dr Dan Van Syoc
Reviewed by LtCol Warren Kadrmas, AF/SG consultant in Orthopedic Surgery

CONDITION:
Spondylolysis and Spondylolisthesis (May 12)

I. Overview.

Spondylolysis refers to a defect in the pars interarticularis (isthmus between the superior and inferior facets) within the posterior elements of a vertebra, which enables the body of the vertebra to be displaced anteriorly. The prevalence of spondylolysis in the general population is estimated as 5%, and up to 8% in the elite athlete population.[1] Up to 6% of adults have spondylolysis, and L5 (85%-95%) is the most common site.[2] Spondylolysis can be unilateral but is often bilateral. Stress or fatigue fractures of the pars interarticularis (isthmus) can result from repetitive extension of the lower back that occurs especially with athletic activities in childhood and adolescence. The presence of spondylolysis is known to accelerate intervertebral disc and facet degeneration with age.

Spondylolisthesis is the anterior displacement (slippage) of a vertebral body in relation to the vertebral body below. A defect in the posterior elements of the vertebra (spondylolysis) enables the displacement. The degree of displacement determines the grade: low-grade (grade I – up to 25%, grade II – 26 to 50%), and high-grade (grade III - 51 to 75%, grade IV - greater than 75%). This displacement occurs primarily in the lumbar region; it is extremely rare in cervical and thoracic regions. There are five types of etiologies: dysplastic, pathologic, traumatic, degenerative, and isthmic. Dysplastic spondylolisthesis is a congenital condition that is relatively uncommon, as is pathologic spondylolisthesis. Traumatic spondylolisthesis can occur when blunt trauma is applied transversely to vertebral posterior elements other than the pars interarticularis. Degenerative spondylolisthesis, the most common cause of spondylolisthesis, is associated with degeneration of the facet joints and intervertebral discs and is rarely seen before the age of 40.[3] Degenerative spondylolisthesis is most common at L4-L5, rarely is high-grade, is roughly six times more common in females, and is more prevalent with increased age.[4] In the adult, it is rare for spondylolysis to progress to spondylolisthesis or for spondylolisthesis to progress.[5] If spondylolisthesis progresses, the risk of spinal stenosis and neuroforaminal stenosis increases, which usually causes aggravation of symptoms. One study found that progressive slipping occurred in 30% of patients after 5 to 15 years, but did not have any significant effects on clinical outcome.[3] Isthmic spondylolisthesis results from spondylolysis, and gymnasts, weight lifters, and football players are at particular risk. Isthmic spondylolisthesis is the most common type in the younger population with a peak age of onset at 20 years and a 2:1 predilection for males. A 26% incidence in first-degree relatives of patients with isthmic spondylolisthesis has been reported.[1] Isthmic spondylolisthesis is most common at L5-S1 and to a lesser extent at L4-L5.

There is no typical discernable feature in the presentation of low back pain that suggests the presence of spondylolisthesis or spondylolysis. Range of motion about the lower back is commonly restricted due to pain and hamstring tightness is common. Initial treatment provided should follow acute nonspecific low back pain clinical guidelines. Spondylolisthesis and spondylolysis are

conditions often discovered after x-rays are taken during the management of low back pain patients who fail to improve as anticipated. The classic break in the "Scotty dog's neck," seen on 45-degree oblique radiographs that represents the defect in the pars interarticularis, is diagnostic of spondylolysis. Lateral radiographs are used to diagnose spondylolisthesis.[6] A computed tomography (CT) scan can serve to validate the presence of spondylolysis if there is uncertainty on the radiographs. Neuroforaminal stenosis, disc herniation, spina bifida, and central spinal stenosis are all comorbidities; therefore, an MRI or CT may be useful in cases in which radicular findings are present or suspected. A bone scan, standard or single-photon emission CT (SPECT), can be helpful in determining acuity if recent trauma is reported.[1]

Treatment of flyers with spondylolisthesis and/or spondylolysis follows that for nonspecific low back pain, i.e., exercise, analgesics, and education. Hyperextension should be avoided until pain symptoms resolve. Use of a low back brace that retards lumbar lordosis for 1 to 3 months may augment treatment, particularly in cases when a new onset spondylolysis has occurred. Bracing is commonly prescribed for youth and adolescent cases. For individuals with associated foraminal stenosis, selective nerve root blocks may help. Facet blocks may be useful over the area of spondylolysis.[6] In individuals who develop neurological symptoms or who fail to improve despite conservative treatment, operative intervention should be considered.[3] Surgery is not typically indicated and is usually a final effort to resolve pain attributed to spondylolysis and/or spondylolisthesis that persists after one year of aggressive conservative management. Surgery may also be indicated if any of the above comorbidities present warrant such intervention. Grade IV spondylolisthesis warrants surgical consideration. A study of over 10,000 surgically treated cases of spondylolisthesis revealed a complication rate of 7.9% and demonstrated that the highest complication rate was in patients with high-grade disease, evidence of degenerative spondylolisthesis, and in the older patients.[7]

The clinical course for low-grade (I, II) spondylolisthesis is much different than high-grades (III, IV) in that grades I to II rarely progress while high-grade spondylolisthesis often leads to disabling back pain, neurogenic claudication, and/or nerve root impingement. The recommended treatment in athletes for grades I and II is conservative care while surgical intervention is significantly more likely with high-grade spondylolisthesis.[2] For symptomatic low-grade spondylolisthesis, conservative management is successful in 75%-80% of cases. However, such management is efficacious in only about 10% of high-grade spondylolisthesis cases.[1] A 2-year outcome randomized cohort study of 304 patients with image confirmed spinal stenosis and degenerative spondylolisthesis found no significant advantage for surgery over nonsurgical care, even though reanalysis that allowed for patient crossover (non-randomized) later showed surgical benefit.[4] There is no long-term outcome study in athletes regarding return to sports after fusion.[2]

II. Aeromedical Concerns.

Spondylolisthesis and spondylolysis represent structural abnormalities of the lumbar spine and may be manifested by low back pain. Such pain is unlikely to cause sudden incapacitation but can cause distraction during flight operations. Additionally, it has long been hypothesized that spondylolisthesis may reduce the ability of the spine to withstand high Gz forces and as such could cause severe problems on ejection. However, in a study of 138 ejection cases with or without spinal fractures, no difference in deviations of the vertebral arc (spondylolysis and spondylolisthesis) was found, and in fact the percentage of such deviations (7%) approximated the percentage deviations in non-ejected pilots with an otherwise healthy spine (6 – 7%).[8] Furthermore, an AF Aerospace

Medical Research Laboratory report on spinal column considerations for flight physical standards noted that there were no proven demonstrations in which the aggravation of spondylolisthesis was shown in the course of time.[9] Another report found that it was much more common to have stability of spondylolysis or spondylolisthesis maintained following trauma severe enough to cause multiple fractures of adjacent vertebral segments than to observe a very rare case of trauma induced aggravation of spondylolisthesis.[10] These findings are not inconsistent with the theory that spondylolysis and spondylolisthesis occur and are exacerbated by, the excessive force on the pars interarticularis that is produced when the lower back is hyperextended while forced backwards.[11] This resultant force is a shearing (angulated) force rather than an axial force such as that experienced during ejection. Hence, the historical concern that spondylolysis or spondylolisthesis predisposes a flyer to severe injury in the event of an ejection appears to have been overestimated and not supported by available outcome data.

III. Waiver Considerations.

Symptomatic spondylolysis or spondylolisthesis is disqualifying for all flying classes. Although not listed as disqualifying for ATC/GBC or SMOD duties, severe cases that require hospitalization are disqualifying for retention and will then require a waiver if returned to duty. Spondylolysis and spondylolisthesis are often associated with other spinal pathology (e.g. spina bifida, disc protrusion, spinal stenosis, disc disease) that is also disqualifying. If spondylolysis or spondylolisthesis is treated with surgery, please refer to the waiver guide on herniated nucleus pulposus (HNP) and spinal fusion for additional waiver considerations.

Table 1: Waiver potential for spondylolysis and/or spondylolisthesis

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**
I/IA	Asymptomatic spondylolysis and/or asymptomatic grade I/II spondylolisthesis	Yes AETC
	Symptomatic spondylolysis and/or symptomatic spondylolisthesis, or asymptomatic spondylolisthesis grade III or higher (treated or not)	No AETC
II/III ATC/GBC SMOD**	Asymptomatic spondylolysis and/or asymptomatic spondylolisthesis	Yes# MAJCOM
	Symptomatic spondylolysis and/or symptomatic spondylolisthesis controlled with exercise or NSAIDs	Yes* MAJCOM
	Spondylolysis and/or spondylolisthesis treated with surgery	Maybe* AFMSA/MAJCOM†

* Waiver unlikely for untrained FC II and FC III personnel.
# If spondylolisthesis is grade III or greater waiver unlikely for untrained FC II and FC III individuals.
† See HNP and spinal fusion waiver guide.
** Waiver authority for SMOD personnel is AFSPC or GSC.

A review of AIMWTS in April 2012 revealed 125 individuals with waiver dispositions for spondylolysis and/or spondylolisthesis. The breakdown was as follows: 4 FC I/IA cases (3 disqualifications), 67 FC II cases (5 disqualifications), 48 FC III cases (9 disqualifications), 3 ATC/GBC cases (2 disqualifications), and 3 SMOD cases (0 disqualifications). There were a total of 19 disqualified cases; all but three were disqualified primarily for back pain-related issues. One DQ was for PTSD, another for anthropometrics, and the final one for MS.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver should include the following:
A. History – Provide a history of how diagnosis was made along with a thorough back history that includes any adolescent sports injuries and vehicular accidents. If individual had past or present symptoms, document nature of pain and treatment received. State current activity level.
B. Physical – back (range of motion), extremities (range of motion, strength, sensation, and reflexes).
C. Radiological –X-ray (AP, LAT, obliques). If CT accomplished, provide results.
D. Spine/Orthopedic consult.

The AMS for waiver renewal should include the following:
A. Interval history – Describe circumstances of any back pain, severity, limitations, treatment, duration of symptoms, and DNIF period; current activity level.
B. Physical – back (range of motion), extremities (range of motion, strength, sensation, and reflexes).
C. Radiological – X-ray (AP, LAT, obliques) results if recurrent symptoms.
D. Spine/Orthopedic consult – if recurrent symptoms.

If spondylolysis or spondylolisthesis is treated with surgery please refer to the waiver guide on herniated nucleus pulposus (HNP) and spinal fusion for additional requirements.

ICD9 Codes for Spondylolysis and Spondylolisthesis	
738.4	Acquired spondylolisthesis/spondylolysis
756.11	Spondylolysis (congenital)
756.12	Spondylolisthesis (congenital)

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WAIVER GUIDE
Updated: Jul 2010
Supersedes Waiver Guide of Mar 2006
By: LtCol Scott Zaleski (RAM X) and Dr. Dan Van Syoc
Reviewed by Dr. Steve McGuire, ACS Neurologist.

CONDITION:
Subarachnoid Hemorrhage, Non-Traumatic (Jul 2010)

I. Overview.

Subarachnoid hemorrhage (SAH), which is defined as the presence of blood in the space between the arachnoid membrane and the pial covering of the brain or spinal cord, is a significant life-threatening neurological event. It results from the rupture of blood vessels on or near the surface of the brain or ventricles, usually from cerebral aneurysms or arteriovenous malformations (AVMs). These hemorrhagic strokes release blood into the cerebrospinal fluid (CSF) space with significant consequences. Morbidity may be as high as 50%.[1] The most significant neurological complications of SAH include rebleeding, vasospasm, hydrocephalus, and seizures.[2] Among those that survive, up to 30% may have significant neurologic deficits. Incidence rates of SAH may approach 16 per 100,000, with about 30,000 new cases in the United States each year (with a slight predominance in women); the peak incidence is in the sixth decade of life.[3] Risk factors include hypertension, heavy drinking, and smoking.[4] More rare causes of SAH include hematologic disorders (thrombocytopenic purpura, disseminated intravascular coagulopathy, and hemophilia), central nervous system neoplasm, and vasculitis.

The classic presentation is the acute onset of a diffuse severe headache (often noted as the "worst headache of my life") with vomiting, as well as possible loss of consciousness (for a variable period of time). Focal neurological signs, retinal hemorrhages, nuchal rigidity, photophobia, and signs of meningismus can possibly be seen as well. Diagnosis is usually made by non-contrast head CT (with a sensitivity of about 94%) which should be performed as soon as practicable. Those patients with suspected SAH with negative CT should undergo a lumbar puncture (LP) which might demonstrate xanthochromia on centrifuged CSF. The bilirubin of xanthochromia (from the breakdown of SAH-released RBCs) requires 12 hours to develop, so occult SAH patients outside of this time window will need cerebral angiography to confirm the diagnosis. Intra-arterial angiography is the gold standard to diagnose aneurysms. Timely diagnosis and localization of aneurysms can hasten surgical or endovascular intervention and prevent rebleeding.[2]

Initial management of SAH rests on the basics of circulatory, ventilator, and airway support in the intensive care setting. Transfer to a tertiary care center is recommended where endovascular, neurosurgical, and neurointensive care management can be provided.[3] Those with a Glasgow Coma Scale (GCS) < 8 should receive elective intubation to protect the airway from obstruction and aspiration pneumonia (even though spontaneous breathing is seldom compromised in SAH).[1] SAH patients are frequently volume depleted and require maintenance of euvolemia with normal saline. Hypotonic or dextrose-containing solutions could result in hyperglycemia or hyponatremia due to the release of large amounts of catecholamines and vasopressin. Up to 20% of SAH patients develop hydrocephalus, possibly within hours, due either to the acute bleed with possible intraventricular extension. This can cause either communicating hydrocephalus or obstructive hydrocephalus. Some cases require external ventricular drainage. Significant elevations of blood

pressure can be treated with alpha- or beta-receptor antagonists. Nitroglycerine and nipride should be avoided as they are cerebral venodilators adversely effecting cerebral blood flow (CBF).

Cerebral vasospasm can occur in up to 75% of SAH patients. This can involve the vessels in the circle of Willis and their major branches (often different than the arteries responsible for the initial bleed) and can cause infarction distal to the location of spasm. Nimodipine is an oral calcium channel blocker that is one of the few medications found to be effective in the treatment of vasospasm. Transcranial Doppler (TCD) studies can be used to determine intracranial vascular flow (narrowed vessels in vasospasm have increased flow velocities heralding possible neurologic deterioration). In those SAH patients with vasospasm who develop symptoms of neurological deterioration, intervention is commonly initiated with hypervolemia, hypertension, and hemodilution ("triple H therapy") to enhance CBF. Vasopressor amines (dopamine, dobutamine, and phenylephrine) can be used to raise systemic blood pressure to achieve adequate CBF. Vasospasm refractory to medical treatment may be amenable to balloon angioplasty, at least in proximal vessels, though this has an attendant risk of rupture, rebleeding, and reperfusion syndrome.[2] Ischemic necrosis related to vasospasm, as well as cortical damage from bleeding into the neocortex, can result in seizure shortly after onset of SAH. Prophylactic anticonvulsants may be required. Massive release of catecholamines can result in additional non-neurologic medical conditions. This includes neurogenic pulmonary edema as well as electrocardiographic changes suggestive of acute myocardial infarction (deep inverted T-waves). Congestive heart failure may ensue. Swan-Ganz catheters and central venous pressures can be used to monitor compromised pulmonary or cardiac conditions that may compromise CBF.

Re-bleeding is a possibility in 30% of those experiencing aneurysmal SAH. An aneurysm may be amenable to corrective procedures to exclude it from the circulation or to relieve its pressure on adjacent neurological tissue. Surgical obliteration, achieved through clipping the base of the aneurysm, is the most commonly used treatment option. Alternatively, up to a third have been treated using an endovascular approach. A detachable platinum coil threaded into the aneurysm through percutaneous access and angiographic guidance is heated with electric current. This causes clotting of the blood within the aneurysm and elimination of the lesion as a site of potential re-bleeding. Timing of treatment is based on stability of the patient, more severely affected patients being treated conservatively until their status improves to a point where they may better tolerate the intervention.

Up to 15% of patients with acute SAH will have no detectable lesion (aneurysm or otherwise) on cerebral angiography. This group has a much better prognosis than patients with pathological vascular findings on angiography.[5] The most common idiopathic source of angiogram-negative SAH is perimesencephalic SAH (PM-SAH) at 68% of cases, which has a good clinical outcome with minimal risk of re-bleeding. PM-SAH has a distinct radiographic pattern of hemorrhage centered anterior to the pons and midbrain, without extension of bleeding into the region of the brainstem or into the proximal sylvian fissure, or into the suprasellar cistern.[6] The exact cause of PM-SAH has yet to be determined; it is felt to be from a venous source.[7] Good clinical outcomes have been seen in close to 100% of PM-SAH patients.[5] Such patients have neither reduced quality of life nor any risk of re-bleeding in the first years after the initial bleeding.[8] There is no excess in mortality compared to the normal population. It has been noted that perhaps no restrictions should be imposed on PM-SAH patients (whether by physicians or life/health insurance companies.

II. Aeromedical Concerns.

The high mortality rate of aneurysmal SAH (from 32-67%) indicates to the severity of the diagnosis. Survivors are left with a high rate of disabling sequelae (20-30%). A quarter of survivors will have continuing neurologic deficits.[9] Memory and executive deficits are some of the better-known neuropsychological consequences among aneurysmal SAH survivors.[2] Those with aneurysmal SAH will have a 30% risk of rebleed during the first month. Thereafter, survivors will have a 2-3% annual risk of a rebleed.[9] Only a third of surviving aneurysmal SAH patients resume their previous life style and occupation. There is a 7-12% risk of seizures from aneurysmal SAH, highest during the first year post-event. There is less risk of seizures following treatment with coiling as opposed to surgical clipping.[2]

PM-SAH is a non-aneurysmal variant that has uncommon neurological complications and carries a good prognosis.[10] Though the exact etiology of PM-SAH is uncertain, there is minimal risk of re-bleeding. Therefore it is possible to consider waiver for trained assets to return to flying status. There is no waiting period requirements or any time restrictions. In contrast to this, untrained FC I/IA candidates may be considered for waiver with a history of PM-SAH if the evaluation by a neurologist or neurosurgeon is absolutely normal.

III. Waiver Consideration.

The history of any SAH event is disqualifying for all classes of flying in the US Air Force. SAH secondary to head trauma is covered in the Head Injury waiver guide. Aneurysmal SAH is not waiverable due to the very high rate of associated problems and rebleed risk in the future. SAH is not specifically mentioned in the GBC/ATC or SMOD sections of 48-123, but inferences to serious CNS events are noted, therefore they are held to the same waiver guidance.

Table 1 – Waiver criteria for non-traumatic subarachnoid hemorrhage

Flying Class	Category	Waiver Potential[!] Waiver Authority
I/IA	Any history of SAH	Yes[**] AETC
II	Aneurysmal SAH	No MAJCOM
	PM-SAH[*]	Yes[#] MAJCOM
IIU	Aneurysmal SAH	No AFMSA
	PM-SAH[*]	Yes[#] AFMSA
III	Aneurysmal SAH	No MAJCOM
	PM-SAH[*]	Yes[#] MAJCOM
GBC/ATC[@]	Aneurysmal SAH	No AETC/MAJCOM
	PM-SAH[*]	Yes[#] AETC/MAJCOM
SMOD	Aneurysmal SAH	No AFSPC
	PM-SAH[*]	Yes[#] MAJCOM

* See Section IV for requirements for waiver consideration.
** FC I/IA waiver can be considered for PM-SAH if evaluation is totally normal.
# Waiver cases will be forwarded to the ACS for review.
@ AETC is waiver authority for initial training; thereafter it is MAJCOM.
! No indefinite waivers

A search of AIMWTS in May 2010 yielded 8 flyers with a diagnosis of subarachnoid hemorrhage. Only two were non-traumatic cases, and both were non-aneurysmal. One was a FC I candidate, and was not recommended for waiver, while the second case, FC II, (verified PMSAH) was recommended for return to flying duties. There were no FC IIU, GBC/ATC, or SMOD members with the diagnosis of subarachnoid hemorrhage in the database.

IV. Information Required for Waiver Submission.

The aeromedical summary for the initial waiver for SAH should include the following:
A. Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current

clinical guidelines/recommendations. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history of the event to include any known risk factors.
C. Complete neurosurgical and/or neurological consultation.
D. All reports from any CT, MRI, angiographic imaging (to evaluate for aneurysms), and EEG testing.
E. Report of any neuropsychological testing performed.

The aeromedical summary for waiver renewal for SAH should include the following:
1. Pertinent interval history.
2. Neurosurgical and/or neurological consultation if indicated.
3. Any appropriate EEG, imaging, or angiographic studies since the last waiver submission.

ICD-9 code for SAH	
430.0	Subarachnoid hemorrhage

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WAIVER GUIDE
Updated: June 09
Supersedes Waiver Guide of Feb 02
By: Maj David Hardy (RAM 09B) and Dr. Dan Van Syoc

CONDITION:
Suicide Attempt (Jun 09)

I. Overview.

Suicide results from unendurable emotional pain with the belief that cessation of pain is the only option. Elements of despair, distress and loss of control are common[1]. Suicide attempt (parasuicide) is a somewhat different phenomenon from completed suicide; attempters report less precipitating pain and the desired outcome is more likely to be a cry for help rather than death[2]. However, the National Institute of Mental Health states empathically that most suicide attempts are expressions of extreme distress, not harmless bids for attention and that a person who appears suicidal should not be left alone and needs immediate mental-health treatment. Some suicide attempts are miscalculations of intended death by suicide. Attempters most often use medication overdose while completers more often use a weapon, carbon monoxide or hanging[3] That being said, military and civilian psychiatrists have treated "survivors" of self-inflicted gunshot wounds to the cranium, carbon monoxide inhalations that resulted in coma, and self-hanging attempters who were discovered and rescued.

Demographic analyses of non-military populations indicate that women are three times more likely to attempt suicide than men, but men are three times more likely to complete suicide. The overall rate for suicide within the general U.S. population is 10.9 per 100,000 people and is the eleventh leading cause for death. An estimated 8 to 25 attempted suicides occur per every suicide death[3]. Within the Air Force, statistics collected over the past fourteen years demonstrate that the rate for completed suicides had decreased from 16.4 per 100,000 in 1994 to 9.4 per 100,000 in 1998, and has stayed relatively stable at 10.0 per 100,000 in 2008. The overall rate for officers is lower than for enlisted members.

The perception is that suicide attempts have decreased recently in the Air Force. One reason for the decrease in suicide attempt in the Air Force may be a command directed initiative to change social norms regarding seeking help for emotional stressors. In 1996, the Air Force implemented a population based prevention program, involving community agencies inside and outside the healthcare sector. The Air Force established an Integrated Product Team (IPT) in 1996, to evaluate the problem of suicides and recommend prevention-based strategies. The IPT recommended actions to combat AF suicides on three fronts.

First, they worked to mitigate risk factors, including legal, mental health, substance abuse, and relationship problems. Second, they worked to strengthen protective factors, such as social support, coping skills, and establishing a culture that encourages help-seeking behavior. Emphasis was placed on institutionalizing community-wide training efforts to heighten awareness of a range of risk factors that confer vulnerability for various behavioral and physical adverse events or problems, foremost of which was suicide. In addition, on an ongoing basis, the entire community received education about policy changes regarding the availability of resources to those in need. Finally, senior leaders in the Air Force strongly endorsed a radical change in social norms to decrease

stigma around help-seeking behaviors for all members of the community, and subsequently worked to sustain these newly stated values. The product of this effort was a multi-layered intervention targeted at reducing risk factors and enhancing factors considered protective. The intervention consisted of attempting to reduce the stigma of seeking help for a mental health or psychosocial problem, enhancing understanding of mental health, and changing policies and social norms. As a result of this program and attitudinal changes, there has been an estimated 33% relative risk reduction in suicide attempts between 1996 and 2002[4].

Contributors to suicidal ideation include distressing life circumstances, recent significant losses, a history of suicide in a family member or close associate, feelings of hopelessness or helplessness, substance abuse, or the presence of almost any psychiatric disorder[5]. The study of aviator suicide or suicide attempt is an emerging field in psychiatry and flight medicine. The Air Force has looked at this issue utilizing a number of databases. In the samples studied (USAFSAM Coversheet file-attempters for years 1970-1988, USAF Surgeon General data repository-mortality data base for years 1974-1984, USAFOSI data-suicides for years 1981-1986, USAF MPC data mortality data base/cause of death for years 1950-1986), a failed or failing intimate relationship was the prominent trigger for suicide or suicide attempt followed by administrative/legal problems, psychiatric disorder, death of a spouse and job conflicts; substance abuse, most often alcohol, was involved in 54% of the attempts and 79% of the completions. Most attempts were impulsive (77%) whereas most completions were well-planned (93%). People contemplating suicide variously signal their intentions[5]. However, since aviators are known for their use of denial, rationalization, and compartmentalization, aviator suicidal intentions may be subtle and may not be perceived by aviator colleagues who are similarly psychologically defended. Given the nature of flying high-performance aircraft, self-destructive motivation should be considered in individuals who begin or persist in flying in a reckless or dangerous manner: this may be a manifestation of subintentional or overt suicidal behavior[6, 7].

From the current known information about aviator suicide, the incidence is small, and probably much less than most other military or civilian occupational groups. Between 1993 and 2002 there were 3648 fatal aviation accidents. The NTSB determined that sixteen were aircraft assisted suicides. All pilots involved were male with a median age of 40 years. Seven of the fourteen pilots for whom specimens were available were positive for disqualifying substances. Specifically, four pilots tested positive for alcohol while one had evidence of marijuana, one for cocaine, two for benzodiazepines and one for venlafaxine. Ten of the sixteen airmen had thought of suicide, talked of suicide, attempted suicide before and/or left a note. Additionally, 46% had experienced domestic problems, 46 % had criminal issues and 31% suffered from depression[8]. Within the United States Air Force there have been zero proven suicides by aircraft in the period of 1988-2007.

II. Aeromedical Concerns.

Suicidal ideation must always be taken seriously in any airman, for the protection of the member and because of the availability of aircraft as a means of self-destruction. Not only is the individual aviator at risk, but the safety of others in the air and on the ground must be considered, as well as the conservation of valuable national assets, and the implications of access to nuclear and other weapons.

Of further and perhaps ultimate concern is the high performance required of military aviators for readiness and mission completion. While suicide/suicide attempt is a single act, it represents a

distinct, overt behavior in a very long, debilitating process[9]. The ability, if not necessity, of aviators to deny, suppress and otherwise defend against emotional turmoil highlights the need for peers, commanders and flight surgeons to carefully monitor aircrew for the early signs of emotional conflict, despair, and intimate relationship deterioration[10, 11].

A history of attempted suicide or suicidal behavior is disqualifying. All suicidal ideation, self-destructive actions or overt suicidal attempts by aviators require immediate DNIF action and mental health evaluation, including voluntary or involuntary hospitalization if psychiatrically indicated. Such decisions are based on many factors besides the specific diagnosis, including the patient's intent to die, the lethality of the method chosen, availability of means, the energy put into the attempt, the role of possible substance abuse, the circumstances of the rescue (i.e., found by accident vs. found after hints, phone call, presentation to ER, etc.), and the emotional support systems available to the aviator. Appropriate action should be taken in regard to the Personnel Reliability Program, if applicable. If the precipitating event involved acute or chronic alcohol abuse or dependence, additionally waiver will be managed IAW AFI 48-123 and AFI 44-121, *Alcohol and Drug Abuse Prevention and Treatment (ADAPT) Program*.

III. Waiver Considerations.

For aviators, a history of attempted suicide or suicidal behavior is disqualifying for all classes of flyers.

Table 1 – Waiver potential for aviators with history of suicide attempt

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Review/Evaluation**
I/IA	Maybe*# AETC	Maybe**
II	Maybe*# MAJCOM	Yes**
III	Maybe*# MAJCOM	Yes**

* Underlying condition that exacerbated suicide attempt must be treated successfully and the aviator or aviator candidate must not have a higher risk of suicidal behavior than does the general military population.
**ACS review/evaluation if requested by AETC for initial FC I/IA, FC II, FC IIU and FC III applicants.
No indefinite waivers.

AIMWTS review in May 2009 revealed a total of 19 cases submitted with a diagnosis of suicide attempt. Of this total, 5 were for FC I/IA, 2 were for FC II and the remaining 12 were FC III. In the FC I/IA category, 4 were disqualified, but 2 of those were for vision-related issues. In the FC II category, there were no disqualifications. Lastly, for FC III, there were a total of 4 disqualifications, 3 of which were for initial FC III submissions.

IV. Information Required for Waiver Submission.

Waivers are based in part on the psychiatric diagnosis of which the suicidal factors are a manifestation. Additionally, waivers are based upon the effectiveness of the remediation of the precipitating causes for the attempt, quality and duration of stability, reports from supervisors, local flight surgeon and mental health as well as ACS evaluation. However, *recurrent* suicidal ideation, actions or attempts are the basis for permanent disqualification. The aviator should receive the indicated psychiatric or psychological treatment and follow-up evaluations; in addition to the criteria for waiver mentioned above, the aviator should be symptom-free and treatment should be completed for at least six months before waiver will be considered.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed utilizing appropriate treatments according to the best current clinical guidelines/recommendations.

Information required for an initial waiver for a history of suicide attempt should include:
A. List and fully discuss all clinical diagnoses requiring a waiver.
B. Complete history to include all event chronologies leading up to the suicide attempt(s) and all subsequent care given to member. Evidence that the underlying problem precipitating the suicide attempt has resolved must be provided.
C. History, if any, of alcohol-related incidents/problems and treatment. ADAPT history if applicable must be included.
D. Exam: complete exam with emphasis on mental health portion.
E. Psychiatry consultation report.
F. MEB results if completed.

The following information will be required for waiver renewal.
A. Interim history.
B. Updated exam.
C. Psychiatry consultation report.

ICD 9 code for suicide attempt	
E950	Suicide attempt
300.9	Unspecified neurotic disorder

This waiver guide was reviewed by Col Timothy Sowin, ACS chief of Neuropsychiatry.

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Sep 2007
By: LtCol Chris Walker (RAM 11) and Dr Dan Van Syoc
Reviewed by Dr. Bill Kruyer, ACS Chief Cardiologist

CONDITION:
Supraventricular Tachycardia (Jan 11)

I. Overview.

Supraventricular tachycardia (SVT) is defined as 3 or more consecutive supraventricular premature beats at a heart rate of 100 beats per minute (bpm) or faster. The spectrum of SVT thus ranges from an asymptomatic three-beat run that is unnoticed by the individual to a sustained run with hemodynamic symptoms or sudden cardiac death. Approximately 60% of SVTs are due to a reentry mechanism within the AV node, AV node reentrant tachycardia, more commonly referred to as paroxysmal SVT (PSVT) and 30% of SVTs are associated with a bypass tract. The other 10% of SVTs are a variety of mechanisms, including automatic foci in the atria.[1] SVT associated with bypass tract is addressed in a separate waiver guide "Wolff-Parkinson-White (WPW) and Other Pre-Excitation Syndromes." Ablation of all SVT mechanisms is addressed in the "Radiofrequency Ablation (RFA) of Tachyarrhythmias" guide. This waiver guide addresses SVT caused by mechanisms other than bypass tract.

In a 1992 Aeromedical Consultation Service (ACS) review of 430 military aviators evaluated for nonsustained or sustained SVT there were no deaths caused by or related to SVT. Forty-two (10%) had symptoms of hemodynamic compromise with syncope, presyncope, light-headedness, chest discomfort, dyspnea or visual changes and an additional 21 (5%) had recurrent sustained SVT without hemodynamic symptoms.[2] Palpitations are not considered to be a hemodynamic symptom. Recurrent is defined as any recurrence, i.e. more than one run of SVT. From this review, sustained SVT is defined aeromedically for the Air Force as SVT lasting greater than 10 minutes. Neither frequent PACs, PAC pairing, nor nonsustained SVT was predictive of hemodynamically symptomatic SVT or of recurrent sustained SVT.[2, 3] The study thus documented that most individuals with asymptomatic SVT remained healthy and symptom free for many years. In those with symptomatic SVT, 90% initially presented with these symptoms. The remaining 10% who later developed symptoms presented with either sustained or recurrent sustained episodes of SVT. Of the multiple factors examined, only presentation with recurrent sustained SVT, hemodynamic symptoms or WPW ECG pattern were at higher risk for future events.

Furthermore, in the above ACS review, of those initially presenting with asymptomatic nonsustained SVT, only 0.9% experienced sustained SVT during the follow-up period, none with associated hemodynamic symptoms. Of those presenting with one or more episodes of sustained SVT, recurrence of sustained SVT was 1-2% per year. Civilian population-based studies report recurrence up to 10% per year.[3]

A recent meta-analysis of the efficacy and safety of ablation for the treatment of supraventricular tachycardia shows that this is a safe and effective procedure for our aviators who truly have symptomatic episodes of SVT. There is a 93.2% success rate with the first ablation treatment for SVT with a rate of adverse events of 2.9%.[4]

II. Aeromedical Concerns.

The aeromedical concerns associated with SVT include hemodynamic symptoms associated with any degree of sustained or nonsustained SVT, recurrent episodes of sustained SVT and associated cardiac disease.

Various antiarrhythmic medications may be used clinically to attempt suppression of SVT. Medication concerns include side effect and safety profiles of the medications, proarrhythmic effects and patient compliance in taking the medication every day. Acceptable control with medication is often not achieved with tolerable side effects, and one must accept that the arrhythmia may "break through" and recur on medication. SVT that is otherwise disqualifying would thus still be disqualifying on antiarrhythmic medication. Many antiarrhythmics have a proarrhythmic effect, meaning that they also precipitate tachyarrhythmias, usually ventricular tachyarrhythmias. Given the current high success and low complication rates of ablation, SVT that previously required suppression will now preferentially be referred for ablation.

III. Waiver Considerations.

SVT is disqualifying for all classes of flying duties and for retention in the Air Force (this covers those individuals in the FC IIU, ATC/GBC, and SMOD programs). ACS review is required for waiver consideration. ACS evaluation may be required, depending on the aviation duty, SVT characteristics or specific concerns in an individual case. SVT associated with hemodynamic symptoms will typically not be considered for waiver, unless successful ablation has been performed. Palpitations are not considered to be a hemodynamic symptom. A single episode of asymptomatic nonsustained SVT of 3-10 beats duration will typically be recommended for indefinite waiver for all aviation classes after ACS review. For recurrent episodes of asymptomatic nonsustained SVT or a nonsustained SVT episode longer than 10-beats duration, ACS evaluation will be required, with anticipation of waiver for FC II/III. Waiver for FC I/IA and untrained FC II/III will be considered on a case-by-case basis depending primarily on characteristics of the nonsustained SVT. A single episode of sustained SVT without hemodynamic symptoms may be considered for FC II/III waiver without ablation, on a case-by-case basis. Recurrent sustained SVT is disqualifying without waiver unless successful ablation is performed. SVT treated with antiarrhythmic medication for suppression is disqualifying without waiver. Table 1 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties. Most cases of SVT for FC IIU, ATC/GBC, and SMOD personnel will most likely be recommended for a waiver unless there is significant hemodynamic compromise.

Table 1. Summary of Supraventricular Tachycardia (SVT) and ACS Requirements.

SVT (symptoms refers to hemodynamic symptoms)	Flying Class	Waiver Potential/ Waiver Authority	Required ACS Review and/or ACS Evaluation
Asymptomatic, single episode of 3-10 beats duration	FC I/IA/initial FC II/IIU, & ATC/GBC, indefinite	Yes AETC	ACS review
	FC II/III, & ATC/GBC indefinite	Yes MAJCOM	ACS review
	FC IIU	Yes AFMSA	ACS review
	SMOD	Yes AFSPC	ACS review
Asymptomatic, recurrent nonsustained SVT or single episode nonsustained SVT >10 beats duration	FC I/IA/initial FC II/ IIU, & ATC/GBC	Maybe AETC	ACS evaluation
	FC II/III & ATC/GBC	Yes* MAJCOM	ACS evaluation
	FC IIU	Yes* AFMSA	ACS review
	SMOD	Yes AFSPC	ACS Review
Asymptomatic sustained SVT (>10 minutes duration), single episode, no ablation†	FC I/IA/initial FC II/ GBC	No AETC	ACS review
	FC II/III & ATC/GBC	Maybe MAJCOM	ACS evaluation
	FC IIU	Maybe AFMSA	ACS evaluation
	SMOD	Maybe AFSPC	ACS review

Table 1. Summary of Supraventricular Tachycardia (SVT) and ACS Requirements. (con't)

SVT (symptoms refers to hemodynamic symptoms)	Flying Class	Waiver Potential/ Waiver Authority	Required ACS Review and/or ACS Evaluation
Recurrent sustained SVT or any degree of SVT associated with hemodynamic symptoms, no ablation†	FC I/IA/initial FC II/IIU & ATC/GBC	No‡ AETC	ACS review
	FC II/III & ATC/GBC	No‡ MAJCOM	ACS review
	FC IIU	No‡ AFMSA	ACS review
	SMOD	No‡ AFSPC	ACS review
Any degree of SVT requiring antiarrhythmic medication for suppression	FC I/IA/II/IIU/III/ initial FC II/ & ATC/GBC	No MAJCOM	ACS review
	SMOD	Maybe AFSPC	ACS review

* Waiver in untrained FC II and III individuals is on a case-by-case basis.
‡ Waiver is possible after successful ablation – refer to "Radiofrequency Ablation (RFA) of Tachyarrhythmias" waiver guide.
† Sustained or symptomatic SVT requires medical evaluation board (MEB).

If the disease process appears mild and stable, waiver for all classes of flying duties will generally be valid for three years with ACS reevaluation/review at that time for waiver renewal. Each waiver recommendation will specify requirements and timing for waiver renewal.

A query of AIMWTS through September 2010 showed 295 aeromedical summaries written for individuals with SVT. Breakdown of the total is as follows: 12 FC I/IA (4 disqualified); 189 FC II (17 disqualified); 81 FC III (16 disqualified); 9 ATC/GBC (1 disqualified); and 4 SMOD cases (none disqualified). Of the disqualified candidates: seven were disqualified because of SVT (failed ablation, member refused treatment or member did not follow through with ACS evaluation); thirteen were disqualified because of additional cardiac diseases (e.g. coronary artery disease, dilated aortic root, aortic insufficiency, atrial fibrillation, and recurrent syncope); and nine were disqualified for other medical conditions (e.g. ocular hypertension, color vision deficiency, other vision issues, alcohol dependency, recurrent kidney stones). The majority of the qualified cases were for nonsustained single episode of SVT, followed by recurrent non-sustained SVT and then SVT treated with radiofrequency ablation.

IV. Information Required for Waiver Submission.

ACS review/evaluation is required for all classes of flying duties for SVT. One 24-hour Holter monitor should be obtained. If the initial SVT is found on a Holter, then that Holter will suffice and repeat Holter is not warranted unless requested by the ACS/USAF Central ECG Library. If the evaluation reveals only one isolated run of SVT of 3- to10-beats duration, no further testing is typically required. Aeromedical disposition will be recommended after the studies are forwarded to the ACS for review and confirmation. If more than one run of SVT is present, or if a single run is more than 10-beats in length, ACS evaluation is required. No additional studies are routinely required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for waiver consideration for SVT, unless ablation is performed. Ablation of all SVT mechanisms is addressed in the "Radiofrequency Ablation (RFA) of Tachyarrhythmias" guide.

For initial waiver (ACS review or evaluation) the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
B. Original or legible copy of the tracings documenting SVT (ECG, rhythm strip, Holter, treadmill, etc.). (Notes 1 and 2)
C. Copy of the report and representative tracings of the Holter, if not provided under B. (Notes 1 and 2)
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, echocardiogram). (Notes 1 and 2)
E. Additional local cardiac testing is not routinely required but may be requested in individual cases.

For renewal waivers [ACS follow-up evaluations (re-evaluations)] the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD 9 code for supraventricular tachycardia	
427.0	Paroxysmal supraventricular tachycardia

V. References.

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WAIVER GUIDE
Updated: Mar 2010
Supersedes Waiver Guide of Feb 2007
By: Dr Dan Van Syoc
Reviewed by Dr. William Kruyer, ASC Chief Cardiologist and Dr. Steve McGuire, ACS Neurologist.

CONDITION:
Syncope (Mar 10)

I. Overview.

Syncope is a symptom defined as a transient, self-limited loss of consciousness, potentially leading to falling. The onset of syncope is relatively rapid, and the subsequent recovery is spontaneous, complete, and usually prompt. The underlying mechanism is a transient global cerebral hypoperfusion. Presyncope or "near syncope" occurs when an individual has symptoms of hypoperfusion, such as feeling faint or experiencing tunnel vision, but does not lose consciousness. An underlying condition that predisposes a flyer to syncope or near syncope could have significant aeromedical significance due to the potential for incapacitation or loss of aircraft control[1-4]. In addition, injuries associated with syncopal attacks occur in about one-third of patients and recurrent episodes can have a significant psychological impact[5]. Also, it is important to distinguish syncope from seizures, since the latter have a high risk of recurrence and cause severe incapacitation. The history is critical in making this distinction.

Syncope is a common clinical problem, and has been estimated to account for 3-5 percent of emergency room visits and 1 percent of hospital admissions. The etiology is diverse: syncope can be caused by disturbances in homeostasis or neuronal-mediated reflexes, cardiovascular disease or arrhythmias, neurologic or psychiatric conditions, medications and a variety of metabolic disorders. Careful evaluation is required to determine the etiology and risk for recurrence or long-term complications. Even after evaluation, the cause of syncope remains unknown in many cases[5]. An evaluation of the Framingham Heart Study revealed that approximately 37 percent of syncopal events were due to unknown causes[6]. A 2001 Italian prospective study evaluated 341 consecutive emergency department visits for syncope and found the following distribution of causes: neuronal-mediated (e.g., vasovagal) – 58 percent; cardiac disease – 23 percent; neurologic or psychiatric – 1 percent; and unexplained syncope – 18 percent[7].

Neuronal-mediated syncope refers to a reflex response causing vasodilatation and/or bradycardia (rarely tachycardia) leading to systemic hypotension and cerebral hypoperfusion. Types of neuronal-mediated syncope include neurocardiogenic (vasovagal) syncope, carotid sinus syncope, situational syncope, and glossopharyngeal neuralgia. Patients with vasodepressor or vasovagal syncope do not appear to be at increased risk for all-cause or cardiovascular mortality, but may be subject to recurrent symptoms. The overall recurrence rate for vasovagal syncope has been estimated at 30 percent. Risk factors for recurrence have not been well-characterized, but a history of previous syncopal episodes and the number of episodes indicate a greater risk of recurrence[8, 9].

In contrast, syncope due to underlying cardiac disease or arrhythmia is associated with significantly higher all-cause and cardiovascular mortality, and risk of recurrence. Thus it is important to evaluate patients with a history of syncope for potential cardiac causes. A detailed study of a large

group of syncope patients initially labeled as syncope of unknown cause has suggested that 45 to 80 percent of such cases could be assigned a cardiac cause[6].

The clinical history is the most important factor in establishing a diagnosis in syncope patients. When evaluating patients, the flight surgeon should consider the postural setting, pre-syncopal (premonitory) symptoms**,** the syncopal episode, and the syncopal setting. The detailed history is designed to rule out cardiac or neurological disease. Recent research in athletes with syncope has concluded that syncope or presyncope that occurs during exertion is more likely to be life-threatening than episodes that occur at rest[10]. Patients should be questioned closely for family history of cardiovascular disease or unexplained sudden death. The standard 12-lead electrocardiogram (ECG) should be part of the routine evaluation, with particular attention paid to rhythm, QT interval, bundle-branch morphology, and any evidence of ischemia or hypertrophy. If there are any questions or concerns after the ECG, then echocardiography should be performed[11].

Tilt-table testing is the only method for diagnosing neurocardiogenic syncope that has undergone rigorous testing. In spite of that, there are serious questions concerning sensitivity, specificity, diagnostic yield, and day-to-day reproducibility of this modality. In patients with a negative evaluation (no evidence of cardiac disease), the pretest probability that the diagnosis is neurocardiogenic syncope is high, so the tilt-table test contributes very little to the diagnosis. An additional diagnostic tool is the implantable loop recorder (ILR). The device can record automatically or be activated by the patient after a syncopal episode. Due to the need for surgical implantation and the cost, this device should be reserved for patients with recurrent syncope in whom the diagnosis remains uncertain despite a conventional evaluation[11, 12]. Additionally, the ILR has been utilized in some patients with an unexplained diagnosis in an effort to better demonstrate whether or not there was a cardiac etiology. A Canadian study has shown that the ILR is more likely to uncover a cardiac diagnosis than is conventional testing[13].

Medication treatment options have had varying rates of success. Beta-blockers have been used for many years in patients with recurrent neurocardiogenic syncope, but the published studies to date are inconclusive. Similarly fludrocortisone has been utilized for its sodium retention properties and early studies indicate it may reduce neurocardiogenic syncope. Midodrine hydrochloride, a direct α_1-receptor agonist and vasoconstrictor has been utilized for treatment of symptomatic orthostatic hypotension and for recurrent neurocardiogenic syncope. Due to the role that serotonin may have in regulating sympathetic activity, selective serotonin-reuptake inhibitors (SSRI) have been proposed as therapy. One randomized placebo-controlled study with the SSRI paroxetine showed a significant improvement demonstrated by significantly longer syncope-free intervals. Transdermal scopolamine has also been utilized without significant effect[11, 14].

There have been numerous non-medicine treatment modalities studied in the past decade. A double-blind randomized study utilizing pacemaker therapy has not demonstrated reduction in the risk of recurrent syncope[15]. Physical Counterpressure Maneuvers (PCM) have been used with success in some groups to abort attacks and reduce recurrent episodes. PCM tools include leg crossing, handgrip or arm tensing – the patients are trained to use the maneuvers in situations in which they have been prone to vasovagal syncope and immediately when they note prodromal symptoms[1, 16].

II. Aeromedical Concerns.

Any underlying condition that predisposes an aviator to suffer syncopal attacks could lead to incapacitation and loss of aircraft control. For this reason, loss or disturbances of consciousness, orthostatic or symptomatic hypotension, or recurrent vasodepressor syncope are disqualifying. Any aviator being treated with beta blockers, scopolamine, paroxetine, fludrocortisone, or alpha-agonists will not be eligible for a waiver as these medications are not approved for aviation duties in the US Air Force.

The following limited circumstances do not require waiver:

A. An isolated (single) episode of neurocardiogenic syncope associated with venipuncture, prolonged standing in the sun (or similar benign precipitating event) which is less than 1 minute in duration, without loss of continence, and followed by complete and rapid recovery without sequelae, if thorough neurological and cardiovascular evaluation by a flight surgeon reveals no abnormalities. Multiple or recurrent episodes will require a more complete evaluation and a waiver.

B. Physiologic loss of consciousness (LOC) caused by reduced oxygen tension, general anesthesia, or other medically induced LOC provided there is full recovery without sequelae.

C. G induced loss of consciousness (G-LOC) during a centrifuge run does not require waiver for continued flying duty, unless there are neurologic sequelae, or evidence that the G-LOC occurrence is associated with coexistent disease or anatomic abnormality. Inflight G-LOC caused by an improperly performed anti-G straining maneuver, or a disconnect of the anti-G protective gear is not disqualifying, and is managed as a physiological incident. The local flight surgeon completes appropriate post-incident medical evaluation and reports the incident according to applicable directives.

For the situations described above the evaluation should include:

A. History: The history is the most important component and should include: a complete description of the syncopal episode to include posture, pre-syncopal symptoms, duration, pre- or post-syncopal amnesia, convulsive accompaniments; any precipitating factors such as venipuncture, medical procedure or standing in formation; other contributory factors (dehydration, inadequate nutrition, strenuous exercise, fatigue, recent illness, etc.) and documentation of any previous syncopal or near-syncopal episodes. A history of previous episodes or any other features exceeding the parameters described above, require a waiver. To the extent possible, details of the syncopal episode such as pre-and post-syncopal appearance and behavior, duration of loss of consciousness, post-syncopal posture and any convulsive accompaniments should be based on reliable witness observations. If the episode was not witnessed, then duration and other details of the syncopal episode cannot be verified.

B. Physical Exam: The cardiovascular exam should assess pulses for rate, rhythm and differences between extremities; resting and orthostatic blood pressure, and auscultation for murmurs or abnormal heart sounds. Orthostatic hypotension is diagnosed when one or more of the following is present within two to five minutes of quiet standing:

- ≥20 mmHg fall in systolic pressure
- ≥10 mmHg fall in diastolic pressure
- Symptoms of cerebral hypoperfusion

Neurologic exam should assess mental status, cranial nerves, motor and sensory function, deep tendon and plantar reflexes, coordination, gait and Rhomberg test. Any neurological deficit(s) or cardiovascular abnormalities require further evaluation and necessitates waiver submission. If seizure disorder is a diagnostic concern, an EEG will be a necessary part of the evaluation.

C. The evaluation for G-LOC has additional requirements. In-flight G-LOC must be reported as a physiologic event. Evaluation should include a description of the sequence of events and careful video tape recorder (VTR) review for adequacy of anti-G straining maneuver. Cases in which G-LOC continues to occur despite correction of underlying factors and/or additional and training conducted by an aerospace physiologist are managed IAW AFI 11-4-4, *Centrifuge Training for High-G Aircrew*.

III. Waiver Consideration.

Air Force aviators with orthostatic or symptomatic hypotension or recurrent vasodepressor syncope are disqualified for all flying classes per AFI 48-123. They will need to be evaluated carefully before consideration for a waiver. As noted in the section above, not all aviators experiencing a syncopal episode require a waiver. Consideration for waiver is limited to cases in which the risk of recurrence is low and/or the underlying condition or triggering factor can be adequately controlled. Benign syncope limited to predictable settings may be waived if there is negligible risk of recurrence in the aviation environment. If a treatable etiology for syncope is found, then correction of the underlying condition may allow a return to flying status. However, certain conditions (e.g., arrhythmia) and/or medications may pose unacceptable risks of recurrence or side effects. If the etiology of syncope remains unknown despite extensive diagnostic evaluation, then a clinical judgment based on careful consideration of all available information must be made before allowing a flyer to return to the cockpit.

Table 1: Waiver potential for syncope

Flying Class (FC)	Waiver Potential Waiver Authority#	ACS Review/Evaluation
I/IA	Yes AETC	Yes*
II	Yes MAJCOM	Yes*
IIU	Yes AFMSA	Yes*
III	Yes MAJCOM	Yes*

*Most cases will not result in an in-person ACS evaluation
#MAJCOMs have waiver authority for simple syncope; if the cause of the syncope is disqualifying, the member needs an additional waiver for that condition.

Review of the AIMWTS database in January 2010 revealed a total of 172 waivers submitted with the diagnosis of syncope. Of this total, 23 were FC I/IA, 75 were FC II, 0 were FC IIU, and 74 were FC III. There were a total of 54 disqualifications: 9 were FC I/IA, 18 were FC II and 27 were FC III. Most of the DQ cases were for issues related to syncope – some were on beta blockers, others had unexplained etiologies and others had ongoing issues with syncope. About 20 percent of the DQ cases were disqualified for issues other than syncope.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. List and fully discuss all clinical diagnoses requiring a waiver.

The aeromedical summary for syncope should include the following:

A. Complete aeromedical summary (AMS): including history and physical exam as described above. If possible, the flight surgeon should interview witnesses personally and the AMS should indicate which elements of the history were provided by witnesses. Past medical history, medications, allergies, and family history (especially of sudden death, arrhythmia or epilepsy) should be documented.
B. Consultations: Cardiology consultation is required if cardiac etiology is suspected or etiology is unknown. If clinically indicated, tertiary testing such as echocardiogram, Holter or event monitor, tilt-table testing, stress-test, electrophysiology studies, etc may be necessary. Neurology consultation should be sought if the LOC cannot be attributed to syncope and/or neurologic deficits are identified or suspected. Psychology or psychiatry consultation should be considered if psychogenic factors are suspected.
C. Documentation should include the following:
1) ECG
2) Results of any laboratory or imaging studies, cardiodiagnostic testing, and neurologic tests such as electroencephalograms (EEGs). For Aeromedical Consultation Service (ACS) review/evaluation, original images, tapes, etc. will be required.

ICD 9 code for syncope	
780.2	Syncope and collapse

V. References.

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WAIVER GUIDE
Updated Sep 2011
Supersedes waiver guide of Dec 2006
By: Maj Chris Keirns (ACS Staff Internist) and Dr. Dan Van Syoc

CONDITION:
Systemic Glucocorticoid (Steroid) Treatment (Sep 11)

1. Overview.

Systemic glucocorticoids (GC) are potent anti-inflammatory agents that are frequently used in the treatment of a variety of medical conditions. There are several known side effects to these agents to include skin thinning, purpura, Cushingoid appearance, weight gain, bone loss, glucose intolerance, acceleration of atherosclerosis, cataracts, gastritis, immunosuppression, euphoria, hypomania, depression and psychosis. Therefore, aviators who are undergoing treatment with GC are not considered for a waiver and, medical conditions requiring standing (long-term) doses of glucocorticoids are not generally considered stable or waiverable.

For more benign conditions, brief (less than three weeks) treatment with systemic GC is not concerning. However, patients who are on high doses of GC for extended periods of time are at risk for complications such as avascular necrosis, immunosuppression, cataracts, myopathy, obesity, osteoporosis and suppression of the hypothalamic-pituitary-adrenal (HPA) axis with resultant adrenal insufficiency. HPA axis suppression has been reported to occur in up to 63% of those on long term GC treatment. These patients can present with hypotension, abdominal pain and other features of adrenal crisis such as are seen in primary adrenal insufficiency (Addison's disease) during times of stress. Hyperkalemia is a rare complication but hypoglycemia is common after discontinuation of long-term corticosteroid therapy.

II. Aeromedical Concerns.

HPA axis suppression after the completion of GC therapy is the most significant concern. This is unlikely to occur with a short course of daily morning therapy, but becomes more common with courses exceeding three weeks or with split-dose or nighttime therapy. If an aviator requires a longer course of therapy, the dose should be tapered over several weeks depending on the level of steroids and as the underlying condition tolerates. The goal of tapering is to use a rate of change that will prevent both recurrent activity of the underlying disease and symptoms of cortisol deficiency due to persistent HPA suppression. The primary aeromedical concern is the response to stress after discontinuation of long courses of GC. The normal adrenal is able to meet these needs; however, the suppressed HPA axis may not be capable, and adrenal crisis can be precipitated. The unique stresses of aviation could precipitate adrenal crisis in an aviator with suppressed HPA axis.

III. Waiver Considerations.

Aviators (FC I/IA, II, and III) who are undergoing treatment with systemic GC are not eligible for waiver. Treatment with systemic GC is not specifically listed as disqualifying for ATC/GBC and SMOD duties, but adrenal hyperfunction (Cushing's syndrome), not responding to therapy and adrenal hypofunction are not qualified for retention standards. Therefore, these members need to be

carefully evaluated and considered before returning to duty. Conditions which require long term use of GC typically require waiver, but the history of GC use by itself is not disqualifying as long as the medication has been discontinued, symptoms have resolved and the HPA is intact. Therefore, documentation of an intact HPA axis should be accomplished prior to return to flying status if GC use was greater than 3 consecutive weeks within the last 12 months. After GC treatment, if waiver is required for the underlying condition, the aeromedical summary (AMS) should include results of the ACTH stimulation test. Refer to the applicable waiver guide for assistance in the development of an AMS for the underlying condition.

IV. Workup Required after Use of Oral Glucocorticoids.

If an aviator has received systemic steroid therapy for over three weeks within the preceding twelve months, documentation of normal basal and stress cortisol levels off medication is required prior to returning to flying status. Basal cortisol levels are drawn in the morning from a fasting individual. The short adrenocorticotropic hormone (ACTH) stimulation test is used to document stress response. A dose of 250 mcg of Cosyntropin® (recombinant ACTH) is injected IV or IM after a baseline cortisol level is drawn. A stimulated cortisol is drawn 60 minutes later. The two samples need to be carefully labeled as basal and stimulated. A stimulated cortisol >18 mcg/dl is considered normal. Stimulation testing can be performed at any point after GC discontinuation but as a general rule is performed one month after discontinuing therapy; if abnormal, it can be repeated at monthly intervals until normalized.

Please see the table below for a summary of the workup requirements based upon the duration of GC therapy.

Table 1: Workup Required Based on Duration of GC Therapy

Duration of Steroid Therapy	**Flying Class**	**Studies Required**
$\leq$ 3 weeks of GC therapy during the preceding 12 months	All	N/A
> 3 weeks of GC therapy during the preceding 12 months	All	-- Normal basal cortisol level (>10mcg/dl) off medication and -- Normal stress cortisol level (>18mcg/dl) off medication -- Testing can be performed anytime after discontinuation of treatment but typically testing is begun 1 month after GC medication discontinuation

V. References.

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WAIVER GUIDE
Updated: Jun 2012
Supersedes Waiver Guide of Sep 2008
By: LtCol Manoj Ravi (RAM 12) and Dr Dan Van Syoc
Reviewed by LtCol Edith Canby-Hagino, AF/SG Consultant for Urology

CONDITION:
Testicular Cancer (Jun 12)

I. Overview.

Testicular tumors account for 1% of all tumors and 0.1% of all cancer deaths in men. However, it is the most common malignancy in men in the 15- to 35-year age group. The incidence of testicular cancer in Western Europe and North America has been showing an increase, doubling, in the last 40 years with the etiology unclear.[1] The incidence is 2.5 to 20 times higher in men with cryptorchidism, even when the undescended testis has been brought down surgically.[1, 2, 3] Testicular cancer most commonly originates from germ cells (95%), but can arise from other cell types (e.g. sex-cord stromal tumors, lymphomas).[1, 3] Germ cell tumors are categorized as seminomas (40%) or non-seminomatous germ cell tumors (NSGCT, which includes embryonal cell carcinoma, yolk sac tumors, choriocarcinomas, and/or teratoma). Germ cell tumors that contain any tumor type in addition to or other than seminoma are categorized as non-seminomatous. This is an important distinction, because the treatment for NSGCT is different than treatment of pure seminoma.

Testicular cancer usually appears as a painless or sometimes (30-40%) painful unilateral intrascrotal mass.[1, 4] Two to three percent of testicular cancer are bilateral, occurring either simultaneously or successively.[1, 4] Five-10% of germ cell tumors present at an extra-gonadal site, predominantly retroperitoneum or mediastinum.[4, 5] These extragonadal germ cell tumors tend to have a delayed presentation, and may manifest with supra-clavicular adenopathy, back pain, lower extremity edema, or symptoms of renal failure from compression of retroperitoneal structures.

Scrotal ultrasound is the gold standard for testicular imaging, having a sensitivity of almost 100% and is used to determine whether a mass is intra- or extra-testicular. However, when a clinical diagnosis indicates a high likelihood of a solid testicular mass, urology referral and treatment should not be delayed by lack of an ultrasound.[1, 4]

Alpha-fetoprotein (AFP), β-human chorionic gonadotropin (β-hCG), and lactate dehydrogenase (LDH) (marker of tissue destruction) are serum tumor markers that contribute prognostic value in diagnosis and staging. Overall, these markers are elevated in 51% of cases of testicular cancer.[1] AFP can be produced by yolk sac tumors, teratoma, embryonal carcinoma or combined tumors but is not increased in pure choriocarcinoma or pure seminoma.[1, 4, 5] β-hCG is secreted by both seminomas (5-10% - usually below 500ng/mL) and NSGCT (all choriocarcinomas and 40-60% embryonal carcinoma).[1, 4, 5] Chest x-ray and chest, abdominal and pelvic computed tomography (CT) are used in staging and monitoring, in addition to these serum tumor markers.

The standard treatment of all primary testicular cancers is a unilateral radical inguinal orchiectomy with high ligation of the spermatic cord (although testis sparing procedures can be considered in

some cases). An inguinal orchiectomy provides not only histopathologic and staging information but potentially a complete cure for individuals with testis-confined disease.[1, 6]

Table 1. American Joint Committee on Cancer (AJCC) Testicular Cancer Staging System.[7]

Stage	Primary Tumor (pT)	Regional Lymph Nodes (N)	Distant Metastasis (M)	Serum Tumor Markers (S)
0	pTis	0	0	0
I	pT1-4	0	0	0
IA	pT1	0	0	0
IB	pT2, 3 or 4	0	0	0
IS	Any pT/Tx	0	0	1-3
II	Any pT/Tx	1-3	0	X
IIA	Any pT/Tx	1	0	0-1
IIB	Any pT/Tx	2	0	0-1
IIC	Any pT/Tx	3	0	0-1
III	Any pT/Tx	Any N	1	SX
IIIA	Any pT/Tx	Any N	1a	0-1
IIIB	Any pT/Tx	N1-3 Any N	0 1a	2 2
IIIC	Any pT/Tx	N1-3 Any N Any N	0 1a 1b	3 3 Any S

pT – pTX (primary tumor cannot be assessed), pT0 (no evidence of primary tumor), pTis (intratubular germ cell neoplasia [carcinoma in situ]), pT1 (tumor limited to testis and epididymis without vascular/lymphatic invasion; tumor may invade into the tunica albuginea but not the tunica vaginalis), pT2 (tumor limited to testis and epididymis with vascular/lymphatic invasion, or tumor extending through the tunica albuginea with involvement of the tunica vaginalis), pT3 (tumor invades the spermatic cord with or without vascular/lymphatic invasion, pT4 (tumor invades scrotum with or without vascular/lymphatic invasion).
N – NX (regional lymph nodes cannot be assessed), N0 no regional lymph node metastasis), N1 metastasis with lymph node mass 2 cm or less in greatest dimension; or multiple lymph nodes, none more than 2 cm in greatest dimension), N2 (metastasis with lymph node mass > 2cm but ≤ 5cm in greatest dimension; or multiple lymph nodes, any one mass > 2 cm but ≤ 5 cm greatest diameter), N3 (metastasis with lymph node mass > 5cm in greatest dimension)
M – MX (distant metastasis cannot be assessed), M0 (no distant metastasis, M1 (distant metastasis), M1a (non-regional nodal or pulmonary metastasis, M1b (distant metastasis other than to non-regional lymph nodes and lungs.
S – SX (marker studies not available or not performed), S0 (marker study levels within normal limits), S1 (LDH <1.5 times upper limit of normal and hCG< 5000[mIu/ml] and AFP <1000 [ng/ml]), S2 (LDH 1.5 to 10 times upper limit of normal or hCG 5000-50,000 or AFP 1000-10,000), S3 (LDH > 10 times normal or hCG > 50,000 or AFP > 10,000).

Approximately 80% of seminomas present with stage I disease (limited to the testis), while 15% have stage II disease. NSGCT has a greater tendency to present with metastatic disease.[1, 4, 5, 6] Seminomas most commonly metastasize via lymphatics to retroperitoneal nodes, and more rarely spread hematogenously to other areas (e.g., liver, lung, bones, or brain). Seminomas are very

sensitive to radiation therapy (RT) while NSGCT are more radioresistant. Seminomas frequently do not have elevated tumor markers, while NSGCT have elevated β-hCG or AFP in 85% of cases.[1, 6, 8]

Low stage seminomas are commonly treated after orchiectomy with RT. Numerous studies report 5-year survival rates in excess of 95%.[1 ,4, 5] Between 15-20% of individuals with seminomas, experience relapse during surveillance if they do not undergo adjuvant RT after orchiectomy.[1, 5] Acute side effects of RT are mostly gastrointestinal, particularly nausea.[9] A newer option for treatment of stage I seminoma is 1 cycle of single agent carboplatin, which has similar survival rates to radiotherapy.[10] Individuals with stage II seminomas treated with post orchiectomy RT have 5-year disease-free survival rates of approximately 80%, ranging from 70 to 92%, but overall survival with salvage therapy approaches 100%.[1, 4, 6, 8] In individuals with distant metastases or bulky retroperitoneal disease after orchiectomy (e.g., stage IIC, III) chemotherapy is the most common treatment, most commonly bleomycin, etoposide and cisplatin (BEP). More than 90% of individuals with stage III achieve complete response.

In contrast to patients with pure seminoma, those with NSGCT are more likely to harbor metastatic disease at presentation. Approximately 33% of individuals with NSGCT present with disease limited to the testis (stage I). NSGCT treatment after orchiectomy depends on stage at presentation, and can include observation, chemotherapy or retroperitoneal lymph node dissection (RPLND), individually or in combination. Treatment planning is based on tumor markers and their behavior after orchiectomy, radiographic staging with CT, and risk stratification. Occult metastatic disease is frequent, with 30% of clinical stage I NSGCT having pathologic evidence of metastatic disease (stage II or greater) despite normalization of tumor markers and normal imaging.[4, 8, 11] Metastasis is most commonly found in the retroperitoneal lymph nodes, but can skip the retroperitoneum, with pulmonary lesions being the next most common site. RPNLD is the only modality that can accurately delineate pathologic stage I from pathologic stage II. The risk of relapse in observation of stage I NSGCT is 27-35%, with more than 50% during the first year after orchiectomy, although late relapses ($\geq$ 24 months) occurring in 10%.[1, 5] The cure rate for clinical stage I is ~95%, with similar rates regardless of treatment (observation + salvage therapy if recurrence develops, primary RPNLD, or primary chemotherapy). However, it should be noted that salvage therapy is almost always more intensive and complex than primary RPLND or primary chemotherapy. For higher stage NSGCT, chemotherapy is usually the initial treatment, followed by post-chemo RPLND or surveillance.[1] The most common chemotherapy for NSGCT is a combination of bleomycin, etoposide and cisplatin. However, similar cancer control rates have been achieved with elimination of bleomycin and a longer course of therapy with etoposide and cisplatin in an effort to avoid the pulmonary toxicity of bleomycin.

Individuals with seminomas with stage I, II and stage IIIA and IIIB and individuals with NSGCT with stage I, II and IIIA have a five-year survival of 91%.[6, 12] Stage IIIC seminomas or stage IIIB NSGCT have a five-year survival rate of 79%. Stage IIIC NSGCT have a five-year survival rate of 48%.[12]

There are some potential long-term toxicities of chemotherapy.[11] These possible long-term side effects include the following:

1. Leukemia: there is a 0.5-2% risk of developing leukemia after treatment with etoposide, depending on the total dose administered.

2. Other solid tumors: there is an approximately 1.5-fold increased risk for second malignancies after chemotherapy for testis cancer.

3. Pulmonary toxicity: there is a 2-3% risk for pulmonary fibrosis after treatment with bleomycin, depending on total dose. Rarely, this can be fatal. Bleomycin also increases the risk of pneumonitis associated with exposure to high concentrations of oxygen. Individuals treated with bleomycin should avoid prolonged exposure to high concentrations of oxygen. Development of pulmonary toxicity can be measured with pulmonary function testing with diffusion capacity testing (DLCO) and bleomycin therapy can be curtailed in this event.

4. Vascular toxicity: up to 1/3 of patients can develop Raynaud's phenomenon after chemotherapy. Patients may need to protect their hands with gloves while working in a cold environment if this develops. There is a 2-2.5-fold increased risk of myocardial infarction after chemotherapy. Patients should protect their cardiovascular health by refraining from tobacco use and maintaining a healthy lifestyle and diet.

5. Neurotoxicity: peripheral sensory neuropathy, which can include ototoxicity, is associated with cisplatin therapy. In general, it is mild and not functionally limiting and frequently improves with time. If it occurs, it usually manifests as paresthesia or dysesthesia in the extremities and does not limit activity. Motor neuropathy is extremely rare.

6. Nephrotoxicity: cisplatin is also associated with nephrotoxicity. Periodic assessment of renal function should be included in the follow up regimen.

7. Infertility: the BEP chemotherapy regimen will cause infertility in all patients temporarily. There is a 25% chance that sperm production will never recover. There is a 50% chance that sperm production will recover to pre-treatment levels. This generally occurs between 12 and 36 months after completion of therapy.[11]

Semen cryopreservation should be discussed with men diagnosed with testicular cancer prior to instituting therapy, as treatment may have an irreversible impact on fertility.

II. Aeromedical Concerns.

The aeromedical concerns primarily relate to surveillance after diagnosis and the potential long-term morbidity of chemotherapy. Surveillance is intensive and mandatory, regardless of the initial treatment (observation, radiotherapy, chemotherapy, RPLND). Assignments and assignment limitations should be instituted in order to comply with follow up recommendations. Follow up should be scheduled in accordance with standards published by the National Comprehensive Cancer Network at www.NCCN.org. Follow up depends on tumor type, stage and initial treatment. The NCCN is a non-profit consortium of cancer treatment centers that provides evidence-based guidelines for the management and follow up of cancers and should be considered a standard of care in the management and follow up of testicular cancer.[13]

Chemotherapeutic morbidity, particularly pulmonary toxicity associated with bleomycin, must be ruled out in the flying community. In the past, the use of bleomycin in aviators would have been permanently disqualifying. This was based on the risk of pulmonary fibrosis with exposure to oxygen. The value of bleomycin in the treatment of malignancies is in part a function of its specific toxicity, since it does not induce bone marrow aplasia, and thus does not add to the toxicity that limits most oncologic drugs. Instead, the principal target organ of bleomycin-induced injury is the lung, with acute pulmonary damage occurring in 6-18% of treated patients. The pathophysiology of delayed toxicity of bleomycin is complex. In the medical literature of the last thirty years, a number of patients have been described who, having previously received bleomycin therapy, have developed pulmonary toxicity when undergoing subsequent surgery. Typically, these have been

young individuals receiving modest levels of oxygen (33-42%) during long operations (4-8 hours). The true incidence of such delayed toxicity is unknown, since the subsequent literature has largely consisted of isolated case reports or small series.[14, 15] A more cogent argument can be made that the period of risk is primarily in the first year after therapy, since most cases occurred within that time frame. However, it is equally possible that this observation represents a bias related to the timing of operative intervention.

Applicable data had been non-existent, a state of affairs that has been somewhat altered by unpublished data recently supplied by the Duke Hyperbaric Unit.[14] Although it had been the practice in hyperbaric medicine to avoid hyperoxia in bleomycin-treated individuals, the undoubted benefit from hyperbaric oxygen (HBO) in wound healing and osteonecrosis posed against the uncertain risk of delayed bleomycin toxicity led several years ago to a change in policy. Since then, the Duke unit has treated 11 individuals previously exposed to bleomycin with HBO. There was a wide range of time between the last dose of bleomycin and the institution of HBO, ranging from 1 month to 22 years. The range of cumulative bleomycin doses was not noted. Anywhere from 8 to 44 treatments with 100% oxygen at 2 ATA (PiO2 ~ 1475 mmHg) were administered for two hours per treatment, once or twice daily. One individual experienced significant chest discomfort and a decline in diffusion capacity of 50%; both resolved following a break in treatment, and she successfully completed HBO treatment with a reduction in frequency of her sessions. While the Duke experience does not represent occupational exposure per se, and the number of individuals treated is small, the amount of oxygen exposure from HBO therapy is far in excess of what would be expected in aviation, and suggests that the risk of delayed toxicity outside the operating room may be minimal.

Based on this data, policy was changed for aviators treated with bleomycin. Those aviators returning to non-high performance aircraft would be evaluated as usual, addressing risks of tumor recurrence and potential toxicity from chemotherapy. Assuming they had not developed bleomycin pneumonitis during therapy, then no restrictions from altitude chamber or other sporadic oxygen exposure is warranted. For aviators returning to a high-performance cockpit (aircraft requiring routine use of 100% oxygen), and assuming that bleomycin pneumonitis had not occurred during their treatment protocol, an ACS evaluation is required and will include pulmonary function testing (spirometry, plethysmographic lung volumes, and diffusion capacity) and high-resolution CT scanning of the lungs. This evaluation will be repeated at the one and two year point of active flying. Because it is possible, and biologically plausible, that the common perception of an increased period of risk within the first year is correct, a grounding period of one year from the end of treatment is required before the baseline evaluation is undertaken.

There have been case reports of life-threatening pneumonitis developing in patients with a history of bleomycin-induced lung injury, who were later given supplemental oxygen for surgical procedures. Therefore, aviators who have a history of bleomycin-induced lung injury should not be allowed to return to airframes that require routine use of 100% oxygen. Also, they should be exempted from the portions of the altitude chamber qualification that require 100% oxygen use. Use of 100% oxygen during emergencies such as fire or rapid decompression is acceptable and should not be discouraged.[14, 15]

III. Waiver Consideration.

History of testicular cancer is disqualifying for all flying classes. An MEB is required prior to waiver submission. For trained assets, waiver may be submitted after six months in remission and completion of all therapy.

Table 1: Waiver potential for testicular cancer

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Seminoma and nonseminoma – all stages	Yes# AETC	Yes
II/III*	Seminoma and nonseminoma – all stages	Yes+* MAJCOM	Maybe†
ATC/GBC SMOD	Seminoma and nonseminoma – all stages	Yes* MAJCOM	Maybe

*Initial/untrained applicants (all classes) must be in remission 5 years prior to waiver submission
+ For trained FC II and III individuals waiver may be considered six months after treatment completed, in remission and asymptomatic.
† For high performance (routine use of aviator mask while flying) individuals treated with bleomycin, will no longer require an ACS evaluation unless problems arise and the evaluation is requested by the waiver authority.
** Waiver authority for FC IIU is AFMSA.
# Waiver authority for SMOD personnel is AFSPC or GSC.

AIMWITS search in January 2012 revealed: 97 cases of testicular cancer; 4 FCI/IA, 49 FC II, 38 FC III, 2 UAV (s), 2 ATC and 2 SMOD. Of the 97 cases, only eight were disqualified. Of the eight disqualified, five were disqualified because of the diagnosis of testicular cancer (e.g., new metastases to the lung, treated with bleomycin, and recent diagnosis of testicular cancer), one due to complication of the surgery [fracture of coccyx and development of coccydynia, requiring control with narcotics] and one was disqualified for another medical condition. The vast majority of the cases were stage I.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for the initial waiver for testicular cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment, complications of treatment such as pulmonary toxicity, surveillance plan and activity level.
B. Physical – genital, lymph nodes, abdomen, chest, and cardiovascular.
C. Consultation from Urology, Oncology to include all six-month follow-up.

D. Labs: Initial and latest - α-fetoprotein (AFP), β-human chorionic gonadotropin (β-hCG), and lactate dehydrogenase (LDH).
E. Pulmonary function tests, in individuals who underwent chemotherapy or RT to chest.
E. Imaging: Chest x-ray and abdominal/pelvic CT.
F. Pathology report.
G. Tumor board report.
H. MEB findings/ALC.

The AMS for waiver renewal for testicular cancer should include the following:
A. Interval history and detailed physical examination.
B. All applicable labs and imaging tests as in the initial aeromedical summary.
C. Consultation from: Urology, Oncology.

ICD 9 code for testicular cancer	
186.9	Malignant neoplasm of testis, other and unspecified

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WAIVER GUIDE
Updated: Oct 2011
Supersedes Waiver Guide of Mar 2008
By: Lt Col Dwight Peake (RAM 12) and Dr Dan Van Syoc
Reviewed by LtCol Erika Struble, AF/SG consultant for Hematology-Oncology

CONDITION:
Thalassemia (Oct 11)

I. Overview.

Thalassemia, typically an autosomal recessive condition, is among the most common genetic disorders worldwide. Approximately 7% of the world's population, or about 500 million people, carry hemoglobin gene variants, including 1.7% of the population heterozygous for both α-thalassemia and β-thalassemia.[1, 2] Highest thalassemia gene frequencies occur in areas surrounding the Mediterranean, and in South Asia, South-East Asia, and Oceania, and it is thought to have developed due to the protective effect against malaria in heterozygotes.[3] About 15% of American blacks are silent carriers for α-thalassemia; α-thalassemia trait (minor) occurs in 3% of American blacks and in 1 to 15% of persons of Mediterranean origin. β-thalassemia has a 10 to 15% incidence in individuals from the Mediterranean and Southeast Asia and 0.8% in American blacks.[4] Over 50% of the US thalassemia population now consists of people of Asian ancestry due to demographic changes from immigration and other population shifts in the United States.[5]

Figure 1.Thalassemia Syndromes[6, 7]

- Alpha-thalassemia
  - Silent α-thalassemia
  - α-thalassemia trait (α^0)
  - α-thalassemia trait (α^+)
  - Hb H disease
  - Hb Bart's Hydrops Fetalis
- Beta-Thalassemia
  - Thalassemia minor (trait)
  - Thalassemia intermedia
  - Thalassemia major
- Delta-beta Thalassemia
  - Hb Lepore
- Variant hemoglobin with thalassemia phenotype
  - Hb E
- Beta-Thalassemia with variant hemoglobin
  - Hb S/-beta thalassemia
  - Hb C/beta-thalassemia
  - Hb E/beta-thalassemia
- Other

The thalassemias are characterized by reduction in the synthesis of globin chains (α or β) causing decreased hemoglobin synthesis and a hypochromic microcytic anemia from defective hemoglobinization of red blood cells.[8] Several types of conditions may be categorized as

thalassemia syndromes (See Figure 1).[6] Clinical severity varies widely, depending on the degree to which the synthesis of the affected globin is impaired, altered synthesis of other globin chains, and coinheritance of other abnormal globin alleles.[4]

Normal adult hemoglobin is primarily hemoglobin A, which represents approximately 98% of circulating hemoglobin. Hemoglobin A is formed from a tetramer - two α chains and two β chains $\alpha_2\beta_2$. The $\alpha_2\delta_2$ tetramer forms hemoglobin A_2, which normally comprises 1-2% of adult hemoglobin. The $\alpha_2\gamma_2$ tetramer forms hemoglobin F, which is the major hemoglobin of fetal life but comprises less than 1% of normal adult hemoglobin.[9]

α-Thalassemia: α-thalassemia (see Figure 2 and Table 1) results from deletion of one or more of the four genes responsible for α-globin synthesis. Four-gene deletions result in fatal hydrops fetalis with 90-95% Hb Barts (γ_4). Three-gene deletions results in hemoglobin H (Hb H). A two-gene deletion is trait and one-gene deletion is a "silent" carrier state.[10]

Figure 2: α-Thalassemia Terminology[6]

Normal= α α/ α α = 2 α globin genes on each of two chromosomes

α^0-thalassemias (current preferred term replacing "α-thalassemia 1")

- -- (no genes on a chromosome)
- --/ α α = heterozygous α^0-thalassemia = α^0-thalassemia trait
- --/-- = homozygous α^0-thalassemia = Hb Bart's

α^+-thalassemias (current preferred term replacing "α-thalassemia 2")

- -α = one gene on chromosome
- -α/ α α = heterozygous α^+-thalassemia = silent α-thalassemia
- -α/ - α = homozygous α^+-thalassemia trait

Compound heterozygous α-thalassemia

- --/ - α = heterozygous α^0-thalassemia/ heterozygous α^+-thalassemia = Hb H

Persons with α-thalassemia trait may exhibit mild hypochromia and microcytosis usually without anemia. Hb A_2 and Hb F levels are normal. Hb H disease resembles β-thalassemia intermedia, with the added complication that the Hb H molecule behaves like moderately unstable hemoglobin, resulting in hemolytic anemia but milder ineffective erythropoiesis. Survival into mid-adult life without transfusions is common. Another more virulent alpha chain defect (four gamma chains-Hb Bart's) causes the hydrops fetalis that results in death in utero or shortly after birth.[4] Readily clinically available gap PCR gene deletion testing can identify the majority of persons with α-thalassemia including silent α-thalassemia (-α/αα).[10]

Table 1: α-Thalassemia Hemoglobins and Red Blood Cell Indices[11]

Phenotype	Genotype	Hb A (%)	Hb A_2 (%)	Hb F (%)	Hb H (β_4) (%)	Hb Bart (γ_γ)(%)	Hb (g/dL)	MCV (fl)	MCH (pg)
Normal	α α/ α α	96-98	2-3	<1	0	0	15	90	30
Silent	- α/ α α	96-98	2-3	<1.0	0	0	14.5	75-85	26
Trait (α^0 or α^+)*	--/ α α or - α/- α	96-98	1.5-3.0	<1.0	0	0	12-13	68-76	23
High	- -/- α	60-90	<2.0	<1.0	0.8-40	2-5	7-10	57-65	18
Hydrops fetalis	- -/- -	0	0	0	5-10	85-90	3-8	136	32

β-Thalassemia. β-thalassemia (see Table 2) is caused by any of more than 200 point mutations in β-globin chain synthesis and very rarely deletions.[6] Homozygous β-thalassemia is a serious medical condition. Previously, most persons with the condition died in childhood, but individuals treated from birth with transfusions and for iron overload now commonly live to over forty years of age.[7] β-Thalassemia major, with either absent or reduced beta chain production, results in a significant amount of HbF ($\alpha_2\gamma_2$). This tetramer is unstable, readily breaks down, and results in severe microcytic, hypochromic anemia. It is associated with massive enlargement of the liver and spleen, due to excessive red-cell destruction and extramedullary erythropoiesis. Thinning of cortex due to bone marrow expansion also leads to pathological fractures.[12] Transfusion therapy is necessary to sustain life.[7] The clinical phenotype of patients designated as having β-thalassemia intermedia is more severe than the usual asymptomatic thalassemia trait but milder than transfusion-dependent thalassemia major. It encompasses a wide range of disorders from transfusion-dependent with growth and development retardation to asymptomatic.[6] Thalassemia minor (i.e., thalassemia trait) usually presents as profound microcytosis and hypochromia with target cells, but only minimal or mild anemia. Hemoglobin electrophoresis classically reveals an elevated HbA_2, but some forms are associated with normal HbA_2 and/or elevated HbF. Individuals with β-thalassemia trait should be warned that their blood picture resembles iron deficiency and can be misdiagnosed.[4]

Table 2: β-Thalassemia Hemoglobins and Red Blood Cell Indices.[8]

Phenotype	β-Globin Genes	Hb A (%)	Hb A_2 (%)	Hb F (%)	Hb H (β^4) (%)	Hb Bart (γ_γ)(%)	Hb (g/dL)	MCV (fl)	MCH (pg)
Normal	Homo-zygous β	97-99	1-3	<1	0	0	15	90	30
β-Thalassemia minor (trait)	Hetero-zygous β^0or β^+	80-95	4-8	1-5	0	0	♂11-15 ♀ 9-14	<27	<79
β-Thalassemia intermedia	*	10-30	2-5	70-90	0	0	7-10	50-80	16-24
β-Thalassemia major	Homo-zygous β^+or β^0	0-10	4-10	90-96	0	0	<7	50-70	12-20

*Homozygous β^+ (mild) or compound heterozygous β^+/β^0 (more severe)

Delta-beta (δβ) thalassemia produces a phenotype of β –thalassemia intermedia when homozygous and β-thalassemia minor when heterozygous, but does not demonstrate increased Hb A_2 (may be borderline high, but usually < 4). When a person with microcytic, hypochromic anemia is noted to have Hb A_2 levels less than 4% and elevated HbF levels, δβ- thalassemia should be suspected, and the Kleihauer-Betke (K-B) acid elution test can distinguish it from hereditary persistence of fetal hemoglobin (HPFH). Homozygous Hemoglobin Lepore causes thalassemia syndrome varying in severity from β-thalassemia intermedia to β-thalassemia major. The heterozygous Hb Lepore is clinically comparable to β-thalassemia minor, but the hemoglobin electrophoresis shows Hb Lepore, mildly increased Hb F, and low Hb A_2.[6]

Another variant hemoglobin, Hb E, has frequencies as high as 80% in some populations in South and Southeast Asia, has increasing prevalence worldwide, and has now become the most common thalassemia syndrome on the US West Coast. Heterozygous Hb E or Hb E trait (Hb AE) or Hb E/α^0-thalassemia cause mild anemia with normal indices and are otherwise asymptomatic. Hb E/ α^+-thalassemia or homozygous Hb E produce a slightly greater anemia plus microcytic hypochromic indices and may occasionally cause splenomegaly. Hb E/β^0 causes clinical illness with severity of β –thalassemia intermedia to Major, but occasionally is mild enough to be found incidentally in adulthood and is associated with splenomegaly.[13, 14] (See Table 3)

Another significant variant hemoglobin thalassemia interaction is Hb C. Hb C disease (Hb CC) with or without with β-thalassemia is a sickling disease with marked splenomegaly. Heterozygous Hb C trait is asymptomatic and may have no anemia or bed blood cell changes. (Hb AC)/ β-thalassemia, however, causes a clinical syndrome with microcytic anemia and occasional splenomegaly, but the severity, usually mild, of the clinical findings depends on whether the β^0 or β^+-thalassemia form is involved.[7, 15, 16]

Conversely, Sickle cell trait (Hb AS)/ β-thalassemia, unlike Sickle cell trait without thalassemia, may produce a symptomatic clinical sickling syndrome similar to Sickle Cell Anemia (Hb SS) disease.[6]

Table 3. Hematologic Data in Hemoglobin E Thalassemic Syndromes[14]

	Hb, g/dL	**MCV, fL**	**MCH, pg**	**MCHC, g/dL**	**RDW, %**	***Hb typing***
Normal	M15.9± 0.9 F12.5 ± 2.0	87 ± 6	31 ± 1.1	**33 ± 0.9**	13.1 ± 0.8	*A2 (2.5 ± 0.2) + A*
HbE trait[1]	12.8 ± 1.5	84 ± 5	30 ± 2.4	33 ± 1.8	14.1 ± 0.6	E (29.4 ± 2.3%) + A
HbE α^0-thalassemia[1]	13.1 ± 1.4	88 ± 4	ND	ND	ND	E (28.5 ± 1.5%) + A
HbE α^+-thalassemia[1]	12.5 ± 1.4	77 ± 5	23 ± 1.1	32 ± 1.6	ND	E (20.7 ± 1.2%) + A
Homozygous HbE	11.4 ± 1.8	70 ± 4	22 ± 1.9	33 ± 1.7	15.6	E (87.7 ± 5.9%)
HbE/β^0-thalassemia[1]	7.8 ± 2.6	67 ± 6	19 ± 3.6	28 ± 4.8	26.5 ± 5.6	E (58 ± 1.5%) + F
AE Bart's disease[2]	9.1 ± 1.1	60 ± 3	17 ± 2	31 ± 4	ND	E (13.0 ± 2.1%) + A+ Bart's (2.2 ± 1.8%)
EF Bart's disease[3]	8.0 ± 1.3	63 ± 6	18 ± 2	29 ± 2	ND	E (80%) + F + Bart's (5%)

[1] Hb AE = heterozygous Hemoglobin E
[2] HbAE with compound heterozygous α-thalassemia (α^0-thalassemia/$\alpha^=$-thalassemia= --/-α)
[3] Homozygous Hemoglobin E (Hb EE) with α-thalassemia and β-thalassemia

II. Aeromedical Concerns.

Diagnosis of thalassemia syndromes (see Table 4) for aeromedical purposes does not need the detailed genotypic analysis that may be required for genetic counseling. Flyers evaluated for these syndromes should be informed that formal genetic counseling with their partner prior to procreation is necessary due to the potentially catastrophic outcomes in their offspring, and that further testing may be required for genetic counseling purposes. In general, β-thalassemia and variant hemoglobins can be diagnosed from the hemoglobin electrophoresis, and α-thalassemia has been a diagnosis of exclusion because no readily available direct testing exists for α-thalassemia. Although most cases of α-thalassemia can now be easily classified by gap PCR deletion analysis, a presumed diagnosis of α-thalassemia may be sufficient and more cost effective for aeromedical disposition which is based on clinical phenotype evaluation.[6, 11, 17]

The primary thalassemia syndrome related aeromedical issues include anemia, hemolysis, splenomegaly, and sickling potential. Although it is unlikely, the possibility of mild cases of homozygous thalassemia syndromes presenting for aeromedical disposition exists. Anemia requiring regular transfusions, resulting from chronic hemolysis predisposing to hypoplastic crisis, or causing sickling symptoms is sufficiently severe to compromise the oxygen-carrying capacity of the individual. Flying is thus typically contraindicated for β-thalassemias major and intermedia, Hb AS/ β-thalassemia, Hb AE/ β-thalassemia, Hb H, and other similarly severe conditions. Chronic splenomegaly is also disqualifying, and, if waiver is feasible, a waiver may require limitations since splenomegaly may not be compatible with ejection seat duty (See waiver guide on Splenomegaly).

Table 4. Diagnostic Testing[6, 11]

CBC with peripheral smear, reticulocyte count/index
Iron studies (serum iron, per cent iron saturation, TIBC, and ferritin) for iron deficiency assessment
Hemoglobin electrophoresis including Hb H and Hb Bart analysis

- Elevated Hb A_2 with elevated or normal Hb F and no variant Hb = β-thalassemia
- Hb A_2<4% with elevated Hb F
    - Suspect δβ-thalassemia even if no Hb Lepore found
    - Kleihauer-Betke (K-B) acid elution test to distinguish HPFH
- Hemoglobin variant
    - Hb C, Hb E, Hb S
        - Heterozygote vs Homozygote
        - With elevated Hb A_2, Hb F = combination variant hemoglobin β-thalassemia
- No iron deficiency with normal hemoglobin types and Hb A_2 and Hb F levels = presumed α-thalassemia

On the other hand, the heterozygous β-thalassemias generally do not impair normal life and are compatible with aircrew duties; the potential concern is the severity of the microcytic, hypochromic anemia and the possibility of splenomegaly.[18] Likewise, heterozygous α-thalassemias, such as silent thalassemia and α-thalassemia trait, rarely produce more than a mild anemia and are compatible with flying duties. In fact, most individuals with thalassemia minor require no medication and live normal lives, suffering no ill effects or restrictions.[9]

III. Waiver Considerations.

Thalassemia is disqualifying for flying class I/IA, II and III. Thalassemia is not listed specifically as disqualifying for ATC/GBC and SMOD duties. Under retention standards, symptomatic anemia is disqualifying for continued duty. Waiver for α- and β-thalassemia minor/trait is likely as long as the anemia is minimal and the individual is symptom free. However, waiver guidance for heterozygous thalassemia associated with other hemoglobinopathies cannot be generalized and thus waiver status is considered on a case by case basis.

Table 5: Waiver potential for various types of thalassemia.

Flying Class	Condition	Waiver Potential Waiver Authority
I/IA	α-thalassemia (silent thalassemia) and α-thalassemia trait	Yes*† AETC
	Hb H disease	No AETC
	β-thalassemia minor	Yes*† AETC
	β-thalassemia intermedia and major	No AETC
II/III/IIU**	α-thalassemia (silent thalassemia) and α-thalassemia trait	Yes*† MAJCOM
	Hb H disease	No MAJCOM
	β-thalassemia minor	Yes*† MAJCOM
	β-thalassemia intermedia and major	No MAJCOM
SMOD*** ATC/GBC	α-thalassemia (silent thalassemia) and α-thalassemia trait	Yes*† MAJCOM
	Hb H disease	No MAJCOM
	β-thalassemia minor	Yes*† MAJCOM
	β-thalassemia intermedia and major	No MAJCOM

* Waiver likely if asymptomatic and hematocrit >32.
** Waiver authority for FC IIU is AFMSA.
*** Waiver authority for SMOD personnel is AFSPC or GSC.
† Indefinite waiver likely if stable hematocrit > 38 for males and >36 for females and asymptomatic.

Review of AIMWTS in Aug 2011 revealed 100 cases of thalassemia syndrome; 20 FC I/IA, 22 FC II, 41 FC III, 16 ATC, and 1 SMOD. These cases consisted of 60 cases of β-thalassemia minor, 36 cases of silent or trait α-thalassemia, one case of heterozygous Hb C/β-thalassemia minor, one case of heterozygous Hb C/α-thalassemia, one case of heterozygous Hb Lepore, and one not specified. Many of the cases were granted an indefinite waiver. Of the 100 cases, 7 were disqualified: one for

decreased visual acuity, one for stroke, one for intervertebral herniation, one for prediabetes (glucose 122, HDL 24, TG 176), one for hyperthyroidism, and one for asymptomatic β-thalassemia minor with hematocrit of 31.5 and 33.2; a seventh for generalized anxiety disorder. See Table 6 for hemoglobin levels in AIMWTS thalassemia cases.

Table 6. Hb/Hct Values for Thalassemia Syndrome Cases in AIMWTS

	#	Average Hb g/dL)	Average Hct (%)	Min Hb (g/dL)	Max Hb (g/dL)	Min Hct (%)	Max Hct (%)
β-thalassemia							
Female	8	11.1	34.0	10.3	12.5	31.5	38.1
Male	55	12.6	39.4	11	14.5	34.7	46.2
α-thalassemia							
Female	4	11.1	34.3	10.5	11.9	31.9	36.2
Male	32	13.0	39.4	11	15.6	14.3	47.7

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for initial waiver should include the following:
A. History – symptoms such as fatigue, headache, shortness of breath, dizziness, palpitations (include negatives), and activity level, and ethnicity and place of ancestral origin, and family history of "anemia".
B. Physical – skin, mucous membranes, heart, lung, abdomen (report specifically on presence or absence of palpable spleen), extremities
C. CBC with reticulocyte count.
D. Iron studies (serum iron, total iron binding capacity (TIBC), and serum ferritin).
E. If spleen is palpable, abdominal ultrasound to quantify spleen size
F. Hemoglobin electrophoresis.
G. Blood smear result.
H. Hematology consult.

The aeromedical summary for waiver renewal should include the following:
A. History – Brief summary of positive results that led to diagnosis, address any new symptoms (include pertinent negatives).
B. Physical – skin, mucous membranes, heart ling, abdomen, extremities.
C. CBC annually.
D. Iron studies.

ICD-9-CM for thalassemia	
282.4	Thalassemia
282.7	Other hemoglobinopathies
282.8	Other specified hereditary hemolytic anemias
282.9	Hereditary hemolytic anemia, unspecified

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WAIVER GUIDE
Updated: Dec 2011
Supersedes Waiver Guide of May 2007
By: Dr Dan Van Syoc
Reviewed by LtCol Erika Struble, AF/SG consultant in Hematology-Oncology

CONDITION:
Thrombocytopenia, Idiopathic Thrombocytopenic Purpura (ITP), and Idiopathic Thrombotic Thrombocytopenic Purpura (TTP) (Dec 11)

I. Overview.

Due to the diversity of underlying disorders, the differential diagnosis of thrombocytopenia is broad. These range from clinically insignificant pseudothrombocytopenia to life threatening disseminated intravascular coagulation and thrombotic thrombocytopenic purpura. As a result, a thorough history and physical exam as well as appropriate laboratory studies are essential in the search for an etiology.

Units can be a confusing factor when dealing with platelet results. It seems there is little standardization. All of the following results are equal:

100 X 10^9/L	100 X 10^3/uL	100,000/mm^3

For the purposes of this waiver guide, the first of these units will be used.

Platelet counts of less than 100 X 10^9/L are considered in the thrombocytopenic range. Platelet counts of 100 X 10^9/L to 150 X 10^9/L are considered abnormal and are termed "borderline thrombocytopenia." However, the risk of bleeding with trauma or surgery is generally not increased until platelet counts are below 50 X 10^9/L and spontaneous bleeding is unusual above 10 X 10^9/L and treatment is usually initiated if platelets are less than 30 X 10^9/L. Patients with platelet counts less than 5 – 10 X 10^9/L are considered at high risk for spontaneous, life-threatening hemorrhage.[1]

Pseudothrombocytopenia (PTCP): The term pseudothrombocytopenia is used to define a state with a falsely low platelet count reported by automated hematology analyzers due to platelet clumping. Commonly, this clumping is caused by an alteration of the platelet surface glycoproteins when they are incubated with a calcium chelator such as EDTA. These modified platelet antigens then react to anti-platelet autoantibodies to form these large agglutinates. Some resources state that the aggregation of platelets in patients with EDTA-dependent PTCP can be prevented by the use of other anticoagulants such as sodium citrate or heparin, but even these agents can induce platelet clumping, and thus spuriously low platelet counts. Clumped platelets on peripheral blood smear are the hallmark. Repeat within 2 weeks with a peripheral smear. If platelet count is then normal, no further action is necessary.[2]

Dilutional Thrombocytopenia: This occurs with massive transfusion using platelet-poor fluids. The platelet count should be repeated when the patient is stable. The condition which required the transfusion will determine if waiver is required.

Persistent Borderline Thrombocytopenia: When platelet counts persist for 3 months in the range of 100 X 10^9/L and 150 X 10^9/L, other etiologies such as medications, viral infections or other transient conditions have been ruled out, and the aviator is asymptomatic and without other lab abnormalities, a waiver is not required. However, the 10-year probability of developing idiopathic thrombocytopenic purpura (platelet counts persistently < 100 X 10^9/L) was determined in one study to be 6.9%.[3] In the same study, the 10-year probability of developing autoimmune disorders other than ITP was 12.0%. Therefore, complete blood count (CBC) is recommended every six months while on flying status.

Thrombocytopenia Secondary to Decreased Platelet Production: Many conditions can cause decreased platelet production; those likely to affect the previously healthy, flying population include viral infections, nutritional deficiencies, bone marrow disorders, drugs and toxins. A search for such underlying disorders is essential as some are life-threatening while others spontaneously resolve. Transient thrombocytopenia due to viral illness usually spontaneously resolves. Drugs known to occasionally induce thrombocytopenia include quinidine, quinine, sulfa preparations, carbamazepine, methyldopa, aspirin, oral antidiabetic drugs, gold salts, heparin, and rifampin. There are an estimated 87 known drugs with some evidence of causing thrombocytopenia.[4] Recent data indicates that up to 36% of patients on prolonged heparin therapy develop thrombocytopenia.[5] The mechanism is an immune reaction in which drug bound to the platelet membrane acts as a "foreign" antigen. The mechanism is analogous to the immune-mediated destruction of platelets that occurs in idiopathic thrombocytopenic purpura (ITP) and, except for the history of drug ingestion, the disorders are indistinguishable. When the drug is stopped, the platelet count typically begins to increase within 1 to 7 days; gold-induced thrombocytopenia is an exception, because injected gold salts may persist in the body for many weeks.

Thrombocytopenia Secondary to Altered Distribution of Platelets: Hypothermia is a cause of transient thrombocytopenia due to splenic sequestration. Because rewarming is associated with return to normal platelet count and function, the aeromedical concerns focus on the hypothermia itself and are not discussed here. Congestive splenomegaly or hypersplenism is a more common and clinically significant cause of platelet sequestration and more than 200 diseases have been associated with congestive splenomegaly. The clinical and laboratory findings typically include significant splenic enlargement, platelet counts above 50 X 10^9/L, and a decrease in red and/or white blood cell counts.[6] Because the total pool of platelets is normal and mobilization typically occurs with stress, splenectomy is not clinically indicated in most cases. Splenomegaly is disqualifying for flying personnel and splenectomy is often undertaken in pursuit of a waiver; nonetheless, splenectomy is not without potential for complications and is not always curative, so great thought needs to be placed into this decision. Individuals should be immunized at least two weeks prior to splenectomy for *Streptococcus pneumoniae*, *Hemophilus influenzae* b, and *Neisseria meningitidis*.

Thrombocytopenia Secondary to Increased Platelet Destruction: These conditions, mainly idiopathic (immune) thrombocytopenic purpura, disseminated intravascular coagulation, and thrombotic thrombocytopenic purpura, manifest with purpura and/or bleeding.

Idiopathic thrombocytopenic purpura (ITP): ITP is caused by autoreactive antibodies that bind to platelets and shorten their life span. *ITP is an isolated thrombocytopenia, with otherwise normal blood counts, normal peripheral smear, and no clinically apparent associated conditions that may cause thrombocytopenia; it is a diagnosis of exclusion.*[7] *ITP occurs more commonly in women*

during the second and third decades but can occur in either sex and at any age.[8] *Many patients come to medical attention with platelet counts between 5 and 20* X 10^9/L *because they develop petechiae, purpura, gingival bleeding or ecchymoses over the course of several days. Those with 30 to 50* X 10^9/L *often give history of easy bruising. The spleen size is normal. Platelet antibody testing is not necessary for management decisions in patients with ITP and the current available tests do not distinguish ITP from secondary thrombocytopenic purpura, and a negative test does not rule out the diagnosis of ITP.*[7]

In childhood, ITP is usually acute in onset and many cases resolve with and without treatment. If ITP was diagnosed in childhood (<18-years-old) and complete resolution was achieved, regardless of treatment, prognosis is excellent with no long term sequelae. Adult ITP (≥18-years-old) tends to be of more indolent onset with a course that is persistent, often lasting years, and can be characterized by recurrent exacerbations of disease. Of 86 patients that had a complete response, (despite treatment option) at 2 years, 9 had one or more relapses over the ensuing years of study (mean years of follow up was 10.5).[9]

It is estimated that the lifetime risk of fatal hemorrhage for a person with ITP is approximately 5%. The risk of a nonfatal major hemorrhage was found to be 3% per year for patients less than 40 years of age. No conclusive data exist regarding the ability of clinical or laboratory parameters at presentation to predict the risk of major bleeding.

Treatment of ITP must be tailored to the individual patient with an attempt to match the risks of therapy with the severity of disease, taking into account the patient's lifestyle. Treatment is based primarily on the severity of the thrombocytopenia and bleeding. All suspect drugs should be discontinued.[10] The goal of all treatment strategies for adult patients with ITP is to achieve a platelet count that is associated with adequate hemostasis, rather than a platelet count in the "normal" range.[11] *Treatment options include corticosteroids, splenectomy, and, for life-threatening bleeding, platelet transfusions and IV immune globulin.* Adults usually are given an oral corticosteroid (e.g. prednisone 1 mg/kg once/day) initially. In the patient who responds, the platelet count rises to normal within 2 to 6 weeks. The corticosteroid dosage is then tapered over one to four months.[12] However, most patients (70 to 95%) either do not respond adequately or relapse as the corticosteroid is tapered; splenectomy can achieve a remission in about $^2/_3$ of these patients.[13] Of the 30 to 40% of adults that require therapy after splenectomy, the incidence of intracerebral hemorrhage ranges from 2 to 3% per year.[8]

<u>Thrombotic thrombocytopenic purpura (TTP)</u>: TTP and hemolytic-uremic syndrome (HUS) are acute, fulminant disorders characterized by thrombocytopenia, microangiopathic hemolytic anemia, fever, variable neurological symptoms, and renal failure. TTP and HUS involve nonimmunologic platelet destruction. Loose strands of fibrin are deposited in multiple small vessels, which damage passing platelets and RBCs. Platelets are also destroyed within multiple small thrombi. Multiple organs develop bland platelet-fibrin thrombi (without the vessel wall granulocytic infiltration characteristic of vasculitis) localized primarily to arteriocapillary junctions, described as thrombotic microangiopathy. TTP and HUS differ only in the relative degree of renal failure. Diagnosis and management in adults are the same. Therefore, in adults, TTP and HUS can be grouped together.[14] Although most cases of TTP have no known etiology, potential causes and associations are pregnancy, deficiency of the plasma enzyme ADAMTS13, hemorrhagic colitis resulting from Shiga toxin-producing bacteria, and drugs (such as quinine, cyclosporine, mitomycin C).

Plasma exchange is the only treatment for TTP in adults which has firm data supporting its effectiveness.[14] In addition, glucocorticoid therapy is often prescribed. More intensive immunosuppressive therapy with rituximab, cyclophosphamide, vincristine or cyclosporine may be required in some individuals to obtain a remission. In one study relapses occurred in 20% of idiopathic TTP, most within the first year and in those with severe ADAMTS13 deficiency. Many patients describe persistent cognitive abnormalities for many years following recovery that can be documented by tests of new learning and recent memory.

II. Aeromedical Concerns.

Thrombocytopenia itself (apart from the underlying condition) is not likely to affect physical or cognitive performance unless bleeding occurs or the potential for trauma exists, which is inherent in many aeromedical occupations. ITP in adults is frequently a chronic disease that can require treatments not compatible with flying (steroids, immunosuppressive therapy). TTP is an acute, fulminant disease that has a high rate of relapse, especially in the first year. Furthermore, neurological system involvement is common, from seizures, cerebral vascular attacks to mild cognitive deficits. Resolution of symptoms and sequelae needs to be established.

III. Waiver Consideration.

AFI 48-123 does not specifically mention platelet disorders in any of the flying or special duty sections, but for retention purposes, platelet counts less than 100×10^9/Land those with platelet dysfunctions are disqualifying and must be evaluated. Therefore, persistent or symptomatic conditions leading to a decreased platelet count are disqualifying for all aviation duties. Thrombocytopenia of any cause that requires therapy would qualify as symptomatic and result in the need for a waiver.

Table 1: Waiver potential for thrombocytopenia, ITP, or TTP

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA Initial II/IIU/III	Thrombocytopenia or ITP (childhood, < 18-years-old) that resolved. ITP/TTP/causes other than transient (≥18-years-old).	Yes AETC No AETC
II/IIU**/III ATC/GBC SMOD#	Single episode of ITP resolved with platelets >100 X 10^9/L.* Recurrent ITP or not resolved with platelets maintained at >50 X 10^9/L and <100 X 10^9/L.* † Recurrent or not resolved ITP with platelets maintained at <50 X 10^9/L. TTP resolved with platelets >100 X 10^9/L† Recurrent TTP	Yes MAJCOM Yes AFMSA (FC II) MAJCOM (FC III) No MAJCOM Yes AFMSA (FC II) MAJCOM (FC III) No MAJCOM

* Off all treatment and 6 months of stable platelets.
† Waiver not considered until two years after resolution and ACS evaluation is likely.
# Waiver authority for all SMOD personnel is AFSPC or GSC.
** Waiver authority for all FC IIU personnel is AFMSA.

AIMWTS search in Sep 2011 revealed a total of 22 individuals with a waiver request for one of the thrombocytopenic disorders. Breakdown of the cases showed 3 FC I/IA cases (1 disqualification), 12 FC II cases (1 disqualification), 5 FC III cases, 1 ATC/GBC case, 0 FC IIU cases and 0 SMOD cases. All 3 disqualification cases were disqualified secondary to the thrombocytopenia diagnosis.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for thrombocytopenia, ITP, or TTP should include the following:
A. Comprehensive history and physical to include peripheral blood smear interpretation and course of platelets.
B. CBC with differential.
C. Bone marrow aspiration if over 60 years of age or associated symptoms suggest pathology.
D. Hematology consultation.
E. Cortisol stimulation test if treated with steroids for greater than 3 weeks (see systemic glucocorticoid waiver guide).
F. Medical evaluation board (MEB) results for ITP, TTP and thrombocytopenia associated with splenomegaly.

The AMS for renewal waiver for thrombocytopenia, ITP, or TTP should include the following:
A. Interim history and current exam.
B. CBC quarterly (If individual has gone six years without recurrence then CBC just at waiver renewal time).
C. Hematology consultation if platelets not stable since last waiver or platelets < 100 X 10^9/L.

ICD 9 codes for thrombocytopenic disorders	
287.3	Primary thrombocytopenia
287.4	Secondary thrombocytopenia
287.5	Thrombocytopenia, unspecified
287.31	Immune thrombocytopenic purpura
446.6	Thrombotic microangiopathy (TTP)

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WAIVER GUIDE
Updated: Jun 2012
Supersedes Waiver Guide of Feb 2008
By: Dr Dan Van Syoc
Reviewed by Col Erika Struble, AF/SG Consultant for Hematology/Oncology

CONDITION:
Thrombocytosis (Jun 12)

I. Overview.

Thrombocytosis, also called thrombocythemia, is generally defined as a platelet count greater than a defined upper limit of normal that may vary between 350,000/µl to 600,000/µl, depending on the laboratory or medical reference. The most common cut off for normal is <450,000/µl.[1] It is estimated that a platelet count in excess of 450,00//µl occurs in about 2.5% of the population.[2] Elevated platelet counts are often an incidental or unexpected finding on a complete blood count (CBC) conducted to evaluate an unrelated condition.[3] For those individuals found to have thrombocytosis without associated bleeding or thrombosis, the first challenge is to find the underlying cause.

The causes of thrombocytosis are separated into two categories: autonomous (primary) thrombocytosis and reactive (secondary) thrombocytosis. Autonomous thrombocytosis occurs as a result of myeloproliferative disorders, myelodysplastic disorders, or rarely as a result of a hereditary condition.[4] Reactive thrombocytosis is most often a normal physiologic response to coexistent inflammatory condition (e.g., infection, chronic inflammatory condition). Distinction between these two categories is important since autonomous thrombocytosis is associated with a significantly increased risk for thrombotic or hemorrhagic complications whereas reactive thrombocytosis is not.[5]

The most important medical complications of thrombocytosis are hemorrhage and thrombotic events. Thrombosis occurs more frequently in arterial vessels but also occurs in large veins, potentially resulting in deep vein thrombosis, portal vein thrombosis, or pulmonary embolus. The most common location for an arterial thrombus is in the brain.[3] Platelet counts that exceed 1,500,000/µl have an increased risk of bleeding.[6] Thrombocytosis with counts less than 1,000,000/µl are more often associated with thrombosis but the relative platelet count is not proportional to an individual's risk of thrombosis.[7]

Thrombocytosis is frequently present without the symptoms of hemorrhage and thrombotic events. When other symptoms do occur they may be subtle and non-specific. Microvascular thrombi are thought to be the cause of erythromelalgia, pain and warmth with erythema or mottling of the skin. Erythromelalgia is usually present on the extremities but may also affect the face.[7] Other non-specific symptoms may include headache and paresthesias.

A. Reactive (secondary) thrombocytosis

The most common reason for an elevated platelet count is reactive thrombocytosis.[5] Reactive thrombocytosis is most often a normal physiologic response to a coexistent inflammatory condition or surgery. Lifetime reactive thrombocytosis may also be present in patients who have had a

splenectomy. Recent studies have found that between 87% and 96% of people found to have platelet counts over 500,000/µl had reactive thrombocytosis.[8, 9, 10]

Reactive thrombocytosis is generally a self-limiting condition that resolves with the inciting condition. Thrombosis or bleeding occurs in less than 1% of patients with reactive thrombocytosis.[8] The list of conditions that may lead to a reactive thrombocytosis is lengthy. The platelet count should normalize within days after "correction" of whatever problem caused the thrombocytosis. A more prolonged elevation of the platelet count suggests an undiagnosed problem, such as a persistent infection. Common conditions include tissue damage from surgery, infection, malignancy, asplenia, and chronic inflammatory disorders.[7] Other conditions associated with transient thrombocytosis include acute blood loss, "rebound" from thrombocytopenia, iron deficiency, and even exercise.[3, 7]

Reactive thrombocytosis may be a result of a subclinical disorder or occult cancer. Therefore, asymptomatic patients with thrombocytosis must have a comprehensive physical evaluation for malignancy or other potentially treatable disease.

B. Autonomous (primary) thrombocytosis

1) Myeloproliferative disorders.

a) Polycythemia vera (PV) causes thrombocytosis with an increase in blood viscosity. Thrombosis in the brain or other vital organs is a significant threat for PV patients.[11] PV is not a waiverable condition.

b) Chronic myeloid leukemia (CML) – The leukemias have many significant medical complicating factors other than thrombocytosis that have the potential for progression and performance decrement. CML is not a waiverable condition.

c) The natural history of chronic idiopathic myelofibrosis is associated with marrow failure and transfusion-dependent anemia. Median survival for this condition is 5 years. Thrombocytosis associated with chronic idiopathic myelofibrosis is not waiverable.

d) Essential thrombocytosis (ET) is a diagnosis of exclusion. It tends to be a disorder of adults in the sixth or seventh decade of life.[12] The median age at diagnosis for ET is 60 with as many as 20 percent being younger than 40. There appears to be a slight female preponderance in ET cases.[13] No single specific clinical, cytogenic, or molecular test is available for the diagnosis.[14] Janus kinase 2 (JAK2) present in 95% of polycythemia vera cases, is also present in 50% of ET cases.[15] ET should be suspected in the asymptomatic patient found to have a chronically elevated platelet count, especially if the count exceeds 1,000,000/µl. The criteria for making this diagnosis have recently been updated by the World Health Organization and must include all four of the below items.[15]
i. A platelet count greater than or equal to 450,000/µL.
ii. A bone marrow biopsy consistent with ET.
iii. A lack of any criteria for PV, CML, myelofibrosis, or myelodysplastic syndromes.
iv. The demonstration of a JAK2 mutation or other clonal marker; or in the absence of a clonal marker, no evidence for reactive thrombocytosis.

Most commonly, ET is found incidentally on complete blood counts (CBCs), but less commonly it may be found due to complications. Complications of ET can generally be categorized into thrombotic, hemorrhagic, or progression into one of the other three myeloproliferative disorders.[3] Determinants of an increased risk for complications are generally agreed upon to be age over 40, previous thrombotic event, or presence of cardiac risk factors. The annual risk of thrombotic complications in a cohort of untreated/treated patients was found to be 6.6%/patient-year.[16] In this cohort, the most common thrombotic event was a cerebral arterial thrombosis. The annual risk of thrombotic and hemorrhagic complications in a cohort of untreated patients with age range of 16-55 was found to be 2.3%/patient-year.[17] The risk of hemorrhage or progression to another myeloproliferative disorder is less than that of a thrombotic event.[18]

Treatment of ET is generally categorized into one of two types of therapy. Aspirin therapy is indicated for relief of erythromelalgia symptoms and to reduce the risk of thrombotic events. It is very important to emphasize that aspirin therapy in these patients is not without risk. ET patients with platelet counts over 1,500,000/µl may develop an acquired von Willebrand's disease. Aspirin in these patients greatly increases their risk of hemorrhagic complications. The second category of therapy for ET is cytoreductive therapy. This category includes the antineoplastic drugs such as the alkylating agent busulfan and the antimetabolite hydroxyurea. The newest cytoreductive drug indicated for ET is anagrelide.[19] These drugs are not approved for flying status. Furthermore, even if one were to reduce the platelet count to normal range with a cytoreductive drug complication rates still exceed acceptable aeromedical standards (probably because the platelets are still qualitatively abnormal). For patients at high risk for vascular events, some researchers feel that the combination of hydroxyurea and low-dose aspirin is superior to anagrelide plus low-dose aspirin.[20]

2) Myelodysplastic disorders cause different degrees of cytopenia and abnormal cell maturation. These patients are therefore at increased risk of anemia, infection, and bleeding which are often refractory to treatment.

3) Hereditary thrombocytosis is an extremely rare and heterogeneous genetic disorder that presents clinically like ET.

C. <u>Non-specific thrombocytosis.</u> A recent "expert panel" has recommended that a platelet count of 400-450,000 needs no further evaluation.[15] Any platelet count > 450,000 does need evaluation. If there is no evidence of a "reactive" thrombocytosis, then Janus kinase 2 mutation (JAK-2) testing should be done. A bone marrow biopsy should also be done, which would include testing for the Ph+ chromosome. Commonly, if these tests are negative, the individual platelet count is between 450,000/µl and 600,000/µl, and no evidence of reactive process then the individual is labeled "non-specific thrombocytosis."

Evaluation

The approach to an individual found to have an elevated platelet count should begin with an evaluation for reactive thrombocytosis. In this case, the primary medical problem should be managed first. Once the platelet count returns to baseline, no disqualifying platelet condition exists and the individual may be returned to flying status as long as the primary medical condition doesn't require a waiver.

Patients who are asymptomatic and found to have an elevated platelet count require additional testing to rule out autonomous thrombocytosis or an occult illness causing reactive thrombocytosis. If the history does not identify a risk factor for thrombocytosis, the physical exam should focus on evidence of bleeding or thrombosis. The spleen may be enlarged in cases of autonomous thrombocytosis.

If history and physical exam are non-contributory the most useful laboratory tests will be a repeat platelet count, the peripheral blood smear, and serum iron studies including plasma fibrinogen and ferritin. Other tests that may suggest an occult inflammatory process is present include an erythrocyte sedimentation rate and C-reactive protein levels. Although platelet production is regulated by the hormone thrombopoeitin, serum thrombopoeitin levels are not helpful in differentiating reactive from autonomous thrombocytosis.[4] Additional testing must also include stool for occult blood and chest x-ray for occult malignancy. Cases of persistent thrombocytosis in an otherwise normal patient must have a formal hematological evaluation.

II. Aeromedical Concerns.

A. Essential thrombocytosis. The most significant aeromedical concern is the greater than 1%/year risk of a thrombotic event (most common cerebral). Unfortunately the level of thrombocytosis does not predict thrombotic events. Hemorrhagic complications are seen with elevated thrombocytosis levels (>1.5 million/µl).

B. Secondary thrombocytosis. Thrombotic and hemorrhagic complications do not occur in reactive thrombocytosis unless the underlying condition itself predisposes to such complications (e.g., individuals who are post-operative or with malignancy).[5] The elevated platelet count by itself will not cause complications that affect physical or cognitive performance. For the condition to be labeled a reactive thrombocytosis, a credible underlying etiology must be identified. Individuals who have had a surgical splenectomy frequently have lifelong reactive thrombocytosis and once again do not have an increased risk for thrombosis or bleeding.[4, 9] (See splenectomy waiver guide.)

III. Waiver Consideration.

Platelet counts greater than 450,000/µl are disqualifying for all flying classes. If, after work-up, the elevation is determined to be reactive thrombocytosis secondary to an acute illness (e.g., surgery, infection) and the platelet count returns to normal, waiver is not required. For ATC/GBC and SMOD personnel, a waiver is required for platelet counts greater than 400,00/ µl, as they do not meet retention standards and need an MEB.

Table 1: Waiver potential for thrombocytosis

Flying Class (FC)	Condition/Treatment	Waiver Potential Waiver Authority	ACS review/ evaluation
FC I/IA Untrained II/III	Sustained thrombocytosis secondary to splenectomy.	Yes AETC	No
	All other cases of sustained thrombocytosis	No AETC	No
FC II/III ATC/GBC SMOD**	Non-specific thrombocytosis (<600,000µl and negative work-up)	Yes* MAJCOM	No
	Sustained thrombocytosis secondary to splenectomy.	Yes$ MAJCOM	No
	Sustained reactive thrombocytosis	Maybe#* MAJCOM	Yes
	Essential thrombocytosis without cytoreductive therapy.	Maybe‡ MAJCOM	Yes
	Essential thrombocytosis with cytoreductive therapy	No MAJCOM	No
	All other causes of primary thrombocytosis	No MAJCOM	No

Depending on etiology; medical condition causing reactive thrombocytosis must be identified and likely requires a waiver.
* FC II and III untrained unlikely.
** Waiver authority for SMOD is AFSPC or GSC.
$ Indefinite waiver likely.
‡ FC II (non-pilots only) and FC III may be considered for waiver if ET does not require treatment, no history of thrombosis or hemorrhage, platelet count consistently below 1,000,000/µl, no evidence of JAK-2 and no other risk factors (HTN, erythromelalgia, smoker) and asymptomatic. No waiver for FC II (pilots) and untrained FC II and III.

Review of AIMWTS through Apr 2012 revealed 12 cases of thrombocytosis; 6 were disqualified. Breakout of the cases was as follows: 1 FC I/IA case (disqualified), 3 FC II cases (2 disqualified), 5 FC III cases (1 disqualified), 1 ATC/GBC case (disqualified), and 2 SMOD cases (1 disqualified). Each of the DQ cases was for the thrombocytosis diagnosis and half were due to the untrained status of the applicant.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for thrombocytosis should include the following:
A. Comprehensive history – to include thrombosis or bleeding episodes (negatives included), symptoms, course of platelet values, treatment, and cardiac risk factors.
B. Physical – complete, special attention to skin, neurology and abdomen.
C. Current CBC with differential.
D. Serum iron, ferritin, fibrinogen, erythrocyte sedimentation rate (ESR), C-reactive protein, occult blood studies, chest x-ray.
E. Hematology consultation to include bone marrow biopsy and clonal markers.

The AMS for renewal waiver for thrombocytosis should include the following:
A. History – summary of initial history (platelets, bone marrow, clonal markers) and symptoms (negatives included)).
B. Physical – skin, neurology, abdomen.
C. CBC at least annually (minimum every 6 months for ET) or more frequently at direction of hematologist.
D. Hematology consultation.

ICD 9 Codes for Thrombocytosis	
238.71	Essential thrombocythemia (primary thrombocytosis)
238.4	Polycythemia
205.1	Chronic myelomonocytic leukemia
238.75	Myelodysplastic syndrome, unspecified
238.76	Myelofibrosis with myeloid metaplasia (idiopathic myelofibrosis [chronic])

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WAIVER GUIDE
Updated: Mar 2012
Supersedes: Waiver Guide of Nov 2008
By: Col Billy D. Pruett (RAM 12) and Dr. Dan Van Syoc
Reviewed by LtCol Mark True, AF/SG Consultant for Endocrinology

CONDITION:
Thyroid Cancer (Mar 12)

I. Overview.

There are four histologic types of thyroid cancer: papillary, follicular, medullary, and anaplastic.[1] Papillary and follicular thyroid carcinomas are lumped together under the term "differentiated thyroid carcinoma" and represent 94% of all thyroid cancers. Medullary is a neuroendocrine tumor representing 5%, and anaplastic carcinomas, labeled "poorly differentiated carcinoma", make up the remaining 1% of primary thyroid tumors.[2] More rare are the thyroid lymphomas or other carcinomas which metastasize to the thyroid.

Over the last two decades, the incidence of thyroid cancer has risen globally to the point where it is now the most common endocrine malignancy.[3] In the U.S., the risk is now more than twice what it was in 1990.[4] The current overall estimated incidence is 7.7 per 100,000, with papillary carcinoma demonstrating the greatest proportional increase over time.[5, 6] Its rate increased from 2.7 to 7.7 per 100,000 from 1973 to 2002.[7] Rates for follicular, medullary, and anaplastic types, particularly among women, continue to rise across most age ranges. This is especially true for anaplastic carcinomas.[5]

Much of the perceived increase may well be due to improved detection of small papillary cancers, and many thyroid experts feel that this "increase" is actually due to improvements in diagnostic techniques such as ultrasound, imaging studies and ultrasound-guided fine needle aspiration biopsy (FNAB).[8] For 2011, the American Cancer Society reports approximately 48,020 new cases of thyroid cancer in the U.S. alone, of which 36,550 (76%) were in women, and 11,470 in men. Of these, nearly 2/3 were diagnosed in patients between the ages of 20 and 55 years.[4]

There may also be a role for genetic testing in the future of thyroid cancer diagnosis and treatment, particularly for "inconclusive" cytologic results. A 2011 study of 82 FNA smears, 46 malignant and 36 benign by histology looked to quantify the expression levels of the c-KIT gene by quantitative Real Time PCR. The researchers found a highly preferential decrease in c-KIT transcription for malignant thyroid lesions compared to the benign ones. Their analysis proved to be highly specific and sensitive, improving the cytological diagnostic accuracy of by 15%.[9]

In general, 5% of thyroid nodules represent thyroid cancer.[10] Fortunately, the prognosis is usually excellent, with most forms of the disease (apart from the fulminant and lethal anaplastic variety) running an indolent course. Overall the relative 10-year survival rate is better than 90% (second only to non-melanoma skin cancer), and has remained fairly stable. In 2011 the American Cancer Society reported 1,740 deaths from thyroid cancer, of which 980 (56%) were women and 760 men.[4]

Most thyroid cancers are diagnosed at a local stage (61%), occur in non-Hispanic whites (79.5%), and in females. A 2011 study published by the National Cancer Institute found that among women,

papillary thyroid cancer rates were highest among Asians (10.96 per 100,000 woman-years) and lowest among blacks (4.90 per 100,000 woman-years), while follicular cancer rates did not vary substantially by race or ethnicity. Medullary cancer rates were highest among Hispanics (0.21 per 100,000 woman-years) and whites (0.22 per 100,000 woman-years), and anaplastic rates were highest among Hispanics (0.17 per 100,000 woman-years). Among men, both papillary and follicular thyroid cancer rates were highest among whites (3.58 and 0.58 per 100,000 man-years, respectively), medullary cancer rates were highest among Hispanics (0.18 per 100,000 man-years), and anaplastic rates were highest among Asians (0.11 per 100,000 man-years).[5]

Papillary Thyroid Cancer:

- Age at diagnosis: Most frequently 30-50 years old, with a peak at age 50, and a female-to-male ratio of about 2.5:1.[11]
- Clinical Course: Indolent and slow-growing both in the thyroid gland and in secondary sites. Tends to metastasize locally to lymph nodes and strap muscles of the neck. The presence of local cervical adenopathy does not adversely affect prognosis. It can rarely metastasize to the lungs, bone or brain. Lesions less than 1 cm at diagnosis (micropapillary) have a lifetime recurrence rate of about 5% and no change in death rate from the general population. There is an increased incidence in high iodine intake regions, as well as in those receiving external radiation to the neck as a child.[12]
- Pathologic Variants: Can see Follicular, Tall Cell, or Columnar Cell variants which confer a worse prognosis.
- Prognosis: Excellent. Ten year overall survival is 93%.[13] Patients younger than 40 years have better prognosis than older patients.

Table 1 - Papillary thyroid cancer*

Stage	**5-Year Relative Survival Rate**
I	Near 100%
II	Near 100%
III	93%
IV	51%

*Based on patients diagnosed 1998 to 1999[1]

Follicular Thyroid Cancer:

- Age at diagnosis: Older population than papillary tumors; peak incidence between ages 40 and 60.[14]
- Clinical Course: Tends to metastasize hematogenously to bone and lungs. Often a bone lesion (lytic lesions and pathologic fractures) is the presenting symptom. Small primary lesions in the thyroid may be overlooked. More commonly seen in iodine-deficient regions.
- Prognosis: Excellent. Survival slightly less than with papillary cancer; estimated to be about 85% at ten years.[15] Older patients have a worse prognosis.

Table 2 - Follicular thyroid cancer*

Stage	5-Year Relative Survival Rate
I	Near 100%
II	Near 100%
III	71%
IV	50%

*Based on patients diagnosed 1998 to 1999[1]

Anaplastic or Undifferentiated Thyroid Cancer:

- Age at diagnosis: mean age at diagnosis is 65 years and fewer than 10 percent are younger than 50 years.[16]
- Clinical Course: Typical presentation is an older patient with dysphagia, cervical tenderness, and a painful, rapidly enlarging neck mass. Superior vena cava syndrome may also be present, as well as metastatic disease which is found in 30-50% of new diagnoses.[17] Other symptoms may include stridor, and/or hoarseness. Extremely rapid growth and local invasion can lead to strangulation or esophageal obstruction. While exact figures vary, there may be a history of differentiated thyroid cancer which has undergone transformation.
- Prognosis: Grave in spite of combined surgery, radiation, and chemotherapy. Median survival is 5 months; with a one year survival of 20%.[18] All anaplastic carcinomas are considered Stage IV, and have a 5-year relative survival rate around 7% (based on patients diagnosed between 1985 and 1991).[15] Poor prognosis is associated with acute symptoms (within 1 month of presentation with neck tumor, rapid growth, hoarseness, pain, dyspnea, or dysphagia), tumor >5 cm, distant metastases, or a white blood cell count of >10,000.

Medullary Thyroid Cancer:

- General: Neuroendocrine tumors arising from parafollicular C cells which produce thyrocalcitonin. Sporadic disease is typically seen in older individuals (50-60) and accounts for 80% of cases. Of these 75-95% present as a solitary thyroid nodule; typically in the upper thyroid lobes. The other 20% have inherited tumor syndromes.[19] These syndromes are all autosomal dominant and can be detected with genetic testing. The syndromes are multiple endocrine neoplasia (MEN) type 2A (medullary carcinoma of the thyroid, pheochromocytoma, and multigland parathyroid hyperplasia or tumors), MEN 2B (medullary carcinoma of the thyroid, pheochromocytoma, mucosal neuromas, and marfanoid body habitus), or familial medullary carcinoma. All three involve mutations in the *RET* proto-oncogene and should be suspected in younger patients who present with medullary histology.[20] Lymph nodes are involved pathologically in two-thirds of all cases.[21]
- Clinical Course: Two patterns - a unifocal lesion occurring sporadically in elderly and a bilateral form often associated with pheochromocytomas which tend to be malignant (autosomal dominant MEN type 2). Clinical syndromes include asymptomatic elevated serum calcitonin, intractable diarrhea, Cushing's syndrome, and carcinoid syndrome.
- Prognosis: Overall 10/15 year survival rates approximately 70/65% in the previous studies. When the familial forms were excluded these rates dropped to about 60 and 54% respectively. Younger age at diagnosis, smaller tumor size, and familial form are all associated with better survival rates. Two groups of patients have 10-15 year survival rates no different from the general

population: 1) Patients with the familial form identified by screening (serum calcitonin determinations in relatives of patients with medullary thyroid cancer), and 2) Young patients with tumors <1cm in size and clinical stage I or II at diagnosis. If local lymph node metastases are identified or when the pre-operative serum basal calcitonin is >400 pg/mL, the 2009 American Thyroid Association (ATA) Guidelines suggest additional cross sectional imaging including chest CT, neck CT, three-phase contrast-enhanced liver CT or contrast-enhanced liver MRI are indicated.[22] Given that any medullary carcinoma may be associated with MEN 2, preoperative testing must also include measurement of serum calcium (to rule out hyperparathyroidism requiring concomitant surgical intervention), plasma fractionated metanephrines as the initial screen for pheochromocytoma, as well as serum calcitonin concentration to establish if the tumor is capable of hypersecreting the hormone. In the case of elevated calcitonin, post-operative values should also be followed as post-operative doubling time has been shown to be a prognostic factor for survival rates.[23]

Table 3 - Medullary thyroid cancer*

Stage	**5-Year Relative Survival Rate**
I	Near 100%
II	98%
III	81%
IV	28%

*Based on patients diagnosed between 1985 and 1991[1]

Pathogenesis: Exposure to either external (usually for benign conditions) or ingested radiation in childhood significantly increases the incidence of thyroid cancer. Such exposures result in a higher rate of PTC oncogene mutation than that found in thyroid tumors which do not result from such exposure. By contrast, BRAF gene mutation is less common in such thyroid tumors. Predisposing factors are the dose of radiation (direct correlation), female sex, and younger age at time of irradiation. The carcinogenic effect of irradiation on the thyroid persists for at least 40 years. All patients should be asked about any history of head or neck irradiation in infancy or childhood.

Staging of Thyroid Cancer

Table 4. American Joint Committee on Cancer (AJCC) Thyroid Cancer Staging System.[15]

Stage (T)	Primary Tumor (T)
T1	Tumor 2 cm or lesion greatest dimension limited to the thyroid
T2	Tumor more than 2 cm but not more than 4 cm in greatest dimension limited to the thyroid
T3	Tumor more than 4 cm in greatest dimension limited to the thyroid or any tumor with minimal extrathyroidal extension (e.g., extension to sternothyroid muscle or perithyroid soft tissues)
T4a	Tumor of any size extending beyond the thyroid capsule to invade subcutaneous soft tissues, larynx, trachea, esophagus, or recurrent laryngeal nerve
T4b	Tumor invades prevertebral fascia or encases carotid artery or mediastinal vessels
	All anaplastic carcinomas are considered T4 tumors
T4a	Intrathyroidal anaplastic carcinoma – surgically resectable
T4b	Extrathyroidal anaplastic carcinoma – surgically unresectable
	Regional Lymph Nodes
NX	Regional lymph nodes not assessed
N0	No regional lymph node metastasis
N1	Regional lymph node metastasis
N1a	Metastasis to Level VI (pretracheal, paratracheal, and prelaryngeal/Delphian lymph nodes)
N1b	Metastasis to unilateral, bilateral, or contralateral cervical or superior mediastinal lymph nodes
	Distant Metastasis
MX	Distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Table 5 – AJCC Stage Grouping for Thyroid Cancer.[15]

Papillary or Follicular, Under 45 Years of Age

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)
I	Any T	Any N	M0
II	Any T	Any N	M1

Papillary or Follicular, 45 Years of Age and Older and all Medullary Carcinomas

Stage	Primary Tumor (T)	Regional Lymph Nodes (N)	Distant Metastasis (M)
I	T1	N0	M0
II	T2	N0	M0
III	T3	N0	M0
	T1	N1a	M0
	T2	N1a	M0
	T3	N1a	M0
IVA	T4a	N0	M0
	T4a	N1a	M0
	T1	N1b	M0
	T2	N1b	M0
	T3	N1b	M0
	T4a	N1b	M0
IVB	T4b	Any N	M0
IVC	Any T	Any N	M1

Diagnosis: Carcinoma is a concern in any thyroid nodule. Therefore, all thyroid nodules should be evaluated by an Endocrinologist, ENT surgeon, or someone with experience in the evaluation. The initial evaluation of a thyroid nodule includes a thorough history to include family history for thyroid disease and a personal history of radiation exposure. A TSH should always be checked.[1] A thyroid scan (I^{-131}) is indicated if the TSH is suppressed since hyper-functioning or "hot" nodules are essentially never malignant. Hot nodules require no further workup or treatment except ablation if the patient is hyperthyroid. All nodules >1.5 cm, and those <1.5cm with risk factors, should be sampled using fine-needle aspiration for cytology. If an adequate sample is obtained, cytology can accurately diagnose papillary, medullary, and anaplastic carcinoma cells. Approximately 15-25% of aspirations are "inconclusive" or "inadequate". About 20-40% of the suspicious (inconclusive) lesions may be carcinoma. For nodules with benign cytologic results, recent series report a higher false negative rate with palpation FNA (1-3%) than with ultrasound FNA (0.6%).[24] Therefore, thyroid nodules that are not removed need continued follow-up with repeat evaluation if there is evidence of significant size increases. A significant increase in size is defined as an increase of 20% in at least one dimension and an increase of at least 0.2 cm in two dimensions.

Treatment: Managing differentiated thyroid cancers can be a challenge as there have been limited prospective randomized trials of treatment. In general, thyroid malignancies are treated surgically, though there is some research underway on the use of High-intensity Focused Ultrasound Ablation (HIFU) therapy.[13] The extent of surgery is normally determined by cancer type, but most thyroid experts now advise total or near-total thyroidectomy for all patients with a preoperative diagnosis, as this leads to an improved disease-free survival. All patients should undergo cervical lymph node dissections. The major concern with thyroidectomy is hypoparathyroidism and recurrent laryngeal nerve injury. Many cases of hypoparathyroidism are transient.

Most papillary and follicular carcinomas are also treated with radioactive iodine (I^{-131}) and suppressive doses of thyroxine. The goal of radiotherapy is to destroy any residual microscopic thyroid cancer.[25] In most institutions, a post-therapy scan is done a week after treatment with I^{-131}. This post therapy scan is highly sensitive for residual disease not seen on diagnostic scans.

Treatment with thyroxine, besides replacing thyroid function in patients who have undergone near-total thyroidectomy, is to minimize release of TSH. The dose of thyroxine is based on the patient characteristics. Lower risk patients are given doses to keep TSH in the low-normal range. Higher risk patients and those with some evidence of residual disease are usually treated with a goal of keeping the TSH undetectable with the minimum of symptoms. Patients need life-long regular follow-up to identify local recurrence or lung metastases. Unlike differentiated thyroid cancer, anaplastic carcinoma responds poorly to treatment. Palliative or debulking therapies are done in conjunction with radiation and chemotherapy with limited success.

Treatment of medullary thyroid carcinoma is also surgical, but more aggressive cervical dissections are indicated. Post-surgery, patients are monitored by following the levels of calcitonin as a tumor marker. Persistent elevations of calcitonin indicate residual disease. Those with near normal post-operative calcitonin values can be followed clinically, but those with levels >100 pg/ml of calcitonin should be evaluated for other resectable lesions.

Monitoring: Follow-up is done using thyrotropin stimulated I^{-131} scanning and/or thyroglobulin (Tg) measurements with or without recombinant thyrotropin (rhTSH) stimulation. A positive scan or persistent elevations of thyroglobulin can indicate residual carcinoma or recurrence. (This is only true if the patient had a total thyroidectomy with ablation of any remaining thyroid tissue; otherwise, residual normal thyroid tissue can give false positive results.) Thyrotropin stimulation is done by thyroid hormone withdrawal for 6-8 weeks to induce hypothyroidism or by rhTSH injections on two consecutive days. The former has the advantage of being more sensitive, but is much less convenient for the patient and requires the patient to be hypothyroid and DNIF. Recombinant thyrotropin stimulation is much better tolerated by the patients since the hypothyroid symptoms are avoided and can now be used for treatment as well as follow-up. Most recurrences are localized to the thyroid bed or cervical lymph nodes and occur within 5 years of diagnosis. Recurrences are also treated with surgery and/or radioactive iodine.

Due to the relatively indolent nature of differentiated thyroid carcinoma, patients can have detectable thyroglobulin levels, biochemical evidence of persistent disease, without visible disease by imaging studies (ultrasound, CT scanning, MRI, PET scanning). In some cases, it may represent residual normal thyroid tissue and be completely benign; however, this conclusion should only be made after adequate evaluation. Surgery, repeat radioactive iodine treatment or observation (in some cases) is done as clinically indicated. This low level of disease burden does not impact short-term risk and does not cause incapacitation; therefore, unless there are other indications for grounding, aviators may remain on flying status during the evaluations.

Thyroxine therapy is needed in all patients. Higher risk individuals with differentiated thyroid cancers are treated at doses sufficient to suppress the TSH and render the patient mildly thyrotoxic.

II. Aeromedical Concerns.

Differentiated thyroid cancer poses little aeromedical risk unless there are distant metastases. Fortunately, only 10% of patients develop distant metastases over their life-time, and the majority are seen in the lungs. Bone and CNS metastases are even rarer. The tumors are slow growing in most cases. Even if residual disease is documented, the short-term risks are unchanged unless distant metastases are apparent. The aeromedical concerns center on post-operative and treatment complications. Post-surgical complications include hypothyroidism, and the small risk of damage

to the recurrent laryngeal nerves and parathyroid glands due to local invasion, or surgical damage. Hypothyroidism is easily treated with thyroxine replacement; however, there may be times when replacement is deliberately withheld as part of treatment with the goal of inducing hypothyroidism for radioactive iodine scanning or treatment. Hypothyroid aviators should not be flying and should be placed in a DNIF status even if they have a waiver. Since TSH can stimulate tumor growth and TSH suppression can avoid this, appropriate suppressive therapy typically induces a degree of subclinical hyperthyroidism. The mild thyrotoxicosis slightly increases the risk of atrial fibrillation, but is not associated with sudden incapacitation and would not limit aviation duties.

In patients with papillary, follicular or medullary forms of thyroid cancer, surgery can lead to damage to the parathyroid glands resulting in permanent hypoparathyroidism causing hypocalcemia which can lead to tingling and muscle cramping or potentially life-threatening tetany. With proper treatment, this will be a waiverable condition for any flying class. It is easily treated with calcium and sometimes requires calcitriol, but most patients never have a problem as long as they are taking their pills. Symptoms of hypocalcemia are easily recognizable and reversible with calcium, long before a life-threatening event like tetany would occur. Likewise any lesion of the recurrent laryngeal nerve, whether iatrogenic or part of the natural disease process, would have further potential aeromedical implications. Unilateral involvement would likely result in increased vocal hoarseness which may affect the aviators ability to effectively communicate; particularly in an environment with significant levels of ambient noise. Bilateral damage may result in aphonia which would not be considered waiverable. Unilateral damage should be considered on a case-by-case basis, but bilateral damage is not a waiverable condition.

Medullary thyroid cancer can be an indolent process depending on the extent of the initial tumor. The treatment is aggressive surgical resection. Thus, the same post-operative considerations exist as for the differentiated thyroid carcinomas. Since local invasion is the primary risk, aeromedical concerns center on local damage or risks for future invasion or recurrence. Waiver can be considered if there is no evidence of residual disease and no significant post-operative complications besides the expected hypothyroidism. Waiver can also be considered for those with only biochemical evidence of persistent disease with negative imaging, on a case by case basis.

As all anaplastic thyroid cancer is considered Stage IV, this diagnosis would not be considered waiverable.

III. Waiver Considerations.

History of thyroid cancer is disqualifying for flying classes I/IA, II, and III. Thyroid cancer is not listed as disqualifying for ATC/GBC and SMOD personnel, but all malignancies require an MEB, and all malignant neoplasms that are unresponsive to therapy or have residuals of treatment or not fitting for further service. Therefore, if a patient in either of these categories is diagnosed with thyroid cancer and does well post-operatively, they will probably not require a waiver.

Waivers will be considered for Flying Class II and III individuals with minimal or no residual disease on monitoring who do not have post-operative hypoparathyroidism, hypocalcemia, or recurrent laryngeal nerve damage.

Table 6. Waiver potential of thyroid cancer

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	Stages 1 and 2	Yes#† AETC	Yes
II/IIU	Stages, 1, 2 and possibly early 3	Yes#*+† MAJCOM**	Yes
III	Stages, 1, 2 and possibly early 3	Yes+*† MAJCOM	Yes
ATC/SMOD	Stages, 1, 2 and possibly early 3	Yes† MAJCOM	No
SMOD	Stages, 1, 2 and possibly early 3	Yes† AFSPC or GSC	No

*For untrained FC II and III, waiver may be considered after 2 years of remission.
** AFMSA is waiver authority for FC IIU.
# For FC I/IA and untrained FC II and FC III individuals waiver may be considered after 2 years of remission, asymptomatic.
+ For trained FC II and III individuals waiver may be considered six months after treatment completed, in remission and asymptomatic.
† No indefinite waivers.

Review of AIMWTS through January 2012 showed 48 cases of thyroid cancer. Of this total, 1 was FC I/IA, 30 were FC II, 1 was FC IIA, 5 were for SMOD, 3 were for ATC/Ground Base Controller and 8 FC III; 42 were granted waivers and 6 were disqualified. Of the six disqualifications (3 FC II, 1 FC III, 1 SMOD, & 1 ATC), 3 were disqualified due to a concomitant disqualifying diagnosis, 1 due to failure to provide additional requested info, 1 due to inadequate time lapse since treatment, and one because, as a nurse, the member could not deploy due to an assignment limitation code. 15 of the 48 cases were female and four of them were disqualified.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for <u>initial waiver</u> for thyroid cancer should include the following:
A. History – symptoms, pathology, stage, treatment, including date of last treatment and I^{-131} scans and treatments, surveillance plan, levothyroxine dose, and activity level.
B. Physical – Neck exam.
C. Endocrinology and surgeon reports to include six-month follow-up.
D. Labs – All thyroid function tests to include: TSH, serum thyroxine, Tg, and Tg antibodies. (CEA and calcitonin are relevant if medullary cancer, as are screening tests for appropriate MEN syndromes)
E. Reports of any imaging studies, if done.
F. Tumor board report, military or civilian, if applicable.
G. Medical evaluation board results.

The AMS for waiver renewal of thyroid cancer should include the following:
A. History – brief summary of stage, treatment, frequency of surveillance and results, any symptoms, activity level.
B. Physical – Neck exam.
C. Endocrinology consult.
D. Labs – all thyroid function test results since previous waiver. (include Tg and Tg antibodies, and CEA, calcitonin if medullary cancer)
E. Reports of any imaging studies, if done.

ICD9 Code for Thyroid Cancer	
193	Malignant neoplasm of thyroid gland

V. References.

1. Cooper DS, Doherty GM, Haugen BR, et al. Revised American Thyroid Association Management Guidelines for Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid, 2009; 19: 1167-1214.

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WAIVER GUIDE
Updated: Feb 2012
Supersedes: Waiver Guide of Nov 2008
By: Col Billy D. Pruett (RAM 12) and Dr. Dan Van Syoc
Reviewed by Col Roger Hesselbrock, ACS Neurologist

CONDITION:
Transient Ischemic Attack (TIA) and Stroke (CVA) (Feb 12)

I. Overview.

Stroke is the acute neurological injury that occurs as a result of brain ischemia or brain hemorrhage. Brain hemorrhage may be secondary to intracerebral hemorrhage or subarachnoid hemorrhage. Brain ischemia may be secondary to atherosclerosis, cardioembolism, artery-to-artery embolism, small-vessel lipohyalinosis, arteritis, arterial dissection, vasospasm, or systemic hypoperfusion. It should be noted here that CVA, TIA, and Coronary Heart Disease (CHD) all share common risk factors and pathological mechanisms from the standpoint of ischemia. 2% to 5% of patients with acute ischemic stroke have fatal cardiac-related events in the short term, with a prevalence of cardiac disease at entry typically in the range of 20% to 30%.[1] Furthermore, while some providers consider CVAs as serious and TIAs less so, it is more accurate to consider them a spectrum of the same illness. In fact, some studies have reported rates of previous TIAs as great as 50% among those with atherothrombotic stroke.[2]

The risk factors for TIA and stroke are the same and include increasing age, male gender, family history, prior history of stroke or TIA, hypertension, diabetes, high cholesterol; as well as heart, carotid, and peripheral vascular disease. Although hypertension, high cholesterol and diabetes are modifiable, studies showing the risk of recurrence found only diabetes as the major risk factor.[3, 4] Other conditions which increase TIA/stroke risk include atrial fibrillation (both clinical and subclinical), sickle cell anemia, cardiac anomalies such as patent foramen ovale (PFO), presence of mechanical artificial heart valve, congenital or acquired hypercoagulable states, medications (e.g.: rosiglitazone) and various vasculidities such as Wegener's Granulomatosis.[5, 6, 7]

Strokes may be large-artery atherosclerosis (LAA), including large-artery thrombosis and artery-to-artery embolism; cardioembolism (CE); small artery occlusion (SAO); stroke of other determined cause (OC); and stroke of undetermined cause (UND). UND (or cryptogenic) generally account for approximately 35% of all strokes, CE ~ 27%, SAO ~ 23%, LAA ~ 13%, and OC ~ 2%. There are approximately 795,000 new or recurrent strokes in the U.S. per year. Of these, 370,000 (46.5%) were males. Approximately 610,000 are first attacks, and 185,000 were recurrent. 2008 mortality data indicates that stroke accounted for 134,100; or 1 of every 18 U.S. deaths, making it the third leading cause of death. On average, every 40 seconds, someone in the U.S. suffers a stroke, and there are approximately 7 million stroke survivors making up 3% of the U.S. population.[8] Stroke is also the leading cause of long-term disability in the U.S.

Until recently, classification of stroke type was based on the TOAST (Trial of ORG 10172 in Acute Stroke) diagnostic criteria.[9] However, as a result of increasing knowledge about stroke mechanisms combined with the introduction of new diagnostic techniques, a new phenotypic classification scheme is now being promoted. Known as ASCO, the subtypes of this new scheme are as follows: large artery disease (A), small-vessel disease (S), cardiac source (C), and another cause (O).[10]

Prior to 2009, TIAs were events defined clinically as any sudden, focal, cerebral ischemic event with symptoms lasting <24 hours. This changed in 2009 with the endorsements of both the American Heart Association (AHA) and the American Stroke Association (ASA) of the ABCD2 criteria. The new definition does two things. First, it redefines TIA as: a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction, and CVA as: an infarction of central nervous system tissue. Thus creating a tissue diagnosis, & removing the arbitrary time criteria.[11] In some writings, patients with transient symptoms who have infarctions on imaging are referred to as DWI (diffusion-weighted imaging)+ TIA; vs. those with negative imaging referred to as DWI- TIA. For the purposes of the new criteria, imaging must be accomplished within 24 hours of the episode.

Secondly, the new definition incorporates a scoring system which is used to risk-stratify these patients as to their immediate future stroke risk. Known as ABCD2, points (indicated in parentheses) are assigned for each of the following factors: age $\geq$60 years (1); blood pressure $\geq$140/90 mm Hg on first evaluation (1); clinical symptoms of focal weakness with the spell (2) or speech impairment without weakness (1); duration $\geq$60 minutes (2) or 10 to 59 minutes (1); and diabetes (1). In combined validation cohorts, the 2-day risk of stroke was 0% for scores of 0 or 1, 1.3% for 2 or 3, 4.1% for 4 or 5, and 8.1% for 6 or 7.[29]

It is difficult to accurately assess the incidence and prevalence for CVAs in the U.S., primarily due to varying criteria used in both diagnosis and the establishing of study populations. Estimates ranging from 200,000 to 500,000 per year, with a population prevalence of 2.3% (or approximately 5 million individuals) have been reported.[12] Obviously, a new syndromic definition will lead to changes in both the prevalence and incidence of the condition. It has been estimated that using the new TIA definition, the 90-day risk of stroke following TIA in the U.S. is 1%. This redefinition will increase annual ischemic stroke incidence from 691,650 to 747,755 and result in a 3.4% absolute reduction in post-stroke disability.[13]

Several conditions can mimic TIAs. These include, but are not limited to migraine, seizure, vasovagal syncope, arrhythmia, compressive neuropathy, hypoglycemia and/or electrolyte imbalances, hyperventilation, anxiety, and conversion disorder.[14] And while there is insufficient evidence regarding which clinical features are best suited to distinguish between TIAs and mimicking disorders, a 2011 Swiss study involving 303 patients found that almost 1 in every 5 patients suspected of having a TIA actually had a TIA mimic.[15]

Stroke-in-the-young by definition is an ischemic event occurring between ages 15 to 45 years. Similar to stroke in the elderly, stroke of undetermined cause accounts for 33%[17] to 37%[18] of stroke-in-the-young. In contrast to stroke in the older population, LAA accounts for 4% - 7.5%, SAO 0% - 9%, CE 21% - 24%, OC 34 – 37%. Cervical artery dissection, occurring in 16% - 24%, is the most common etiology of OC strokes.

Multiple studies of recurrence rate of stroke-in-the-young following an initial event documented similar findings with a recurrence rate of 3% per year,[17] 3.6% in the first year dropping to 1.7% in subsequent years (mean follow up 11.7 years), 6.2% cumulative at three-years, or 17% after ten years (mean follow up 5.7 years) with no leveling of the curve.[3, 16, 17] In one study the annual recurrence rate of stroke-in-the-young or TIA was 5.9% following an initial event for mean follow-up of 26 months.[16]

A correctable etiology theoretically would alter the risk of recurrent stroke. Patent foramen ovale (PFO) is common (autopsy prevalence 29%) and has been associated with stroke.[18, 19] One

retrospective study of 45 patients noted 44 (98%) had no recurrence (mean follow-up 5.3 months) while another retrospective noted zero strokes in 185 patients (mean follow-up 19 months).[20, 21] Despite studies such as this, there remains uncertainty concerning the role of PFO closure in stroke prevention. No prospective studies of PFO have been done which show a difference in stroke recurrence based on the presence or absence of PFO. In the PFO in Cryptogenic Stroke Study (PICSS), a subpopulation of the Warfarin-Aspirin Recurrent Stroke Study (WARSS), the two-year recurrence incidence was 14.3% with PFO and 12.7% without PFO for the cryptogenic subgroup (as classified by the TOAST criteria) and 14.8% versus 15.4% for the entire population, irrespective of whether they received warfarin or aspirin.[21] The French PFO/ASA (patent foramen ovale/atrial septal aneurysm) study (age less than 55; mean follow up 37.8 months) noted 4.2% recurrent stroke without PFO, 2.3% with PFO, and 15.2% with PFO and ASA.[22] Medical treatment did not alter the recurrence rate in either study.

A 2011 prospective study published in Circulation found that percutaneous PFO closure was more effective than medical treatment for secondary prevention of recurrent cerebrovascular events among patients with PFO related TIA or stroke. The study followed 308 patients between 1994 and 2000 that had previous cerebrovascular events presumably related to PFO. The patients underwent either percutaneous PFO closure (150 patients) or medical treatment (158 patients), and were then prospectively followed for up to 15 years. At a median follow-up of 9 years, the primary composite outcome of stroke, TIA, or peripheral embolism occurred in 11 patients slated to PFO closure (11%) and 22 patients slated to medical treatment (21). The treatment effect was driven by a decrease in the risk of TIA of 5% versus 14%, respectively. The risk of all-cause (6% in both groups) and cardiovascular mortality (3% in both groups) appeared identical.[23]

Seizures may occur following stroke. For all age group strokes, the incidence of new-onset seizures is 8.9% (mean follow up 9 months) to 10.6% (mean follow up 32 months).[24, 25] Stroke-in-the-young is similar. The incidence of new-onset seizures is 10% (mean follow up 11.7 years), 10.8% (mean follow up 31.7 months), or 11% at five years (mean follow up 5.7 years) with no new-onset seizures occurring after five years.[3, 4, 17] One multi-center trial (mean follow up 37.8 months; cryptogenic etiology; age 18 to 55 years) detected a 5.5% incidence within 3 years (mean follow up 38 months).[26] Importantly this study provided a Kaplan-Meier estimate of the risk of first seizure following stroke at one year of 2.1, at two years of 2.9, at three years of 3.7, and at four years 3.7, suggesting some degree of flattening of the curve after three years. This is in concert with the other cited studies that suggest minimal difference in seizure incidence with follow-up of 31.7 months, 32 months, 5.7 years or 11.7 years. Stroke location in the cortex increases the risk of seizure[12] although seizures where noted in 2.7% of deep lacunar infarcts (mean follow up 9 months).[24]

II. Aeromedical Concerns.

The primary aeromedical concern is the risk of sudden incapacitation, either from a recurrent stroke or from a seizure. The risk of seizure is unacceptably high for at least the first several years following a stroke. While cortical location is associated with a higher risk of seizure, seizures also occur with subcortical lacunar strokes. The incidence of new-onset seizures declines with time with population studies suggesting the risk is acceptably low after three years.

Symptoms of stroke/TIA are abrupt, usually unrelated to any particular activity, and depend on the distribution of the blood vessel occluded. Symptoms can range from distracting to incapacitating and can include weakness, paresthesias, speech disturbance, visual deficit, vertigo, ataxia, and, rarely loss of consciousness. The stroke recurrence rate is highest immediately following the initial stroke but remains unacceptably high indefinitely, 2-3%/yr. Accepted standards for sudden

incapacitation for trained pilots is up to 1%/year and up to 3%/yr for non pilot aircrew. Strokes with a well-defined and correctable etiology may have a lower incidence of recurrence although the infrequency of these events precludes unequivocal demonstration of the presumed lower rate of recurrence. Closure of a PFO has yet to be demonstrated to lower the risk of recurrence to an acceptable level. Strokes of unknown cause (cryptogenic strokes) have the same rate of recurrence as other strokes.

III. Waiver Considerations.

Irrespective of whether the etiology is embolic, thrombotic or hemodynamic, TIA and stroke are disqualifying for FC I/IA, II and III. Waivers will usually not be considered unless a correctable cause is determined and treated. Examples of correctable etiologies might include iatrogenically-induced stroke such as from catheterization or trauma to the carotid artery without residual injury. Modifiable factors such as hypertension and hyperlipidemia are not considered correctable etiologies. Cryptogenic strokes without a well-defined correctable etiology carry the same risk of recurrence as all other strokes. Additionally, the occurrence of a stroke/TIA leaves a potential seizure focus. A three-year seizure-free observation period after stroke and a two-year observation after TIA is required prior to any potential waiver consideration.

Table 1: Waiver potential after TIA/stroke.

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**	**ACS review/evaluation**
I/IA	TIA/stroke secondary to non-correctable cause	No AETC	No
	TIA/stroke secondary to correctable cause treated	Maybe* AFMOA	Yes
II	TIA/stroke secondary to non-correctable cause	Maybe* AFMOA	Yes
	TIA/stroke secondary to correctable cause treated	Maybe* AFMOA	Yes
III	TIA/stroke secondary to non-correctable cause	Maybe* MAJCOM Yes*	Yes
	TIA/stroke secondary to correctable cause treated	MAJCOM	Yes

* Must be at least 3 years post-stroke or 2 years post-TIA, with no or clinically insignificant residual symptoms.

Review of AIMWTS through mid January 2012 showed 17 cases of TIA/stroke; zero FC I/Ia, 12 FC II/IIa/IIc, two SMOD, and 3 FC III. Of the 17 cases, 5 were disqualified. Of the 12 approved, one had TIAs brought on by G's (subsequently restricted from G's), two were attributed to PFO which was subsequently closed, one had an A-V malformation subsequently treated with coil embolization, one had a TIA secondary to AFib and subsequently underwent chemical conversion, and six had a single-episode TIA of unknown etiology. One had encephalomalacia which was

thought to be perinatal. However, there's no clear history to directly correlate his lesion with a cerebral artery occlusion (434.9, the ICD-9 code used).

IV. Information Required for Waiver Submission.

A full neurologic, laboratory, and diagnostic work-up is required after any symptoms of TIA or stroke in an attempt to pinpoint the location and etiology of the symptoms, define the extent of any deficits or anatomic damage, and to rule out potential non-ischemic causes.

The aeromedical summary should include the following:

A. History – details of the incident to include the extent of symptoms, physical findings, timing of onset and resolution, and possible precipitating factors (i.e., Valsalva or +Gz just prior to onset).

B. Neurology consult.

C. An MRI of the brain which includes DWI sequences, and a magnetic resonance angiogram (MRA) of the carotid and vertebral arteries. Ideally, the diffusion-weighted MRI should be accomplished as soon as possible after the event to pick up subtle ischemic changes in the brain (within 12 hours).

D. Laboratory tests to include: complete blood count (CBC), erythrocyte sedimentation rate (ESR), chemistry panel, partial thromboplastin time (aPTT), lipid profile, and RPR.

E. ECG – 12 lead.

F. Transthoracic echocardiography (TTE) of the heart with bubble contrast to look for a right to left shunt within the heart.

G. A 24-hour Holter monitor.

H. If the flyer is under the age of 45, then additional laboratory testing to rule out a thrombotic predisposition should include antiphospholipid antibody panel (anticardiolipin antibodies, and lupus anticoagulant factor), protein C, protein S, factor V Leiden, and antithrombin III measurements.

ICD9 Code for transient ischemic attack and stroke	
435.9	Transient cerebral ischemia
434.0	Cerebral thrombosis
434.1	Cerebral embolism
434.9	Cerebral artery occlusion, unspecified
432.9	Unspecified intracranial hemorrhage

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WAIVER GUIDE
Updated: Dec 2010
Supersedes Waiver Guide of Jan 2009 (formerly called Head Injury)
By: Dr. Steve McGuire, ACS Neurologist, and Dr Dan Van Syoc

CONDITION:
Traumatic Brain Injury (Dec 10)

I. Overview.

Traumatic brain injury (TBI) is common; CDC data from 2003 indicate an annual incidence of 421/100,000 population.[1] This rate has remained relatively constant from 1998-2003 (414-461/100,000). TBI has a higher incidence among young adults; in the 15-24 year-old population the incidence rate is 760/100,000. In those that recover without apparent deficit, a risk for seizures still exists.

Head injury can be classified in several ways. The Glasgow Coma Scale is the most widely utilized, commonly applied to acute head injury to convey severity to emergency services personnel:

Mild	Moderate	Severe
GCS 13-15	GCS 10-12	GCS 3-9

This scheme categorizes without regard to image findings. This scale is quite good in predicting the outcome at six months following head injury but is predictive of seizures only for a severe GCS.[2, 3]

Annegers et al. performed a retrospective study of the Olmsted County, MN, population from 1935-1984, identifying the incidence of seizures following head trauma.[4] Annegers scheme is:

Mild	Moderate	Severe
LOC or amnesia < 30 minutes	LOC or amnesia > 30 minutes but < 24 hours or skull fracture	LOC or amnesia > 24 hours or presence of subdural hematoma or brain contusion

This study provides the best estimate of seizure risk following severity of head injury but is limited by the lack of modern imaging techniques.

The DOD in 2007 released a classification scheme for TBI.[5]

Mild	Moderate	Severe
Normal structural imaging	Normal or abnormal structural imaging	Normal or abnormal structural imaging
LOC < 30 minutes	LOC >30 minutes but < 24 hours	LOC > 24 hours
AOC < 24 hours	AOC > 24 hours – severity based on other criteria	AOC > 24 hours – severity based on other criteria
PTA < 1 day	PTA >1 day but < 7 days	PTA > 7 days

This classification did not ascribe seizure risk relative to degree of TBI.

Penetrating head injuries have a persistent unacceptable risk of subsequent seizures. A retrospective study of Vietnam War veterans noted posttraumatic epilepsy in 53% at 15-years; of these 7% experienced their first seizure more than ten years following their trauma.[6] Interestingly

in a subsequent 35-year follow-up study, 11/87 (12.6%) of subjects with seizures experienced their first seizure more than 14 years after injury.[7] A 0-25 cc volume loss was associated with a 42% seizure incidence while loss > 75 cc was associated with an incidence of 80%. A retrospective study of the Iraq-Iran War (1980-1988) confirmed the Vietnam study with the likelihood of persistent seizures after 21-years being 74.7%.[8]

Imaging can provide prognostic information. CT classification is strongly related to outcome, with worst outcome for patients with diffuse injuries in CT class III (swelling) or CT class IV (shift).[9] MRI can demonstrate hemorrhagic contusions with gliosis and hemosiderin dregs which can be associated with post-traumatic epilepsy.[10] However to date neuroimaging does not provide a reliable estimate of seizure incidence following mild or moderate head injury.

The relative risk of seizures following mild TBI (utilizing the Annegers' criteria) compared to the normal population remains elevated for five years while the relative risk after moderate or severe TBI remains elevated for over ten years.[11] The actual incidence of seizures, however, becomes aeromedically acceptable much sooner. Given the incidence of unprovoked seizures in the general population is approximately 66/100,000 patient years, the incidence of first seizure following mild TBI at one year is approximately 0.189%/yr (0.061-0.439), for moderate TBI at one year approximately 0.409%/yr (0.146-0.860); and for severe TBI at five years approximately 1.019%/yr (0.512-1.952) with a relatively wide confidence interval at all points.[12]

II. Aeromedical Concerns.

Aeromedically the two major concerns are (1) residual neurological or neurocognitive deficit and (2) risk of sudden incapacitation from a seizure. The risk to safety of flight from a fixed neurological deficit is readily apparent. Neurocognitive deficit may not be readily apparent but can be assessed with appropriate testing. The risk of seizure is more difficult to predict.[13] Furthermore standard operating conditions of military aircraft (sleep disruption or deprivation and hypoxia) may act as facilitators for seizure break-through. Prophylactic use of anticonvulsant medications (AEDs) would not be appropriate, both for their central acting effects on cognition and alertness and the potential hazard of withdrawal seizure following abrupt discontinuation of AEDs.

III. Waiver Consideration.

A history of TBI is disqualifying for FC I/IA, II, IIU, and III. It is not mentioned in AFI 48-123 as disqualifying for ATC/GBC duties, but is disqualifying for SMOD duties (mild head injury does not require a waiver if there is a normal neurological exam). The Aeromedical Standards Working Group established a difference in acceptable risk for sudden incapacitation for aircrew and SMOD, based on the AFSC. This acceptance of risk is reflected in the management tables listed below for selected AFSCs following moderate or severe head injury. For FC I/IA candidates, see footnote below Table 1.

Table 1 - Evaluation of Head Injury

Degree of Head Injury	Minimal Observation Time	Evaluation Requirements*
Aeromedical Mild (LOC or amnesia < 30 minutes; normal MRI)	**1 month**	**Flying Class I, IA, II, IIU, III, SMOD:** **ACS:** none - local evaluation **Neurological exam:** Complete neurological and mental status examination by a Flight Surgeon. **EEG:** none **Imaging:** MRI** **Neuropsychological evaluation:** local to include assessment of general cognitive functioning, memory, attention/concentration, mood, clinical interview†
Aeromedical Moderate (LOC or amnesia > 30 minutes but < 24 hours or non-displaced skull fracture; normal MRI)	**6 months**	**Flying Class I, IA, II, IIU, III, SMOD:** **ACS:** review **Neurological exam:** Complete neurological and mental status examination by a neurologist **EEG:** local **Imaging:** MRI** **Neuropsychological evaluation:** local to include assessment of general cognitive functioning, memory, attention/concentration, mood, clinical interview†
Aeromedical Moderate (LOC or amnesia > 30 minutes but < 24 hours or non-displaced skull fracture; MRI demonstrating evidence of diffuse axonal injury or hemosiderin deposition/plugs)	**6 months^{+}**	**Flying Class III^{+}, SMOD^{+} (see specific AFSCs below):** **ACS:** review **Neurological exam:** Complete neurological and mental status examination by a neurologist **EEG:** local **Imaging:** MRI** **Neuropsychological evaluation:** local to include assessment of general cognitive functioning, memory, attention/concentration, mood, clinical interview†
Aeromedical Moderate (LOC or amnesia > 30 minutes but < 24 hours or non-displaced skull fracture; MRI demonstrating evidence of diffuse axonal injury or hemosiderin deposition/plugs)	**2 years^{+}**	**Flying Class I, IA, II, IIU, III^{+}, SMOD^{+}:** **ACS:** evaluation **Neurological exam:** ACS neurologist **EEG:** during ACS evaluation. **Imaging:** MRI locally within one month of injury; MRI during ACS evaluation **Neuropsychological evaluation:** at ACS

Degree of Head Injury	Minimal Observation Time	Evaluation Requirements*
Aeromedical Severe (LOC or amnesia > 24 hours; normal MRI or MRI demonstrating inconsequential hemorrhage or evidence of diffuse axonal injury or hemosiderin deposition/plugs)	**2 years^{+}**	**Flying Class I, IA, II, IIU, III^{+}, SMOD^{+}:** **ACS:** evaluation **Neurological exam:** ACS neurologist **EEG:** during ACS evaluation **Imaging:** MRI locally within one month of injury; MRI during ACS evaluation** **Neuropsychological evaluation:** at ACS
Aeromedical Severe (LOC or amnesia > 24 hours; presence of subdural hematoma or brain contusion; MRI demonstrating more significant abnormalities)	**2 years^{+}**	**Flying Class III^{+}, SMOD^{+}(see specific AFSCs below):** **ACS:** evaluation **Neurological exam:** ACS neurologist **EEG:** during ACS evaluation. **Imaging:** MRI locally within one month of injury; MRI during ACS evaluation **Neuropsychological evaluation:** at ACS
Aeromedical Severe (LOC or amnesia > 24 hours; presence of subdural hematoma or brain contusion; MRI demonstrating more significant abnormalities)	**5 years^{+}**	**Flying Class I, IA, II, IIU, III^{+}, SMOD^{+}:** **ACS:** evaluation **Neurological exam:** ACS neurologist **EEG:** during ACS evaluation **Imaging:** MRI locally within one month of injury; MRI during ACS evaluation** **Neuropsychological evaluation:** at ACS
Aeromedical Severe (penetrating injury, volume loss > 25cc, seizure)	**No waiver possible**	**Flying Class I, IA, II, IIU, III, SMOD**

*Certification authority for all initial cases is AETC except for SMOD personnel, but if the member needs a waiver, all categories go to AFMSA. Most other cases will go to the MAJCOM for waiver consideration. FC IIU cases that are not for initial certification go to AFMSA.
** For all cases sent to the ACS, the actual MRI needs to be sent with the patient, not just a report. FC I/IA candidates, or any initial candidates with a history of a mild head injury prior to entering college, or more than five years prior to exam, do not need an MRI, neuropsychological evaluation, or ACS evaluation; they do though require a good history and complete neurological exam by the flight surgeon. FC I/IA cases with TBI occurring during college will be handed on a case-by-case basis.
[+]FCIII and SMOD AFSC's that may be considered for waiver for moderate head injury at 6 months or for waiver for severe head injury at 2 years are: See list below.
† Call ACS Neuropsych personnel to get specifics on what testing would be appropriate for the individual and review results with ACS personnel.

Table 2: IFC applicants (all classes) with history of remote (>=5 years) TBI

Normal exam and imaging at time of injury	**Neurological exam:** flight surgeon **Imaging:** report and images of prior studies **Neuropsychological evaluation:** not required unless felt clinically indicated by flight surgeon **Review:** AETC/SGP ACS review at discretion of AETC
Abnormal exam, imaging or EEG at time of injury	**Neurological exam:** flight surgeon **Imaging:** report and images of prior studies, non-contrast brain MRI if no follow-up neuroimaging was performed **EEG:** report of previous studies, sleep-deprived EEG if any previous study was reported as abnormal **Neuropsychological evaluation:** not required unless felt clinically indicated by flight surgeon **Review:** AETC/SGP ACS review at discretion of AETC
Seizure within 24 hours of time of injury*	**Neurological exam:** flight surgeon **Imaging:** report and images of prior studies, non-contrast brain MRI if no follow-up neuroimaging was performed **EEG:** report of previous studies, sleep-deprived EEG if no previous studies performed or if any previous study was reported as abnormal **Neuropsychological evaluation:** not required unless felt clinically indicated by flight surgeon **Review:** AETC/SGP ACS review at discretion of AETC

* seizures occurring other than within 24 hours of TBI are disqualifying; refer to Seizures/Epilepsy/Abnormal EEG chapter of Waiver Guide for assessment/disposition guidance

Regarding FC III and SMOD personnel, the following AFSCs are <u>restricted</u> to waiver consideration at 2 years for moderate head injury and 5 years for severe head injury:
Initial SMOD personnel
1A0X1 – In-Flight Refueling
1A1X1 – Flight Engineer
1A7X1 – Aerial Gunner

The following FC III and SMOD AFSCs can be considered for an <u>earlier</u> waiver (6 months for moderate and 2 years for severe injury):
1A2X1 – Aircraft Loadmaster
1A3X1 – Airborne Mission Systems

1A4X1 – Airborne Operations
1A6X1 – Flight Attendant
1A8X1 – Airborne Cryptologic Language Analyst
1A8X2 – Airborne ISR Operator
1B4X1 – Cyberspace Defense Operations
1C6X1 - Space Systems Operations
1T0X1 – Survival, Evasion, Resistance, and Escape
1T2X1 – Pararescue
13BX – Air Battle Manager
13LX – Air Liaison Officer
13SX – Space & Missile
17DX – Cyberspace Operations

AIMWTS search in Sep 2010 revealed a total of 761 individuals with a waiver contained a diagnosis of closed head injury. The breakdown of cases was as follows: 261 FC I/IA (20 disqualifications), 202 FC II (13 disqualifications), 295 FC III (37 disqualifications), 3 FC IIU (no disqualifications), 17 ATC/GBC (3 disqualifications), and 27 SMOD (5 disqualifications). There were a total of 78 cases resulting in a disposition of disqualify, and in well over half of the cases the major reason for the disqualification was the head injury.

IV. Information Required for Waiver Submission.

Waiver package should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines and recommendations. The aeromedical summary for the initial waiver for TBI should follow the guidelines outlined above in Table 1. Mild TBI cases may be considered for an indefinite waiver, but all other waivered cases should initially be for one year with follow-on waivers for 2-3 years or indefinitely.

The aeromedical summary for waiver renewal for TBI should include the interval history since the previous TBI waiver and all applicable imaging tests appropriate for the degree of initial injury. Consultation from a neurologist is also recommended.

ICD 9 code(s) for traumatic brain injury	
850.1	Concussion with brief loss of consciousness
854.01	Intracranial injury of other and unspecified nature without open intracranial wound with no loss of consciousness
854.02	Intracranial injury of other and unspecified nature without open intracranial wound with brief (less than one hour) loss of consciousness
854.03	Intracranial injury of other and unspecified nature without open intracranial wound with moderate (1-24 hours) loss of consciousness
959.01	Head injury, unspecified

V. References.

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WAIVER GUIDE
Updated: Sep 2010
*Supersedes Waiver Guide of Feb 2008 (Ulcerative Colitis **and** Primary Sclerosing Cholangitis)*
By: Dr Dan Van Syoc
Waiver Guide reviewed by Col David Smith, AF/SG consultant in General Surgery and Col Patrick Storms, AF RAM and gastroenterologist.

CONDITION:
Ulcerative Colitis (Sep 2010)

I. Overview.

Ulcerative colitis (UC) is a chronic, relapsing inflammatory condition of unknown etiology affecting the mucosal layer of the colon. Inflammatory bowel disease (IBD), which includes UC and Crohn's disease, is a chronic condition resulting from inappropriate mucosal immune activation.[1] The most important risk factor is a positive family history for IBD; approximately 15% of IBD patients have affected first-degree relatives.[2] Dr. Samuel Wilks is credited with being the first to describe UC as a distinct entity from bacillary dysentery in 1859.[3] The hallmark clinical symptom is bloody diarrhea often with prominent symptoms of rectal urgency and tenesmus. UC affects approximately 500,000 people in the United States with an incidence of 8-12/100,000/year (no gender difference) and this incidence has been relatively constant over the past five decades.[4, 5]

The clinical presentation is dependent on the extent of colonic involvement and severity of disease. UC invariably begins with inflammation of the rectum and spreads continuously and proximally for variable distances. Disease restricted to the rectum is referred to as ulcerative proctitis (confined to rectum; generally distal 25 cm); left sided colitis is that confined from the distal to splenic flexure, pancolitis is the term to define disease that includes the proximal colon to the splenic flexure; universal colitis is that involving the entire colon, including the cecum; and backwash ileitis is inflammation of distal 10cm or less of terminal ileum in the setting of universal colitis.[4]

UC has a variable degree of presentation. Mild disease is almost always confined to the distal colon and rectum and is associated with intermittent rectal bleeding and mild diarrhea consisting of fewer than four small loose stools per day. Moderate disease normally involves more than the distal colon with disease at least to the splenic flexure. There are frequent loose, bloody stools (up to 10/day) with mild anemia not requiring transfusion, abdominal pain not classified as severe, and possibly with low grade fever. Patients with severe disease have extensive colonic disease, frequent loose stools (more than 10/day), with severe cramps, fever up to 39.5^{o} C, and bleeding often severe enough to require transfusion.[6]

Assessment of disease severity stems from patient complaints (number of bowel movements, presence of blood per rectum, abdominal pain), the impact of disease on daily activities, pertinent physical exam findings, and the presence of abnormal laboratory tests. About 60% of patients have mild disease (mild diarrheal symptoms and no systemic involvement); however, almost all patients have at least one relapse during a 10-year period, and 25% will require colectomy within 3 years of onset for uncontrollable disease.[1, 7] Extraintestinal symptoms can include reactive arthropathies, ankylosing spondylitis, eye involvement with uveitis and episcleritis, skin disorders of erythema nodosum and pyoderma gangrenosum, thromboembolism, autoimmune hemolytic anemia, and primary sclerosing cholangitis. Local complications of UC include massive hemorrhage, fulminant

colitis, intestinal perforation and stricture or toxic megacolon (both rare). Despite the burden of a chronic illness, more than 90% of UC patients are able to maintain capacity for work after 10 years of disease and the overall quality of life is not impaired significantly.[3]

The most feared long-term complication is colorectal cancer. Patients with extensive ulcerative colitis have a markedly increased risk for colon cancer in comparison to the general population beginning 8 to 10 years after diagnosis and increasing with time. The usual figure is 4 – 5 times that of the general population and it increases by a factor of 50 for those who also have primary sclerosing cholangitis complicating their UC. The risk for malignancy is also a function of the anatomic extent of the disease; the risk is much greater with pancolitis than with left-sided disease. Patients with long-standing ulcerative colitis are at risk for cancer even if their symptoms have been relatively mild; that is, colon cancer is seen in patients whose disease has been quiescent for 10 to 15 years. In ulcerative colitis, colon cancers are frequently submucosal and may be missed at colonoscopy. Colon cancer in patients with ulcerative colitis is associated with dysplastic changes in the mucosa at other sites in the colon. Dysplasia cannot always be identified by visual inspection; microscopic examination of biopsy specimens is required. The current standard of care is to perform surveillance colonoscopy with random biopsies in patients with long-standing ulcerative colitis beginning 8 to 10 years after the onset of disease and repeated every 1 to 2 years. If the specimens show dysplasia, the patient is sent for colectomy. Although it is clear that dysplasia is associated with colon cancer in patients with ulcerative colitis, the utility of surveillance colonoscopy has not been firmly established.[2]

Pathologic findings include mucosal erythema, edema, granularity and erosions. With more severe disease, there are ulcerations, erosions with adherent mucopus, friability and hemorrhage. The characteristic histopathology is crypt architectural distortion and gland drop-out. A lymphoplasmocytic infiltrate is also generally seen. Peak age of onset is between 15 and 30 years of age. Compared to current smokers, non-smokers and former smokers are at increased risk for UC. The diagnosis of UC is made by exclusion of other causes of diarrhea (in particular, infectious etiologies) and a characteristic history with corresponding mucosal findings on endoscopy. Histology of biopsies may confirm the diagnosis.[8]

Medical management is used to treat acute disease and for maintenance of remission. The mainstay of treatment is 5-aminosalicylic acid (5-ASA, or mesalamine), administered either topically (when disease is limited to the distal colon) or orally (which requires some mechanism to bypass the upper intestine). The prototypical agent was sulfasalazine (Azulfidine®), which consists of 5-ASA conjugated with a sulfa moiety; the bond between the two moieties was lysed in the colon, and both were believed to be active. However, it is now understood that efficacy of sulfasalazine in UC is due to 5-ASA, while most of its toxicity was due to the sulfa moiety. Currently, oral mesalamine coated in a manner that delays intestinal release (e.g., Pentasa®, Asacol®) is much preferred. (Sulfasalazine was originally developed, and is modestly effective, for the treatment of rheumatoid arthritis, a condition for which, pure mesalamine compounds are curiously ineffective.) When salicylate therapy alone is inadequate for achieving control of UC, corticosteroids, antibiotics, or immunosuppressive drugs (azathioprine, 6-mercaptopurine [6-MP], cyclosporine, methotrexate) may be indicated.[9] Individuals who have reached remission should remain on maintenance therapy with aminosalicylates, which are proven to substantially reduce the incidence of relapse; evidence is also mounting that they offer a protective effect against colorectal cancer. The extent of disease can be predictive of the disease progression and prognosis, with pancolitis leading to more severe

attacks than limited disease. Remission in UC is generally tied to the patient's change in symptomatology with therapy.

The role of tumor necrosis factor inhibitors in uncontrolled UC is a subject of great interest, with infliximab showing benefit. Infliximab (Remicade®) has been studied extensively and has been shown to be an effective therapy for moderate to severe cases of UC. Aviators treated with infliximab need to be observed for at least six months on the medication before consideration of waiver to allow for assessment of response and possible adverse affects.[10, 11]

Removal of the colon and rectum cures ulcerative colitis. Indications for surgery include medically refractive disease, intractable disease with an impaired quality of life, unacceptable side effects from medications, uncontrolled hemorrhage, toxic megacolon perforation, and development of dysplasia or cancer.[4] There are no prospective randomized trials comparing medical treatment of UC to surgery for any indication, but the three absolute indications for surgery are exsanguinating hemorrhage, frank perforation, and documented carcinoma.[5]
The most common surgery is restorative proctocolectomy with ileal pouch anal anastomosis (IPAA), which consists of removal of the entire colon and rectum with preservation of the anal sphincters, and construction of a pouch from approximately 20 cm of the distal ileum. An IPAA is usually performed as a two-stage operation, with the first stage including creation of a temporary diverting ileostomy to allow the ileal pouch to heal. Mean stool frequency ranges from 4 to 9 bowel movements per day, including 1 or 2 nocturnal stools. Rates of complications vary and include obstruction, sepsis, abscess, anastomotic leak, fecal incontinence and sexual and urinary dysfunction. Pouchitis, a nonspecific inflammation of the ileal reservoir, is the most common long-term complication of colectomy with IPAA. Symptoms are similar to UC, with increased frequency of defecation, rectal bleeding, abdominal cramping, rectal urgency, tenesmus and fecal incontinence. Pouchitis occurs in about 20% of individuals, with the highest incidence during the first 6 months after closure of the temporary loop ileostomy. Primary treatment is with antibiotics, with topical and oral mesalamine as second-line therapy.[5]

II. Aeromedical Concerns.

Aeromedical disposition of UC is considerably simpler than Crohn's disease; major complications are unusual and rarely of sudden onset. If an aviator is grounded, it is more often due to the impracticality of flying with frequent bowel movements. Ulcerative proctitis by itself tends to be mild, and is often controllable by aminosalicylate or steroid enemas. With colitis, there is a minimal risk for subtle performance decrement due to gradual onset of anemia if occult blood loss occurs. Relapse is heralded by typical symptoms of diarrhea and can be accompanied by rectal bleeding, fever and malaise in more severe cases. Relapses can also be triggered by psychological stress. However, the aminosalicylates have proven effective to sustain remission and reduce relapse. Dose-related toxic effects of sulfasalazine include headache, nausea, and vomiting. Hypersensitivity reactions include rash, fever, aplastic anemia, agranulocytosis, hepatitis, pancreatitis, nephrotoxicity, pulmonary fibrosis and hemolysis. Although delayed-release forms of mesalamine (e.g., Asacol®, Pentasa®) are more costly than sulfasalazine, these agents are preferred to minimize adverse effects. Immunosuppressants (except etanercept and infliximab), oral steroids and biological agents are not approved for flying duties due to many adverse systemic effects. Although etanercept has been approved for waiver in inflammatory arthropathies and psoriasis, it is not effective in the treatment of ulcerative colitis. Infliximab has been shown to be efficacious in the treatment of ulcerative colitis.

III. Waiver Consideration.

UC and ulcerative proctitis are disqualifying for all flying classes. Waiver is not recommended for FC I/IA and untrained FC II and FC III individuals. Any extraintestinal manifestations of UC should be addressed as separate diagnoses and will require individual work-up. (See venous thromboembolic disease, primary sclerosing cholangitis, and ankylosing spondylitis waiver guides.) If a course of oral steroids of greater than three weeks duration is required to achieve control, but is followed by maintenance of remission on waiverable medications, waiver could be considered after the pituitary axis has returned to normal function (based on Cortrosyn® stimulation testing; see waiver guide – systemic glucocorticoid (steroid) treatment).

Ulcerative colitis is not mentioned by name for FC IIU personnel, but GI bleeding and diarrhea of sufficient severity to require frequent interventions or to interfere with normal functioning is disqualifying. For ATC/GBC personnel, the important consideration is for gastrointestinal bleeding. Regarding SMOD personnel, there are no listed disqualifications that pertain to ulcerative colitis, gastrointestinal bleeding, or diarrhea.

Ulcerative colitis is disqualifying for retention standards in the Air Force. The flight surgeon needs to be aware that an MEB will also be required as part of the overall care, although the two are separate processes.

Table 1: Waiver potential for ulcerative colitis

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Ulcerative colitis, mild, moderate, severe or treated with colectomy	No AETC
II	Ulcerative proctitis and ulcerative colitis, mild+ Ulcerative colitis treated with colectomy Ulcerative colitis, moderate or severe (not mild)	Yes*#& MAJCOM Maybe* MAJCOM No MAJCOM
IIU	Ulcerative colitis, mild, moderate, severe or treated with colectomy	Yes* AFMSA
III	Ulcerative colitis, mild+ Ulcerative colitis treated with colectomy Ulcerative colitis, moderate or severe (not mild)	Yes* MAJCOM Maybe* MAJCOM No MAJCOM
ATC/GBC	Ulcerative colitis, mild, moderate, severe or treated with colectomy	Yes* MAJCOM
SMOD	Ulcerative colitis, mild, moderate, severe or treated with colectomy	Yes* AFSPC

* Waiver for untrained candidates in any category is unlikely.
+ Mild = 4 bowel movements/day without bleeding, no fever, erythrocyte sedimentation rate (ESR) <20, no anemia, normal liver function tests (LFTs).
& FC II flyers successfully treated with infliximab are restricted to a FCIIA waiver and waiver authority is AFMSA.
# AFMSA is waiver authority if limitation code C from MEB in place (for FC IIC not worldwide qualified)

AIMWTS review in Jun 2010 revealed a total of 117 cases with the diagnosis of ulcerative colitis. There were 0 FC I/IA cases, 78 FC II cases, 24 FC III cases, 1 FC IIU case, 3 ATC/GBC cases, and 11 SMOD cases. Of this total, 18 were disqualified: 6 were FC II, 8 FC III, 1 FC IIU, 2 ATC/GBC, and 1 SMOD. Most of the disqualifications were due to issues related to the UC diagnosis.

IV. Information Required for Waiver Submission.

Waiver package should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for ulcerative colitis initial waiver and waiver renewal associated with relapse should contain the following:
A. History – work-up results, disease course (gastrointestinal symptoms), current therapy, presence of complications and surgical resection, presence or absence of any symptoms suggesting extraintestinal disease (e.g. uveitis, arthritis, ankylosing spondylitis, thromboembolism, primary sclerosing cholangitis, skin disease).
B. Labs: Complete blood count (CBC), ESR, LFTs, C-reactive protein (CRP), and albumin.
C. Colonoscopy with mucosal biopsy results.
D. Consultation report from internal medicine or gastroenterology.

The aeromedical summary for ulcerative colitis waiver renewal without relapse should include the following:
A. History - work-up results, disease course (gastrointestinal symptoms), current therapy, presence of complications and surgical resection, presence or absence of any symptoms suggesting extraintestinal disease (e.g. uveitis, arthritis, ankylosing spondylitis, thromboembolism, primary sclerosing cholangitis, skin disease).
B. Labs: Complete blood count (CBC), ESR, LFTs, CRP, and albumin.
C. Colonoscopy report with results if indicated.
D. Consultation report from internal medicine or gastroenterology.

ICD 9 codes for ulcerative colitis	
556.2	Ulcerative proctitis
556.9	Ulcerative colitis, unspecified

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WAIVER GUIDE
Initial Version: Aug 09
By: Dr. Dan Van Syoc

CONDITION:
Urticaria, Angioedema, and Anaphylaxis (Aug 09)

I. Overview.

Urticaria, angioedema, and anaphylaxis are the prototypical manifestations of mast cell activation. The common denominator in these conditions is the release of potent inflammatory mediators from mast cells. Urticaria and angioedema are affected primarily by activation of cutaneous mast cells, which are commonly located around capillaries, lymphatics, appendages, and nerves in the skin. Massive activation of mast cells in the intestinal tract, respiratory tract, and central nervous system produces the multisystemic, potentially catastrophic symptom complex of anaphylaxis[1]. There is an overlap with all three entities and it is not uncommon for an individual with acute or chronic forms of one of these conditions to have one of the others as well.

A major problem in determining the incidence of anaphylaxis has been a lack of universal consensus on its definition[2, 3]. Calculating the actual incidence is further complicated by the fact that many cases are never reported. Estimates place the annual incidence rate for anaphylaxis between 3 and 21 per 100,000 person years. There are about 1500 reported anaphylaxis-related deaths annually in the US[4]. It occurs in all age groups, though the common etiologies tend to differ between children and adults. That assumes that an etiology can be determined at all, since the exact cause of anaphylaxis may remain unidentified in up to two thirds of patients[5, 6]. When a cause for anaphylaxis can be determined, the more common etiologies are drugs, foods, insect stings, and physical factors such as exercise[7]. The most common drugs are aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs), and penicillin. Latex had become a more common cause since the advent of universal precautions, and approximately 8-17% of health care workers experience some form of allergic reaction to latex[4].

Urticaria is a common disorder affecting up to 25% of the population at some point in their lifetime. The normal lesion is an intensely pruritic, circumscribed, raised, erythematous plaque, often with central pallor[8]. Urticaria is classified as acute or chronic; it is acute if the episodes have occurred over a period of six weeks or less, and chronic if persisting longer than that. Chronic urticaria can lead to serious quality of life impairment[9]. Angioedema is characterized by nonpitting, non-pruritic, well-defined, edematous swelling that involves subcutaneous tissues, abdominal organs, or the upper airway. Angioedema can be distinguished clinically from other forms of edema by the following characteristics: 1) relatively rapid onset of presentation; 2) asymmetric distribution which does not favor dependent areas; 3) involvement of lips, larynx, and bowel; and 4) association of some forms of angioedema with anaphylaxis[10]. As with anaphylaxis, most cases of chronic urticaria or angioedema tend to be idiopathic[11].

In most cases of acute urticaria or angioedema, the diagnosis is readily apparent with a thorough history and exam. Conditions that can masquerade as urticaria include erythema multiforme minor, nonspecific maculopapular exanthemata, mast cell releasibility syndromes such as urticaria pigmentosa and urticarial vasculitis[12]. As noted earlier, angioedema can occur without urticaria and if this is the case, the treating physician needs to consider the possible diagnosis of hereditary

angioedema (HAE) which typically involves subcutaneous sites, the gut and the larynx. In HAE, levels of C4 and C1 inhibitor are low[13]. Autoimmune thyroiditis is the only systemic disorder known to be associated with chronic urticaria and angioedema. Of patients with chronic urticaria, 27% have antithyroglobulin antibody, antimicrosomal antibody, or both, while 19 percent have abnormal thyroid function. There is no evidence at this time that these antithyroid antibodies are pathogenic; the thyroid abnormality appears to be a parallel abnormality and may actually reflect the presence of an underlying autoimmune process[14]. However, treatment of the thyroiditis will sometimes resolve the urticaria/angioedema.

Another factor that needs to be considered in the evaluation of patients with these allergic-type diseases is food allergies. IgE-mediated food allergies can affect 6% to 8% of children and approximately 1-3% of adults. In adults, the most common offending agents are shellfish, fish, peanuts, and tree nuts; in children, milk and egg allergies predominate. Symptoms of food-induced allergies range from localized urticaria to life-threatening anaphylaxis. If the primary care physician suspects a food allergy, referral to an allergy specialist is indicated for specific testing. The management in these cases is avoidance of the offending food as immunotherapy is currently unsafe in patients with food allergies[15].

Other etiologies for allergic symptoms are physical. In a small number of individuals, exercise can produce a spectrum of allergic symptoms ranging from mild urticaria to a serious anaphylactic reaction. Cholinergic urticaria are lesions that develop due to an exaggerated cholinergic response to an increase in body temperature (or to anxiety, stress, or exercise). If the diagnosis is unclear, a passive warming test can be performed by immersing the patient in warm water and observing any changes. For suspicions of exercise-induced anaphylaxis, an exercise challenge test can be performed. These should be performed by an allergist due to risks for reproducibility of symptoms with exercise[16]. Other physical triggers include vibration, cold water/temperatures, solar and pressure.

Treatment for most cases of chronic urticaria and angioedema begins with removal of any agents or activities that are known to exacerbate the condition (though, as with anaphylaxis, almost two-thirds of chronic cases have no identifiable inciting agent). Management of most symptomatic patients begins with H_1 antihistamines. First generation antihistamines are effective, but the sedation side-effects may be dangerous for many activities. Therefore, the second generation medications such as loratadine and fexofenadine are often recommended, as common dosing regimens do not have a sedative side effect[12]. Treatment of anaphylaxis is an emergency. Initial management is early administration of epinephrine. All anaphylactic patients need to be referred to an allergist/immunologist for evaluation, and instructed on the necessity of self-treating any future episodes with pre-loaded epinephrine syringes. Family members also need to be trained on proper indications for using epinephrine. Prevention of future anaphylaxis episodes is critical. If there is an identifiable trigger, this needs to be avoided if possible or treated with immunotherapy. If the trigger is not known or obvious, allergy specialists need to be consulted to aid in a diagnosis and development of a long-term treatment plan.

II. Aeromedical Concerns.

The major aeromedical concern with urticaria is pruritus which may be distracting for the aviator, and most medications used to treat this condition have a potential for sedation. Angioedema is more serious, since there is serious concern for airway compromise which can lead to disastrous

outcomes. Angioedema can also be a risk without airway compromise; if there is facial swelling, vision and mask fitting can be adversely affected. Anaphylaxis can be life-threatening as it can lead to airway constriction as well as cardiovascular collapse. The disposition of aviators with recurring forms of these conditions can be very difficult, made more difficult by the unpredictability of recurrences. There is no clear clinical evidence to predict an appropriate waiting time to rule out recurrences. At this time, we state one year, but it is only an "educated guess".

Factors that are important in waiver decision-making are frequency of episodes, the extent and severity of lesions and/or episodes, the type and amount of medication necessary to control the illness and the ability of the aviator to totally avoid any known triggers to the episodes[17]. If there is a clinical need to have an Epi-Pen available at all times, that makes the case incompatible with continued flying duties. For angioedema and especially anaphylaxis, the two critical questions are: 1) are we reasonably certain as to the offending antigen; and, 2) can the latter be reliably avoided?

Reactions to any required vaccines, other than local reactions, need to be evaluated by a MILITARY allergist. While it may be easier to be seen by a civilian allergist, this is not acceptable, as civilian providers will often recommend that the vaccine not be administered in such cases, and this is an inappropriate answer for military members for deployability purposes.

III. Waiver Considerations.

The three conditions of urticaria, angioedema, and anaphylaxis are each disqualifying for all flying classes in the US Air Force.

In patients with initial episodes of urticaria and angioedema with a known cause, routine treatment and grounding until resolved is appropriate. If there are recurrences and the condition becomes chronic (greater than six weeks), then a more aggressive approach needs to take place and a waiver will become necessary prior to returning the aviator to flying duties. Anaphylaxis is not graded acute or chronic, so any aviator case diagnosed as anaphylaxis necessitates grounding followed by a thorough evaluation prior to consideration for a waiver.

Although it is recommended that an aviator with one of these conditions wait a minimum of one year disease-free prior to consideration of a waiver, the ACS would recommend review of the case as soon as possible to facilitate adequate clinical care and maximize the chances for a subsequent waiver approval and to possibly consider waiver sooner than the one year mark. If an aviator with a history of idiopathic urticaria/angioedema without anaphylaxis is advised to carry an EpiPen only as a precautionary measure, the ACS has, in rare cases, recommended a FC IIC waiver (dual control aircraft, with another rated aviator).

Table 1: Waiver potential for urticaria, angioedema, and anaphylaxis.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS review/evaluation
I/IA	History of chronic urticaria and/or angioedema	Maybe*! AETC	Yes
	History of anaphylaxis	No AETC	No
II	Chronic urticaria and/or angioedema	Yes*+! MAJCOM	Yes
	History of anaphylaxis	Maybe#! MAJCOM	Yes
III	Chronic urticaria and/or angioedema	Yes*+! MAJCOM	Yes
	History of anaphylaxis	Maybe#! MAJCOM	Yes

* If resolved for at least one year without events of urticaria/angioedema and all chronic treatment is with approved medications.
+ If immunotherapy used, it must be well tolerated and the aviator must be stable on a maintenance dose.
# Anaphylaxis can be considered for a waiver ONLY if the cause is identified and can be treated and/or totally avoided; no waiver potential for untrained assets.
! No indefinite waivers.

AIMWTS review in Jun 09 revealed a total of 94 cases that met the criteria for chronic urticaria, angioedema, anaphylaxis, or a combination of these conditions. Of the 83 cases, nine were FC I with four of the cases resulting in a disqualification: two were for unrelated issues, one for a severe anaphylactic reaction to red ant bites and the last one was unexplained. There were a total of 44 FC II cases with eight disqualifications: two due to poor control of chronic urticaria, one due to idiopathic anaphylactic shock, one initial flight surgeon case for significant chronic allergic reactions, and four for unrelated issues. Lastly, there were 41 FC III cases with eight disqualifications: four due to poorly controlled urticaria, two due to angioedema deemed secondary to nut allergies, one due to unexplained anaphylactoid-type reactions and the last case was due to an unrelated issue.

Review of the ACS database revealed five patients who have been seen in the past fifteen years with one of the three diagnoses. One was a HH-60 female pilot with chronic urticaria who was disqualified secondary to migraine headaches. There was another pilot with at least two episodes of food-induced anaphylaxis who was evaluated and recommended for a waiver because it was an easily avoidable food. An international F-16 exchange pilot was seen for chronic idiopathic urticaria and recommended to be on daily use of two different antihistamines. As he was not a USAF aviator, no waiver recommendation was given during his evaluation. An air traffic controller

was evaluated for chronic urticaria and angioedema and recommended for a GBC waiver (this case involved neuropsychological testing on and off his non-sedating antihistamine to assure a lack of medication effect). Lastly, a KC-135 pilot was evaluated for a history of chronic urticaria and recommended for a waiver.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Aeromedical summary for initial waiver for urticaria, angioedema, or anaphylaxis must include the following:
A. History specifically discussing the episode(s), frequency of events, any known triggers and timing after exposure to these triggers, pattern of recurrence, duration of attacks, family history of atopy, and treatments used with their effectiveness.
B. List and fully discuss all clinical diagnoses requiring a waiver.
C. All emergent treatment data including any EMS run notes, triage notes and ED treatment records.
D. Results of any skin testing or RAST testing, if performed. If placed on immunotherapy, documentation that member is stable on a maintenance dose.
E. Labs: CBC with differential, urinalysis, ESR, thyroid function tests and thyroid autoantibodies, and liver function tests. If work-up included skin biopsy, those records are needed as well.
F. Clinical consultation report from an allergist.
G. Documentation that the aviator has been counseled about the risks of future attacks and understands the necessity of clinical evaluation should another attack occur.
H. Documentation that the aviator is asymptomatic off all daily medications.
I. Medical Evaluation Board results.

Aeromedical summary for waiver renewal for urticaria, angioedema, or anaphylaxis must include the following:
A. Interim history specifically discussing any recurrences or any changes in the disease pattern and all medications used.
B. Labs: new labs if ordered since last waiver
C. Clinical consultation report from an allergist or from the flight surgeon if there have been no intervening concerns.
D. If on immunotherapy, documentation that it is still well tolerated.
E. Documentation that the aviator is asymptomatic off all daily medications.

ICD9 Codes for Urticaria, Angioedema, and Anaphylaxis	
708	Urticaria
995.1 &277.6	Angioedema
995.0, 995.2 & 995.6	Anaphylaxis

Reviewed by Col Diane Napoli, AF/SG Consultant for Allergy/Immunology, and Dr. Jeb Pickard, AF/SG Consultant for Aerospace Medicine Internal Medicine.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Jun 2007
By: Dr Dan Van Syoc
Reviewed by Col Anthony Propst, AF/SG consultant for OB/GYN

CONDITION:
Uterine Fibroids (Leiomyomas) (Mar 11)

I. Overview.

Uterine fibroids, or leiomyomas, are the most common gynecologic tumor in women; they are benign tumors. The highest prevalence of these tumors occurs during the fifth decade of a woman's life.[1] Leiomyosarcoma is a clinically similar, yet malignant, tumor that occurs in less than 1% of cases. Leiomyomas arise from smooth muscle cells of the uterus, and contain an increased amount of extracellular collagen and elastin matrix as well as a thin pseudocapsule.[2, 3] They are often described by their location in the uterus: intramural, submucosal, subserosal, and cervical. Fibroid symptoms include increased uterine bleeding, pelvic pressure and pain (bulk symptoms), and reproductive dysfunction.[1] Some studies have shown that up to 25% of reproductive aged women have uterine fibroids, but most women with symptomatic fibroids are in their 30s or 40s.[2, 4] Fibroids, and their symptoms, generally regress during the post-menopausal period as the woman's steroid hormone levels decrease. There is some evidence that the following may be risk factors for developing uterine fibroids: early menarche (less than age 10), early age of oral contraceptive pill (OCP) use, family history of fibroids, red meat consumption, hypertension, uterine infection, alcohol consumption (especially beer), and race (black women being 2-3 times more likely than white women). However, the following may *reduce* the risk for uterine fibroids: parity of 2 or more, smoking, injectable progestin-only contraceptives, and OCP use.[2, 3]

The cause of these tumors is incompletely understood, although it is known that each tumor results from a single muscle cell. The majority of women with fibroids are asymptomatic, but one in three will experience pelvic pain or pressure, with dysmenorrhea being the most frequent complaint.[1] Another frequent complaint in symptomatic women is abnormal uterine bleeding which is experienced by up to 30% of afflicted women. Patients with subserosal tumors or numerous tumors may also have reproductive dysfunction.[2, 3]

Treatment for uterine fibroids is aimed at symptom relief. Therefore, asymptomatic fibroids, which represent the majority of cases, are managed expectantly. Symptomatic fibroids, on the other hand, are managed based upon factors such as size, location, woman's age, reproductive considerations, and symptomatology.[5] Symptomatic fibroids can be treated medically or surgically. Medical measures include gonadotropin-releasing hormone (GnRH) agonists (Lupron®)/antagonists, mifepristone (RU-486, Mifeprex®), aromatase inhibitors (Letrozol), danazol (Danocrine®), raloxifene [Evista®], contraceptive hormones, and nonsteroidal anti-inflammatory drugs (NSAIDs). GnRH related drugs can cause a decrease in bone mineral density and osteoporosis and are associated with a rapid return to pre-treatment uterus size when the medicine is discontinued.[5, 6] These drugs are usually used to prepare a woman for surgery as a decrease in the size of the uterus can often times facilitate a vaginal surgical approach as opposed to an abdominal one. The GnRH related medications are not approved for waiver in aircrew. Contraceptive hormones do very little to reduce fibroid size themselves, but they are often effective in relieving the symptoms such as

menorrhagia or dysmenorrhea. Contraceptive hormones, e.g., OCPs and progestin-only injections, are waiverable medications. Nonsteroidal anti-inflammatory medicines do not appear to reduce blood loss in women with leiomyomas.[6] Medical measures have the advantage of avoiding surgery, however, medications offer short tern relief of the symptoms and can have bothersome side effects and unknown long-term effects.

Surgical modalities are the mainstay of treatment.[5] Surgical approaches include hysterectomy (by abdominal, vaginal or laparoscopic approach), myomectomy (by laparoscopy, laparotomy, or hysteroscopy), myolysis, uterine artery occlusion, and uterine artery embolization.[6] Hysterectomy is the definitive procedure; it provides a cure and eliminates the possibility of recurrence.[4] Certain modalities may be preferred in a particular population. For example, women wishing to remain fertile may opt for myomectomy. The repeat surgery rate after myomectomy is 10-40%. A newer treatment of fibroid tumors is uterine artery embolization. In observational studies, embolization has been followed by a significant reduction in uterine volume, a decrease in excessive uterine bleeding, and a low rate of subsequent hysterectomy.[7] Embolization is not as definitive a treatment as is hysterectomy, but a 2007 study showed that it was more cost-effective at one year post-procedure than was hysterectomy.[8]

II. Aeromedical Concerns.

Symptomatic fibroids may cause significant distraction or impairment during flight due to dysmenorrhea, menorrhagia, anemia, and non-menstrual bulk pain symptoms such as pressure, bloating, and urinary frequency/urgency. Medical treatment of fibroids could lead to side effects unacceptable for flying status. Surgical treatment, due to its associated recovery period and possible complications, would be incompatible with flying duties until the individual is fully recovered from her procedure.

III. Waiver Consideration.

Asymptomatic fibroids require no waiver. Symptomatic uterine fibroids, however, are disqualifying for flying classes (FC) I, IA, II, and III. The condition is not listed as disqualifying for ATC/GBC and SMOD duties, nor is it disqualifying for retention purposes, but use of the GnRH agonists/antagonists are probably not authorized in these career fields. Symptomatic uterine fibroids /treated with medications would require a waiver for the medications. Surgical treatment for symptomatic fibroids, if uncomplicated, fully recovered and asymptomatic, *does not require waiver*; non-malignant histology should be documented. These patients are not required to have their cases reviewed by the ACS.

Table 1: Waiver potential for uterine fibroids

Flying Class (FC)	Condition	Waiver Potential Waiver Authority
I/IA	Medically treated with OCPs, progestin or NSAIDs	Maybe AETC
	Medically treated with GnRH agonists/antagonists	No AETC
II/IIU/III*	Medically treated with OCPs, progestin or NSAIDs	Yes MAJCOM
	Medically treated with GnRH agonists/antagonists	No MAJCOM
ATC/GBC	Medically treated with OCPs, progestin or NSAIDs	Yes MAJCOM
	Medically treated with GnRH agonists/antagonists	Maybe MAJCOM
SMOD	Medically treated with OCPs, progestin or NSAIDs	Yes AFSPC or GSC
	Medically treated with GnRH agonists/antagonists	Maybe AFSPC or GSC

*AFMSA is waiver authority for FC IIU personnel

AIMWITS search in January 2011 revealed a total of 7 cases with the diagnosis of uterine fibroids; all 7 cases were FC III. There were 2 disqualifications; one for multiple medical problems and the other for iron deficiency anemia secondary to uterine fibroids.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver submission should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for uterine fibroids should include the following:
A. History and physical. History should include degree of impairment from the symptomatic uterine fibroids, level of functioning before and after uterine fibroid treatment modalities, presence and/or resolution of anemia/fatigue, treatment modalities used, and treatment option considerations (e.g., future fertility desired).
B. Gynecology consultation.
C. Results of special exams or interventions.
D. Current complete blood count.
E. Histology report, if applicable.

The aeromedical summary for waiver renewal for uterine fibroids should include the following:
A. Interval history since last aeromedical summary with emphasis on any symptoms compatible with the disorder.
B. Current complete blood count.
C. Consultation from gynecologist or treating physician.

ICD 9 code for uterine fibroids	
218	Uterine leiomyoma

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WAIVER GUIDE
Updated: Nov 2011
Supersedes waiver guide of Jul 2008
By: Dr. Dan Van Syoc

CONDITION:
Uveitis (Nov 11)

I. Overview.

Uveitis is an inflammation of the uvea which consists of the iris, ciliary body and choroid.[1] The uveal tract is the vascular coating of the eye, lying between the sclera and neuroepithelium. The uvea contains nerves, supporting connective tissue, and a variable number of melanocytes that are responsible for its distinctive color. The incidence of uveitis in the US is unclear. Epidemiologic research in northern California in the late 1990s estimated the incidence to be 52.4/100,000 person-years.[2] Proper diagnosis and management is important in uveitis as it can lead to blindness in some cases; it is reported to be responsible for up to 10% of cases of blindness in the US.[3] In 2005 a standardization of uveitis nomenclature (SUN) working group was formed to develop an anatomical classification system, descriptors, standardized grading system and terminology to be used for following the activity of uveitis.[4] The basic anatomical classification has four groups:

- Anterior uveitis
- Intermediate uveitis
- Posterior uveitis
- Panuveitis

The anterior uveitis is inflammation of the anterior uveal tract. It includes iritis, iridocyclitis and anterior cyclitis. Inflammation confined to the anterior chamber is called iritis; if it extends into the retrolental space it is named iridocyclitis. When the inflammatory reaction involves the cornea it is known as keratouveitis and sclerouveitis when it affects that sclera and uveal tract. Anterior uveitis is the most common form of uveitis (approximately four times more prevalent than posterior) with an annual incidence rate of 8.2/100,000.[5] The primary site of inflammation for intermediate uveitis is the vitreous and includes pars planitis, posterior cyclitis and hyalitis. Posterior uveitis is composed of inflammatory conditions involving the retina and/or choroid. These can be a focal or multifocal, retinitis or chorioretinitis with or without vitritis or vasculitis. Panuveitis describes an inflammation involving the anterior chamber, vitreous, and retina or choroid.

The hallmark of acute anterior uveitis is the presence of inflammatory cells and proteinaceous flare in the anterior chamber of the affected eye.[6] The classic symptoms of anterior uveitis include acute eye pain, redness, photophobia and blurred vision.[7] The symptoms could be minimal (blurry vision or mild redness), if the inflammation begins insidiously (e.g., JRA, Fuchs' heterochromic iridocyclitis). The degree of visual loss can also be variable. Individuals can also present with excessive tearing as their only symptom. Individuals with intermediate or posterior uveitis typically have floaters or impaired vision. Blurred/impaired vision can be the result of myopic or hyperopic shift, inflammatory cells, cataract, scotoma and/or floaters.

The etiology of uveitis includes infectious agents (viral, bacterial, parasite, fungal), systemic inflammatory diseases, isolated eye disease, and idiopathic. The infectious agents known to elicit

uveitis include cytomegalovirus (CMV), toxoplasmosis, syphilis, tuberculosis, cat scratch disease, Lyme disease, histoplasmosis and West Nile virus. The list of systemic inflammatory diseases associated with uveitis is extensive and include HLA-B27 associated disorders, sarcoidosis, Behcet's disease, drugs hypersensitivity reaction, juvenile rheumatoid arthritis (JRA), Kawasaki disease, systemic lupus erythematous and Sjögren's disease. The HLA-B27 associated disorders include ankylosing spondylitis, reactive arthritis, ulcerative colitis and Crohn's disease. Isolated eye diseases include acute posterior multifocal placoid pigment epitheliopathy (APMPPE), multiple evanescent white dot syndrome (MEWDS), subretinal fibrosis and uveitis syndrome, and birdshot retinochoroidopathy.[8] Most anterior uveitis cases are sterile inflammatory reactions, whereas many of the posterior uveitis are infectious in origin.[4] Approximately 30% of individuals with uveitis do not have any apparent associated infectious etiology or systemic disease, therefore, are identified as idiopathic. A comprehensive history and review of systems needs to be obtained for every patient who presents with intraocular inflammation. The diagnosis of uveitis requires an examination of the eye with a slit lamp to look for signs of intraocular inflammation. The presence of leukocytes in the anterior chamber of the eye is characteristic of anterior uveitis, intermediate uveitis if the leukocytes are located in the vitreous humor, and posterior uveitis if active chorioretinal inflammation is found.

Treatment for noninfectious uveitis usually consists of cycloplegic agents and topical ophthalmic steroids.[9] Systemic steroids should be reserved for patients with bilateral disease not responding to topical medications. Recurrent cases, those not responding to topical therapy, cases with inflammation beyond the anterior chamber or with visual impairment should be referred to an ophthalmologist. If there is a systemic or infectious etiology for the uveitis, it should be treated accordingly. Topical or systemic nonsteroidal anti-inflammatory drugs (NSAIDs) and immunomodulatory (e.g., methotrexate, cyclosporine, tacrolimus, and etanercept), therapy may be required.

There is significant interest in the use of intravitreal steroid treatment for noninfectious uveitis when an intermediate or posterior etiology is apparent. As systemic steroid use has significant side effects and topical therapy is only effective for anterior uveitis, a more efficacious method is needed to treat such cases. Currently there are studies using fluocinolone acetonide and dexamethasone intravitreal implants with good initial results.[3, 10]

II. Aeromedical Concerns.

For the flight surgeon, uveitis of any etiology is of concern due to possible complications and sequelae. The acute condition can cause distracting pain. Floaters and blurred vision can impair performance and affect flight safety. Long term sequelae include papillary abnormalities, cataract, glaucoma, retinal scarring, retinal detachment, keratopathy and loss of vision. The flight surgeon also needs to be concerned with possible underlying disease processes which may require aeromedical disposition as well.[11]

III. Waiver Considerations.

Acute, chronic or recurrent inflammation of the uveal tract, except for healed traumatic iritis is disqualifying for flying class I/IA, II and III. If the uveitis is secondary to a systemic disease, waiver consideration will also depend on the status of the systemic disease, see applicable waiver guides. While not specified in AFI 48-123, for ATC/GBC and SMOD personnel, uveitis should be

disqualifying if it is recurrent or chronic and leads to frequent absences from duty or results in a loss of vision.

Table 1: Waiver potential for uveitis.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Review/Evaluation
I/IA	Single episode (mild, nongranulomatous, unilateral), resolved.	Maybe* AETC	Yes
	Single episode (granulomatous and/or bilateral), recurrent episodes and/or on-going visual symptoms/sequelae.	No# AETC	Yes, only in cases eligible for waiver
II/IIU/III trained	Single episode, recurrent episodes without visual symptoms/sequelae	Yes MAJCOM**	Yes, initial and maybe subsequently
	Single episode, recurrent episodes with visual symptoms/sequelae	Maybe MAJCOM**	Yes
II/IIU/III untrained	Single episode (mild, nongranulomatous, unilateral), resolved.	Maybe* AETC**	Yes
	Single episode (granulomatous and/or bilateral), recurrent episodes and/or on-going visual symptoms/sequelae	No# AETC**	Yes, only in cases eligible for waiver
ATC/GBC	Single episode, recurrent episodes without visual symptoms/sequelae	Yes MAJCOM	At discretion of MAJCOM
	Single episode, recurrent episodes with visual symptoms/sequelae	Maybe MAJCOM	Yes
SMOD	Single episode, recurrent episodes without visual symptoms/sequelae	Yes AFSPC or GSC	At discretion of waiver authority
	Single episode, recurrent episodes with visual symptoms/sequelae	Maybe AFSPC or GSC	Yes

* Uveitis occurred greater than one year ago.
** Waiver authority for FC IIU is AFMSA.

If disease treated/remission and waiver eligible for that disease then waiver may be considered if no visual sequelae, ACS review/evaluation required.

A review of the AIMWTS database in Sep 2011 revealed 92 cases of uveitis; 10 were disqualified. There were 0 FC I/IA cases, 51 FC II cases (3 disqualifications), 1 FC IIU case (0 disqualifications), 36 FC III cases (7 disqualifications), 3 ATC/GBC cases (0 disqualifications), and 1 SMOD case (0 disqualifications). Of the 10 disqualified, all but 2 were secondary to the uveitis symptoms; the other 2 were due to multiple medical problems.

IV. Information Required for Waiver Submission.

The aeromedical summary (AMS) should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The AMS for initial waiver for uveitis (single mild episode, nongranulomatous, unilateral and without evidence of systemic disease) should include the following:
A. History – signs, symptoms, duration, treatment and must include pertinent review of system negatives.
B. Physical – complete.
C. Ophthalmology consult.

The AMS for initial waiver for uveitis (granulomatous, bilateral, greater than mild or recurrent and no evidence of systemic disease) should include the following:
A. History - signs, symptoms, duration, treatment and must include pertinent review of system negatives.
B. Physical – complete.
C. Ophthalmology consult.
D. Chest x-ray to rule out sarcoidosis and tuberculosis.
E. Labs: syphilis serology, Lyme titer, HLA-B27, erythrocyte sedimentation rate (ESR).
F. IPPD.

The AMS for waiver renewal of uveitis should include the following:
A. History – etiology, signs, symptoms, duration, frequency, and treatment.
B. Physical – complete if recurrent.
C. Ophthalmology/optometry consult.

ICD9 Code for Uveitis	
364.3	Unspecified iridocyclitis
363.2	Unspecified forms of chorioretinitis and retinochoroiditis
360.12	Panuveitis

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WAIVER GUIDE
Updated: Apr 2010
Supersedes Waiver Guide of Feb 2002
By: Dr Dan Van Syoc
Reviewed by Col Kent McDonald, psychiatrist and chief of the neuropsychiatry branch at the ACS.

CONDITION:
V Codes (Apr 10)

I. Overview.

In DSM-IV-TR, V codes are used to describe other conditions or problems that may be a focus of clinical attention. They are not clinical disorders. They may be a stand-alone reason for a patient visit, they may result from another mental disorder or they may precipitate or exacerbate a mental disorder. When they are the primary reason for a patient's dysfunction they are listed on Axis I. If the condition is more of an additional stressor affecting an Axis I condition, they are listed on Axis IV. The V codes are broadly divided into three groups: 1) The commonly seen *Relational problems*, such as marital/partner or parent-child problems; 2) *Problems related to abuse or neglect*, such as spouse abuse or child neglect, and 3) the *additional conditions*, such as an occupational problem, malingering, adult antisocial behavior, or spiritual problem. The latter group is broad and can vary from non-compliance with treatment through bereavement to phase of life problems.[1-4] The 23 "V codes" are listed in DSM-IV-TR and V codes are recorded on DSM-IV Axis I.

A common V code example amongst our aviators is that of grief or bereavement. Grief can be defined as the physical and emotional pain precipitated by a significant loss, while bereavement literally means to be robbed by death.[5] Grief varies in its duration and intensity and much of our reaction is shaped by our sociocultural influences. Grief can be prolonged and be labeled "unresolved grief" or "complicated grief". One review of psychiatric patients with severe complicated grief indicated that these people had a significantly higher level of depression, anxiety, and general symptomatic distress than psychiatric patients without a significant loss.[6] In the mental health arena, there are distinctions of bereavement-related depression and bereavement-related anxiety that are distinct from traumatic grief.[7] Our aviators are young and active, but are not immune from the extreme reactions related to the death of a loved one. If an aviator is having difficulty sleeping or eating after the death of a loved one, and comes to see the flight surgeon for a medication to help, the reason for the visit could be coded with a V-Code for bereavement.

Family and relational issues and are other common reasons for aviators to seek assistance. Marital relations have the strongest influence on health. The oft-used Holmes and Rahe scale demonstrates that 10 of the 15 most stressful events are family events. Divorce can have long-lasting effects on all members of a family. Multiple studies have indicated that divorce is more traumatic for boys than for girls in divorced families.[8] Similarly, family environments that are characterized by verbal conflict or physical violence can have a negative impact on a person's psychosocial development. These negative influences can extend well into adulthood for both males and females.[9]

Every aviator has unique experiential histories. How that person responds to the stressors of life is highly dependent on their home of origin and how they were conditioned as a child and adolescent. Similar stressors applied to multiple individuals will elicit a wide range of responses. We see this

often after disasters and major accidents. Flight surgeons need to be aware of stressors in the lives of their aviators and pay close attention to the response to past and current stressors.

II. Aeromedical Concerns.

The V codes represent a psychiatric gray area in aerospace medicine. Many of the everyday problems faced by flyers - and therefore by flight surgeons - may be described by V codes. These involve the kinds of situations discussed in flying safety talks by flight surgeons, or in stress management lectures by aerospace psychologists or physiologists. V code issues may interfere with safe or effective flying, or they may not. Matters such as adjusting to different cultures, or dealing with a recalcitrant child, or trying to save a failing marriage are of obvious aeromedical concern, but whether they are grounds for administrative or medical removal from flying duties, or for establishing a psychiatric diagnosis, are clearly matters of degree.[10-12] What becomes most relevant to aeromedical decision-making is the response of the aviator rather than the severity of the stressor. Numerous "small" stressors can produce fatigue, irritability, early task saturation, distraction and cognitive inefficiency as much as a single major stressor.

Aeromedically dangerous responses to stressors include those of worry, anxiety, anger, depression, guilt, somatization, and behavioral acting-out. They may occur during stable situations, or during such contingencies as unexpected TDYs or deployments, or a PCS. Other aeromedically relevant issues include patterns of sleep, eating, preoccupation, ability to relax, overall mood, affective changes, duty requirements, and especially flying performance as assessed by the flyer, peers, and the supervisor. Because these conditions and their impact can be insidious, the flight surgeon should approach such life problems in flyers carefully, using techniques that range from informal discussion, as the least intrusive intervention, all the way to a referral for full mental health workup/treatment. Each type of assessment or intervention should consider whether the aviator should continue to fly. In some cases, the aviator may be able to resolve the troubling issue without being placed in a DNIF status. If placed DNIF, once the flyer has completed use of any medications, and the symptoms are sufficiently relieved so that return to flying is possible, then decide whether a waiver will be necessary. *Note: a flyer may be recommended for return to flying even though non-medication "talk therapy" is continuing when the symptoms have subsided sufficiently (during marital therapy, for example).*

If the concerning responses persist or are severe, a mental health diagnosis may be warranted. The flight surgeon must always be vigilant for more severe pathology. A partner relational problem is a good example of a stressor that may precipitate multiple DNIF periods due to loss of sleep and thus become a “V-Code”. It may be that the relationship issue precipitates a Major Depressive Disorder that requires treatment and a waiver . The relationship problems may even be the result of a Major Depressive Disorder that began affecting the aviator’s personal relationships. If a diagnosis seems warranted, establish it in accordance with DSM-IV-TR criteria, and see that the flyer receives proper treatment. *NOTE: beware of delaying or withholding proper treatment solely in order to avoid DNIF.*

III. Waiver Consideration.

V codes are not specifically mentioned in AFI 48-123, but the problems that may arise such as worry, anxiety, anger, depression, guilt, somatization, and behavioral acting-out may indeed lead to the need for grounding or disqualification.

Table 1: Waiver potential for V Codes Diagnoses

Flying Class (FC)	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Yes AETC	At the request of AETC
II	Yes MAJCOM	At the request of MAJCOM
IIU	Yes AFMSA	At the request of AFMSA
III	Yes MAJCOM	At the request of MAJCOM

AIMWTS search in Feb 2010 revealed 9 cases with a V-code diagnosis. There were 0 FC I cases, 5 FC II cases, 0 FC IIU cases, and 4 FC III cases. The breakdown of V-codes showed 2 for bereavement issues, 6 for partner-related problems and 1 for adult antisocial behavior. Two of the cases resulted in a disqualification disposition; one for a FC III aircrew with partner problems but also for depression, and the other was a FC II aircrew, also with partner problems but with psychotic symptoms as well.

IV. Information Required for Waiver Submission.

If the V code is an additional diagnostic code listed for completeness during the treatment of another disqualifying mental disorder , waiver action should be taken primarily in accordance with the requirements for the primary disqualifying diagnosis.. If the V code stands alone, resulting in prolonged interference with duty, then the submission should be along the lines of:

A. An aeromedical summary that includes any pertinent social, occupational, legal or financial information, as well as a good history of the particular stressor. A paragraph describing the rationale why the member should be safe to return to flying status especially if the situational stressor is not completely resolved or if it could reasonably be expected to recur.
B. A recent mental health evaluation, to include all treatment notes from the treating mental health professional as well as an MEB-type narrative summary of the mental health record.
C. Any psychological testing or evaluation reports.
D. A letter from the flier's supervisor rendering an opinion about the aviator's readiness to return to flying status.

ICD 9 V Codes	
V61.1	Partner Relational Problem
V62.82	Bereavement
V71.01	Adult Antisocial Behavior
V62	Other Psychosocial Circumstances
V15.81	Non-compliance with treatment
V65.2	Malingering

V. References.

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of May 2007
By: Dr Dan Van Syoc
Reviewed by Dr Bill Kruyer, ACS chief cardiologist

CONDITION:
Valve Surgery - Replacement or Repair (Jan 11)

I. Overview.

Replacement or repair of a cardiac valve is a complicated aeromedical subject and disposition consideration. This presently is a surgical procedure, but catheter-based techniques are under active investigation. In the military aviator/aircrew population valve replacement or repair will usually be for severe regurgitation of the aortic or mitral valve. In the older aviator population with bicuspid aortic valve, significant aortic valve stenosis is an unusual possibility. Procedures for mitral stenosis and tricuspid valve disease are very rare. One occasional consideration in candidates for initial flying training may be balloon valvuloplasty of congenital pulmonary valve stenosis performed during childhood. Due to the broad spectrum of procedures, types of valve prostheses and other considerations, valve replacement/repair considered for waiver must be evaluated by the Aeromedical Consultation Service (ACS) (See Table 1). Information in this waiver guide will thus be very general.

II. Aeromedical Concerns.

Aeromedical concerns include thromboembolic events, anticoagulation and/or antiplatelet medications, infective endocarditis, dysrhythmias, residual or progressive post-procedure valvular regurgitation and/or stenosis, and short- and long-term durability of the procedure, especially prostheses. The etiology of the underlying valve disease is also a consideration as it may affect procedure outcomes, e.g. repair of severe mitral regurgitation (MR) due to myxomatous disease has a much better prognosis than severe MR due to rheumatic disease.

Prosthetic valves are of two basic types, mechanical (metal and plastic) and biological (human and nonhuman tissue). Regardless of valve type, valve prostheses in the mitral position have higher thromboembolic rates than those in the aortic position and are thus unacceptable for military aviation. Mechanical valves have higher thromboembolic rates than biological valves and require chronic warfarin therapy, with associated risk of major hemorrhage. The combined risk is considered unacceptable for military aviation. Biological valve prostheses are of several tissue types and designs. They do not require chronic warfarin therapy unless there is some other indication, such as chronic atrial fibrillation. These valves in the aortic position may be a consideration for waiver. Mitral valve repair and annuloplasty for severe MR due to a myxomatous valve (i.e. mitral valve prolapse) also may be a consideration for waiver. Valve prostheses with residual regurgitation or other concerns regarding long-term durability will likely be restricted to low performance aircraft. Select architecturally intact valves with no residual regurgitation may be considered for unrestricted waiver on a case-by-case basis.

III. Waiver Consideration.

Cardiac valve replacement or repair by surgery or catheter-based technique is disqualifying for all classes of flying duties. ACS review/evaluation is required for initial and renewal waiver consideration.

Table 1: Waiver potential for various valve replacements and repairs.

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Mitral valve, aortic valve and tricuspid valve surgery	No AETC	No
	Pulmonic valvuloplasty	Maybe AFMSA	Yes
II	Mitral valve prosthetic (mechanical or biological)	No AFMOA	No
	Mitral valve annuloplasty or repair	Maybe AFMSA	Yes
	Aortic valve (mechanical)	No AFMSA	No
	Aortic valve (biological)	Maybe AFMSA	Yes
	Other procedures or valves	Maybe AFMSA	Yes
III* IIU** ATC/GBC* SMOD***	Mitral valve prosthetic (mechanical or biological)	No MAJCOM	No
	Mitral valve annuloplasty or repair	Maybe MAJCOM	Yes
	Aortic valve (mechanical)	No MAJCOM	No
	Aortic valve (biological)	Maybe MAJCOM	Yes
	Other procedures or valves	Maybe MAJCOM	Yes

*Waiver authority for initial FC III and initial ATC/GBC is AETC.
**Waiver authority for FCIIU personnel is AFMSA except for initial certification which is AETC.
***Waiver authority for SMOD cases is AFSPC or GSC, depending on assigned location.

AIMWITS search in September 2010 revealed 7 cases of aortic valve replacement and 10 cases of mitral valve replacement. Within the AV category there were 5 FC II cases (2 disqualifications) and 2 SMOD cases. Within the MV category, there were 9 FC II cases (3 disqualifications) and 1 FC III case.

IV. Information Required for Waiver Submission.

Prior to waiver submission for valve replacement or repair there is a minimum nonflying observation period of six months. After the six-month observation period, submit an aeromedical summary (AMS) with the following information:
A. Complete history and physical exam – to include description of symptoms before and after surgery, cardiovascular risks (family history, smoking status, lipids, and history of rheumatic disease), medications, and activity level.
B. Copy of pre- and post-procedure local echocardiogram reports. For all FC II individuals and for FC I and III individuals requiring ACS evaluation, send videotape/CD copy of the echocardiographic images to the ACS. (Notes 1 and 2)
C. Copy of the formal operation/procedure report and follow-up progress notes by the attending cardiovascular specialists.
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, Holter monitor). For all FC II individuals and for FC I and III individuals requiring ACS evaluation if reports or tracings not attached in AIMWTS then send to ACS. (Notes 1 and 2)
E. Results of medical evaluation board (MEB) (worldwide duty evaluation for ARC members).
F. Additional local cardiac testing is not routinely required but may be requested in individual cases.

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

V. References.

1. Bonow RO, chair. ACC/AHA guidelines for the management of patients with valvular heart disease. A report of the American College of Cardiology/American Heart Association task force on practice guidelines (committee on management of patients with valvular heart disease). J Am Coll Cardiol, 1998; 32: 1486-1588.

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WAIVER GUIDE
Updated: Mar 2011
Supersedes Waiver Guide of Aug 2007
By: Dr Bill Kruyer and Dr Dan Van Syoc

CONDITION:
Valvular Heart Disorders – Miscellaneous (Mar 11)

I. Overview.

Some valvular heart disorders are discussed in their own specific waiver guides, including bicuspid aortic valve, aortic insufficiency, aortic stenosis, mitral valve prolapse, primary mitral regurgitation and surgical repair or replacement of a cardiac valve. This waiver guide will address other miscellaneous valve disorders not discussed elsewhere.

Valvular disorders considered further in this waiver guide include regurgitation/insufficiency of the tricuspid (TR) and pulmonary valves (PI), mitral stenosis (MS), tricuspid stenosis (TS) and pulmonary stenosis (PS). These disorders may all be asymptomatic and thus found incidentally. The natural history and progression of disease depends on the underlying cause.[1, 2] These disorders will be seen rarely, if ever, in our aviator population. The most likely to be seen is mild congenital pulmonary stenosis.[3, 4] (the most common seen in the AIMWTS search is TR, most of which are trace to mild, and this is considered a normal variant).

In the aircrew population, regurgitation (insufficiency) or stenosis of a cardiac valve will typically be diagnosed on an echocardiogram (echo) done for a murmur evaluation or for a variety of other clinical or aeromedical indications, such as an abnormal electrocardiogram. Valvular regurgitation is graded on echo as trace, mild, moderate and severe. In the absence of valvular pathology, tricuspid and pulmonary valve regurgitation graded on echo as trace or mild are considered normal variants, are not disqualifying and a waiver is therefore not required. Any degree of mitral, tricuspid or pulmonary valvular stenosis is considered abnormal.[3, 4] For FC I/IA/II individuals, echos read locally as trace or mild regurgitation of the tricuspid and pulmonary valves (i.e. normal variant) require the Aeromedical Consultation Service (ACS) ECG Library to review. The report and a CD/videotape copy are required for confirmation and to exclude underlying pathology such as mitral valve prolapse. If the ECG Library confirms trace or mild PI and TR with no underlying pathology, a letter for the medical record will be sent to that affect; the individual is medically qualified, and no waiver and no further work-up is required. If the ECG Library determines other than the above, a letter will be sent directing the need for a waiver. (For further information on ECG Library see https://kx.afms.mil/kxweb/dotmil/kjPage.do?functionalArea=AerospaceMedicine&cid=CTB_082025.) ECG Library review is optional for FC III, and may be requested by the local flight surgeon or the waiver authority. Echos read locally as any degree of stenosis of the mitral, tricuspid or pulmonary valves require ACS evaluation; the report and a CD/videotape copy are required for confirmation.

In early 2007, the American Heart Association published new infective endocarditis guidelines that are dramatically different from past recommendations.[5] Endocarditis prophylaxis was recommended only for specified high risk groups, and only for dental procedures, respiratory tract procedures, and procedures on infected skin, skin structures or musculoskeletal tissue. The high

risk group was limited to prosthetic cardiac valves, previous endocarditis, select congenital heart conditions and cardiac transplant patients with valvulopathy. Prophylaxis was no longer recommended for gastrointestinal or genitourinary procedures. Conditions commonly seen by most aerospace medicine practitioners were not included in the list of high risk conditions. Such common conditions no longer recommended for endocarditis prophylaxis included, but are not limited to, mitral valve prolapse, bicuspid aortic valve, mitral or aortic regurgitation with normal valve (e.g. primary MR) and uncorrected small defects of the atrial and ventricular septum.

II. Aeromedical Concerns.

In general, aeromedical concerns for these various valvular disorders include progression of the regurgitation and/or stenosis, requirement for surgical or catheter-based valve repair or replacement, underlying or associated disease processes, thromboembolism and arrhythmias.[1, 2, 3, 4]

III. Waiver Consideration.

Moderate and severe PI and TR and any degree of MS, TS and PS are disqualifying for all classes of flying duties and ACS review/evaluation is required for confirmation of diagnosis and recommendation for aeromedical disposition. For FC IIU, any asymptomatic valvular heart disease graded moderate or worse is disqualifying. For ATC/GBC personnel, symptomatic valvular heart disease or asymptomatic moderate to severe valvular disease associated with hypertrophy, chamber enlargement, or ventricular dysfunction is disqualifying. For retention purposes, severe valvular or subvalvular pulmonic stenosis is disqualifying as are most cases of symptomatic mitral stenosis. The table below summarizes likely disposition recommendations for these several valve disorders. Due to the rarity of these disorders in our population, they may be considered on a case-by-case basis. Waiver may be considered after surgery or catheter-based intervention; please refer to the "Valve Surgery – Replacement or Repair" waiver guide.

Additional considerations for waiver recommendation include but are not limited to: normal ventricular and atrial size, normal ventricular function, no prior thromboembolic events, no associated tachydysrhythmias and no symptoms attributable to the disorder.

Table 1. Summary of Associated Clinical Conditions and ACS Requirements

Type and Degree of Valvular Disease Graded on Echocardiogram	Flying Class	Waiver Potential Waiver Authority	ACS Review/Evaluation Required
Trace or mild PI and TR	FC I/IA	Qualified N/A	ECG Library review
	FC II/III /IIU ATC/GBC, SMOD	Qualified N/A	FC II - ECG Library review, FC III, ATC/GBC, and SMOD not required
Moderate PI and TR	FC I/IA	Maybe AETC	ACS evaluation
	FC II/III/IIU ATC/GBC SMOD	Maybe MAJCOM**	ACS evaluation#
Severe PI and TR – asymptomatic and nonsurgical per guidelines	FC I/IA	No AETC	ACS review
	FC IIA only	Maybe* AFMOA	ACS evaluation
	FC III (low performance only) IIU** ATC/GBC SMOD	Maybe* MAJCOM	ACS evaluation#
Congenital mild PS	FC I/IA	Yes AETC	ACS evaluation
	FC II/III/IIU ATC/GBC SMOD	Yes** MAJCOM	ACS evaluation
Any degree of mitral or tricuspid valve stenosis	FC I/IA	No AETC	ACS review
	FC II/III/IIU	No** MAJCOM	ACS review
	ATC/GBC SMOD	Maybe MAJCOM	ACS review

*Waiver for untrained FC II and III individuals unlikely.
**Waiver authority for FC IIU is AFMSA
#ACS evaluation not required for ATC/GBC personnel

AIMWITS search in January 2011 revealed a total of 29 cases of miscellaneous valve disorders (PI, TR, PS and MS). There were 17 cases with TI, 2 cases with PI, 3 cases with PS, 1 cases with MS, 5 cases with PI and TI, and 1 case with PI and PS. There were 3 FC I/IA cases (0 disqualifications), 11 FC II cases (one initial FC II that was disqualified), 0 FC IIU cases, 14 FC III cases (with 3 IFC III disqualifications), 0 ATC/GBC cases, and 1 SMOD case (no disqualifications). The 4 disqualified cases were all for initial waivers; one for mild-to-moderated TI and mild MI, one primarily for syncope, one primarily for coarctation of the aorta, and the last for mild-to-moderated TI.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

ACS review/evaluation is required for confirmation of diagnosis and recommendation for aeromedical disposition. No additional studies are routinely required prior to ACS review/evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for ACS review/evaluation.

For initial ACS evaluation the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications, activity level and CAD risk factors (positive and negative).
B. Report and complete tracings of the echo documenting the findings. (Notes 1 and 2)
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

For ACS follow-up evaluations (re-evaluations) the aeromedical summary should contain the following information:
A. Complete history and physical examination – to include detailed description of symptoms, medications and activity level.
B. Local follow-up cardiac testing is not routinely required prior to ACS re-evaluation. If requested for individual cases, it will have been specified in the report of the previous ACS evaluation.
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, treadmill, stress echocardiogram). (Notes 1 and 2)

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913
For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 codes for Misc. Valve Disorders	
394.0	Mitral Stenosis
397.0	Diseases of the Tricuspid Valve
397.1	Rheumatic diseases of the Pulmonary Valve
424.2	Tricuspid valve disorders, specified as non-rheumatic
424.3	Pulmonary valve disorders

V. References.

1. Bonow RO, Cheitlin MD, Crawford MH, Douglas PS. 36th Bethesda conference: Eligibility recommendations for competitive athletes with cardiovascular abnormalities. Task force 3: Valvular heart disease. J Am Coll Cardiol. 2005; 45(8): 1334-40.

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Jul 2007
By: Dr. Bill Kruyer and Dr Dan Van Syoc

CONDITION:
Ventricular Tachycardia (Jan 11)

I. Overview.

Ventricular tachycardia (VT) is defined as three or more consecutive ventricular premature beats at a heart rate greater than 100 beats per minute. The spectrum of VT thus ranges from an asymptomatic three-beat run that is unnoticed by the individual to a sustained run with hemodynamic collapse.[1] VT may be due to underlying cardiac disorders, such as coronary artery disease (CAD) and myocardial scarring, hypertrophic or dilated cardiomyopathy, and electrical or ion-channel abnormalities such as Brugada's syndrome or long QT syndrome. VT is termed idiopathic when no underlying cardiac disorder can be discerned. Radiofrequency ablation (RFA) for VT is discussed in the RFA of tachyarrhythmias waiver guide and is handled on a case-by-case basis.

A clinical distinction is made based on the presence or absence of hemodynamic symptoms which may include near syncope, syncope, chest pain, heart failure related symptoms or sudden cardiac death. An electrophysiological distinction is also made based on the duration of the dysrhythmia. That is, VT of greater than 30 seconds is clinically regarded as sustained VT whereas nonsustained VT has a duration of less than 30 seconds. Twenty-nine (29) seconds of asymptomatic VT is thus clinically considered to be nonsustained. In spite of the data and opinions that a VT run of such duration is probably benign in the absence of underlying cardiac disease, it is also probably too long for most aerospace medicine practitioners to feel comfortable returning a flyer to flying duties, especially to a single-seat, high performance cockpit. For the purpose of aeromedical disposition, VT duration will be expressed in total beats rather than seconds. And waiver policy will be determined by thresholds for VT duration in beats and number of runs of VT per evaluation as discussed below.

In a review of 193 aviators evaluated at the Aeromedical Consultation Service (ACS) from 1960 to 1992 for nonsustained VT, the maximum predicted event rate for idiopathic nonsustained VT was 0.3% per year.[2] The longest VT duration was 11 beats or less in 98% of the cohort and the number of VT runs per evaluation was four runs in 90% of the cohort, establishing these two limits as thresholds for the previous and current VT waiver policies. In a more recent review of 140 military aviators evaluated at the ACS from 1995 to 2005 for asymptomatic nonsustained VT, only one member was found to have a cardiac event over a mean follow-up of eight years. The individual subsequently was shown to have arrhythmogenic right ventricular cardiomyopathy. In this review approximately 25% had some degree of CAD, 5% had significant CAD, 9% had mitral valve prolapse and 11% had bicuspid aortic valve. There was one case of cardiomyopathy.[3]

The aforementioned case review also revealed that of 12 members undergoing centrifuge testing for an initial ACS evaluation of VT, none had acceleration-induced tachyarrhythmias. Thus, centrifuge testing is no longer a requirement for return to high performance flying duties and waiver for nonsustained VT is for unrestricted flying duties.

II. Aeromedical Concerns.

Ventricular tachycardia associated with hemodynamic symptoms may render an individual incapable of remaining in control of an aircraft or supporting the flying mission. Though sudden cardiac death related to sustained VT would be an obvious and dramatic explanation for such an event, a less dramatic near syncopal episode is also likely to result in sudden incapacitation or interference with duty performance. Sudden cardiac death is predominantly caused by acute coronary syndromes resulting in sustained VT. For many, this may be the initial manifestation of underlying ischemic or structural heart disease.[4] Underlying CAD may thus be the inciting event that leads to the final common pathway of a dysrhythmic event impairing an aircrew member.

III. Waiver Consideration.

Ventricular tachycardia is disqualifying for all classes of flying duties. It is not specifically mentioned as disqualifying for ATC/GBC and SMOD duties, but it is disqualifying for retention and therefore needs an MEB and waiver for those duties as well. The currently approved waiver policy recommends unrestricted FC II or FC III waiver when the following findings are present:

- No hemodynamic symptoms associated with any episode of VT.
- No more than 4 episodes of nonsustained VT per study ($\leq$4 episodes VT).
- Duration of each VT episode no longer than 11 beats ($\leq$11 beats duration).
- No underlying cardiac disorder.

Therefore, sustained VT and any duration of nonsustained VT with associated hemodynamic symptoms are disqualifying without waiver recommendation. Nonsustained VT with underlying cardiac disorder is disqualifying and waiver maybe considered on a case-by-case basis. Nonsustained VT with duration longer than 11 beats and/or with more than four episodes of nonsustained VT per study (e.g. treadmill, Holter) is disqualifying and waiver may be considered on a case-by-case basis. Idiopathic nonsustained VT with duration 11 beats or less and with four or less episodes of nonsustained VT per evaluation is waiver eligible. Waiver may be considered on a case-by-case basis for initial FC I/IA applicants. FC I, FC II and FC III waivers for VT require ACS evaluation/review. Table 1 summarizes the current approved aeromedical policy.

Table 1: Waiver potential for ventricular tachycardia

Flying Class (FC)	Condition	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA Untrained II, IIU, and III	Nonsustained idiopathic VT (max duration ≤11 beats, ≤4 episodes per study)	Maybe AETC**	Yes
	Nonsustained idiopathic VT (max duration >11 beats, >4 episodes per study)	Maybe AETC**	Yes
	Nonsustained VT with underlying cardiac disorder	No AETC**	No
	Sustained VT or any duration VT with associated hemodynamic symptoms	No AETC**	No
II/III/IIU	Nonsustained idiopathic VT (max duration ≤11 beats, ≤4 episodes per study)	Yes MAJCOM**	Yes
	Nonsustained idiopathic VT (max duration >11 beats, >4 episodes per study)	Maybe MAJCOM**	Yes
	Nonsustained VT with underlying cardiac disorder*	Maybe MAJCOM**	Yes
	Sustained VT or any duration VT with associated hemodynamic symptoms	No MAJCOM**	No
ATC/GBC	VT requiring medical treatment	Yes MAJCOM	At the discretion of the waiver authority
SMOD	VT requiring medical treatment	Yes AFSPS or GSC	At the discretion of the waiver authority

* Cardiac disorders that are unlikely to be waivered include moderate and significant coronary artery disease, hypertrophic or dilated cardiomyopathy, and electrical or ion-channel abnormalities (e.g. long QT and Brugada's syndrome)
** Waiver authority for all FC IIU cases is AFMSA

AIMWITS search in December 2010 revealed a total of 90 individuals with an aeromedical summary containing the diagnosis of ventricular tachycardia. Of the total of 90 cases, there were no FC I/IA, FC IIU, or SMOD cases; 68 FC II cases (11 disqualifications), 20 FC III cases (2 disqualifications), and 2 ATC/GBC cases (0 disqualifications). Of the 13 disqualified cases, all were disqualified primarily for ventricular tachycardia or coronary artery disease except for two cases; one was a FC II aviator disqualified for anxiety disorder and the second was a FC II aviator with the diagnosis of lung cancer.

IV. Information Required for Waiver Submission.

The aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

Nonsustained VT will usually be discovered on 24-hour Holter monitor or treadmill performed for a variety of clinical and/or aeromedical indications. ACS evaluation is required for all classes of flying duties if waiver is being considered for sustained or nonsustained ventricular tachycardia. No additional studies are required prior to ACS evaluation. If however, the treating physician deems it clinically necessary to perform additional studies, it is required that all studies be forwarded to the ACS for review. There is no minimum required nonflying observation period for waiver consideration for nonsustained VT.

The aeromedical summary should contain the following information:
A. Complete history and physical examination to include detailed description of symptoms before and after the acute episode, medications, activity level and CAD risk factors (positive and negative).
B. Report and complete tracings of the test documenting nonsustained VT (e.g. ECG, Holter monitor, treadmill). (Notes 1 and 2)
C. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. echocardiography, treadmill, nuclear stress imaging). (Notes 1 and 2)
D. Additional local cardiac testing is not routinely required but may be requested in individual cases.

Note 1: The address to send videotape/CD and reports not attached in AIMWTS is:
Attn: Case Manger for (patient's MAJCOM)
USAFSAM/FECI
Facility 20840
2510 Fifth Street
WPAFB, OH 45433-7913

For expediting the case, recommend sending via FedEx. Include patient's name, SSN and POC at base.
Note 2: State in AMS when studies were sent to ACS.

ICD 9 code for ventricular tachycardia	
427.1	Paroxysmal ventricular tachycardia

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WAIVER GUIDE
Updated: Jan 2011
Supersedes Waiver Guide of Apr 2007
By: Dr Dan Van Syoc
Reviewed by LtCol Mark Boston, AF/SG Consultant for Otolaryngology and LtCol Mark Packer, USAF neurotologist

CONDITION:
Vertiginous Disorders , Peripheral (Ménière's Disease, Benign Paroxysmal Positional Vertigo, Vestibular Neuronitis [Labyrinthitis]) (Jan 11)

I. Overview.

Vertigo is a symptom of illusory movement; it is not a diagnosis. Some may even refer to it as a hallucination of movement.[1] It arises from an asymmetry in the vestibular system due to damage to or dysfunction of the labyrinth, the vestibular nerve, or central vestibular structures in the brainstem. In evaluating the "dizzy" patient, it is important to establish first whether their symptom represents vertigo or some other form of dizziness such as presyncope. Not all who suffer from vertiginous disorders will describe a classic spinning sensation. Some may describe imbalance or disequilibrium, or be unable to describe their sensations in words. Other clinical features that help characterize vertigo include the time course and presence or absence of provocative or aggravating factors. Given the ability of the central nervous system to adapt to aberrant sensory input, peripheral vertigo (which is more often paralytic as opposed to excitatory) is generally transient, lasting no more than several weeks (although the susceptibility to repeat attacks may persist for much longer exacerbated by nonstatic, unequal excitations of the vestibular sensory pathway).[2] Dizziness that is provoked by position change may be presyncopal in nature if the provocative maneuver would be expected to decrease blood pressure or cerebral blood flow. Conversely, dizziness prompted by a position change (such as rolling over in bed) that does *not* have these physiological effects is more likely vertiginous. Finally, all vertigo is made worse by head movement, so a patient experiencing dizziness that does *not* worsen with head motion is probably not suffering vertigo.

Differentiation of central and peripheral causes of vertigo is also important. Epidemiologic case reviews of nonspecific dizziness from primary care, emergency department, and specialty dizziness clinics have established that approximately 40% of dizziness is of peripheral vestibular origin, 10% central, 15% psychiatric, and 25% "other" (including presyncope).[3] Features that suggest a central origin include purely vertical nystagmus, nystagmus that changes direction with gaze, nonfatiguing or sustained nystagmus, absence of latency period before onset of positional nystagmus, and focal neurologic deficits. Causes of central vertigo include migraine headaches, traumatic brain injury, multiple sclerosis, cerebrovascular disease, cervical vertigo, anatomic variants such as Arnold Chiari malformation, and neoplasms. Features suggesting a peripheral origin are nystagmus which is horizontal or horizontal-torsional, suppression with visual fixation, and no change in direction with gaze.[4] This waiver guide will address only peripheral causes of vertigo.

Other associated problems such as hearing loss, pain, nausea, vomiting, or neurological symptoms, and review of associated systems and factors that contribute to balance such as age, medication profile, hydration status, vision, proprioception, and metabolic profile, can help differentiated the cause of vertigo.[5] Once the suspicion of peripheral vertigo has been established, the major

differential diagnoses include benign paroxysmal positional vertigo (BPPV), vestibular neuronitis (labyrinthitis), and Ménière's disease (endolymphatic hydrops). The lifetime prevalence of a vestibular-induced case of vertigo is about 7.4%, so it is a common problem in the primary care setting. Of all patients presenting with peripheral vertigo, about 50% will be found to have BPPV.[6, 7]

Benign Paroxysmal Positional Vertigo (BPPV) is characterized by the abrupt onset of relatively brief symptoms of vertigo (typically less than 30 seconds) precipitated by certain head positions and movements.[8] These characteristic symptoms help distinguish BPPV from vestibular neuronitis, which usually causes a single episode of vertigo lasting several days, with symptoms that may be aggravated by any head movement rather than only certain specific motions; and Ménière's disease, which leads to recurrent attacks of spontaneous vertigo that last longer (minutes to hours) and is accompanied by hearing loss and tinnitus. BPPV is usually idiopathic, although it may also occur as the sequela of other primary causes such as head trauma, viral vestibular neuronitis, Ménière's disease, or migraine disorders.[6] There is evidence that post-traumatic BPPV may be more difficult to treat and more likely to recur than idiopathic BPPV.

BPPV was first described by Barany in 1921. It was several decades before the etiology was determined to be the motion of dislodged otoconia from the utricle (canalithiasis) floating freely in the semicircular canals, most commonly the posterior semicircular canal, but occasionally the horizontal and rarely the anterior canal.[7] Diagnosis of BPPV is established definitively by classic findings on the Dix-Hallpike test, in which an examiner attempts to provoke nystagmus and vertiginous symptoms by rapidly laying a patient from sitting to supine while extending the patient's neck slightly and rotating his head first to one side, and then repeating the maneuver rotating the head to the other side. Findings consistent with classic posterior canal BPPV include the occurrence, after a one- to two-second latency period, of a mixed torsional and vertical nystagmus with the upper pole of the eye beating toward the dependent ear and the vertical nystagmus beating toward the forehead. Upon the subject's return to the seated position, the direction of nystagmus is reversed. The direction of nystagmus may be more strictly horizontal for horizontal canal BPPV and downbeat and torsional for the rare anterior canal variety. The sensitivity of the Dix-Hallpike maneuver in patients with BPPV ranges from 50-88%.

Recognition of this canalithiasis mechanism has led to the development of various canalith repositioning maneuvers such as the Epley, modified Epley, and Semont maneuvers, which seek to direct particles from the canal to the vestibule by a series of head movements within the geometric plane of the affected canal. Controlled trials have demonstrated a rate of effectiveness of 70-90% for a single application of these procedures, and home regimens involving self-treatment with a modified Epley maneuver have demonstrated rates of improvement of up to 95% after one week. BPPV is generally a self-limited condition that will remit spontaneously, although remission may take months. Recurrence is not at all unusual; with studies demonstrating that up to 50% of patients will experience recurrence within 5 years, with rates of 15-18% in the first year.[8] Vestibular suppressant medications (such as meclizine) may reduce the intensity of symptoms, but they do not reduce the frequency of attacks and may in fact delay central nervous system (CNS) adaptation to the abnormal vestibular signals. Recalcitrant cases that are unrelieved by canal repositioning maneuvers may be related to cupulolithiasis, (otoconia adherent to the ampullary maucula), canalith jams (overlarge immobile mass of otoconiae), or other-than-posterior canal involvement, multiple canal involvement. Surgical options are available for the most intractable cases: either singular neurectomy, in which the posterior ampullary nerve is severed (with some risk of hearing loss); or posterior semicircular canal occlusion, in which a plug is fashioned to occlude the semicircular

canal lumen to prevent endolymphatic flow and render the cupula insensitive to angular acceleration forces.[6, 8]

Vestibular neuronitis (labyrinthitis) is generally attributed to viral infections, often following the prodrome of a viral URI and occasionally occurring in epidemics. Vertigo associated with vestibular neuronitis typically develops over a period of hours, is severe for a few days, is often accompanied by nausea and vomiting, and resolves gradually over the course of a few weeks. In pure vestibular neuronitis, auditory function is preserved; when this syndrome is combined with unilateral hearing loss, it is called labyrinthitis.[9] There are no well-accepted specific diagnostic criteria for vestibular neuronitis. Vestibular neuronitis may have a positive head thrust test; with rapid turning of the head toward the affected side by the examiner, the individual is unable to maintain visual fixation. If symptoms are severe some relief may be provided by vestibular suppressant medications such as promethazine, prochlorperazine, dimenhydrinate, droperidol, meclizine, or transdermal scopolamine, but these do not hasten recovery and are all associated with sedation. Corticosteroids, antivirals and vestibular rehabilitation are other potential treatments, although there are few formal studies of these therapies.[10] Symptoms of hearing loss associated with labyrinthitis should be managed by ruling out otitis media, documenting the hearing deficit with audiometry, and treating the hearing loss as a sudden sensorineural hearing loss with oral, and/or transtympanic steroids. Hearing should be followed to assess recovery or progression, and an MRI of the internal auditory canal should be obtained to rule out retrocochlear pathology as 10% of vestibular schwannoma may present with sudden hearing loss.[11] For vestibular neuronitis, recovery occurs as a result of CNS adaptation to the static imbalance in vestibular signals, as well as from restoration of normal labyrinthine function (which is often incomplete). Nearly 15% of patients with history of vestibular neuronitis will later develop BPPV.[7] Most cases will resolve within weeks and there is not a significant propensity for clinical recurrence.[1, 7]

Ménière's disease, also known as idiopathic endolymphatic hydrops, is a condition thought to arise from abnormal fluid and ion homeostasis in the inner ear. It is named for Prospere Ménière, a French physician, who in 1861 first reported that the inner ear could be the source of a syndrome of episodic vertigo, tinnitus, and hearing loss.[12] Ménière's is a diagnosis of exclusion classically characterized by a tetrad of symptoms and requires the following criteria for definite diagnosis: (a) at least two episodes of rotational vertigo lasting more than twenty minutes that is associated with hearing loss and, generally, prostration from nausea and vomiting (b) fluctuating hearing loss; and (c) episodic tinnitus; and/or (d) the sensation of fullness in the affected ear. Probable Meniere's Disease requires one definitive episode. Possible Meniere's Disease is considered in patients who have similar symptoms without meeting the defining criteria for Meniere's disease.[13]

Most patients will complain of one symptom such as hearing loss or dizziness upon initial presentation. Ménière's is generally a unilateral disease process, although bilateral disease can occur in 30-50% of patients, generally within the first two years of the disease process. There is a slight female predominance (1.3:1), and the peak incidence of disease is in the 40- to 60-year age group.[7] The etiology of Ménière's is not well understood, but genetic, autoimmune, infectious, traumatic, and vascular causes have been proposed. Current treatment for this condition focuses on relief of symptoms, salt restriction diet, diuretics and in severe cases surgical procedures are used; however, there is no known effective cure for Ménière's disease.

There may be a predominance of vestibular or cochlear symptoms with 50% of patients presenting with both vertigo and hearing loss, 19% with only vertigo, and 26% with only hearing loss.[7] In one

study of 574 Ménière's patients, over half of the cases had between 1-4 attacks/week and 1-10 attacks/day.[1] Twenty five percent of patients may have associated BPPV. Two to six percent of Ménière's patients may experience Tumarkin's crises (a.k.a. "drop attacks") which are sudden unexplained falls without loss of consciousness or vertigo most likely due to acute utriculosaccular dysfunction causing inappropriate postural adjustment.[7] Vestibulo-Evoked Myogenic Potential testing in Meniere's disease may offer a way to document active MD, potential for bilateral MD, and severe saccular dysfunction seen in Tumarkins crisis.[14]

The sensorineural hearing loss of Ménière's is typically fluctuating and progressive. Low-frequency fluctuating loss with stable high-frequency loss may produce a "peaked" or "tent-like" audiogram. Profound deafness is rare but may occur in 1% to 2% of patients. The diagnosis of Ménière's can be challenging and is often made by excluding other differential diagnoses including: atypical migraine, superior semicircular canal dehiscense syndrome, otologic syphilis, delayed endolymphatic hydrops, acoustic neuroma, perilymph fistula, Cogan's syndrome, neoplasm, and vascular events.

Head trauma can cause peripheral vestibular damage from numerous mechanisms such as blunt concussive, penetrating, explosive blast and barotrauma. *Alternobaric vertigo* is a transient vestibular dysfunction thought to occur as a result of elevated, and probably asymmetric, middle ear pressure. As many as 26% of divers and 10% to 17% of pilots have admitted to experiencing alternobaric-like vertigo. Although the following two traumas are seen mostly in divers, it is possible to be seen in aviators too. Atmospheric inner ear barotrauma, extremes of abrupt pressure changes in middle ear, are capable of damaging middle and inner ear structures and thus causing vertigo, tinnitus and/or hearing loss. Inner ear decompression sickness (IEDS) is a common result of mixed gas, oxyhelium, for deep sea diving. When the inner ear is affected, vestibular and auditory dysfunction are often permanent, particularly if recompression treatment is delayed. Vertigo is a prominent complaint, and often the sole complaint in 50% of individuals with IEDS.[7] IEDS is generally seen in pilots flying unpressurized aircraft.

Migrainous vertigo is increasingly being recognized as an entity distinct from basilar migraine, which includes vertigo only as a symptom within an aura. In migrainous vertigo, headache may not be a regular accompaniment of the vertiginous attacks in over 50% of cases, making definitive diagnosis challenging. Diagnostic criteria for migrainous vertigo are still evolving. Although it is considered to arise from a central cause it may have both peripheral and central characteristics.[15] A separate waiver guide entry exists for headaches (migraine) and should be consulted for further information.

Superior Semicircular Canal Dehiscense Syndrome (SCDS) is a relatively new diagnosis described by Lloyd Minor in 2000.[16] Vestibular and/or auditory signs and symptoms can occur in SCD. Vertigo and oscillopsia (the apparent motion of objects that are known to be stationary) evoked by loud noises and/or by maneuvers that change middle-ear or intracranial pressure (such as coughing, sneezing, or straining). Persons with SCD may experience a feeling of constant disequilibrium and imbalance, and may perceive that objects are moving in time with their pulse (pulsatile oscillopsia). Auditory manifestations of SCD may include autophony (increased resonance of one's own voice), hypersensitivity to bone-conducted sounds, and an apparent conductive hearing loss revealed on audiometry. SCDS is being identified more frequently in the work up of the vertiginous patient, is diagnosed by temporal bone CT imaging, and definitive treatment is surgical resurfacing or plugging of the superior semicircular canal.

Table 1: Summary of Clinical Features of Common Peripheral Causes of Vertigo[15]

Causes	Time Course	Suggestive clinical setting	Characteristics of nystagmus	Associated neurologic symptoms	Auditory symptoms	Other diagnostic features
Benign Paroxysmal Positional Vertigo	Recurrent, brief (seconds)	Predictable head movements or positions precipitate symptoms	Peripheral characteristics	None	None	Dix-Hallpike maneuver shows characteristic findings
Vestibular Neuritis	Single episode, acute onset, last days to weeks	Viral syndrome may accompany or precede vertigo	Peripheral characteristics	Falls toward side of lesion, No brainstem symptoms	Usually none	Abnormal head thrust test
Ménière's disease	Recurrent episodes, last several hours to days	Spontaneous onset	Peripheral characteristics	None	Episodes preceded by ear fullness/pain, accompanied by unilateral hearing loss, tinnitus	Audiometry shows unilateral low frequency hearing loss
Migrainous vertigo	Recurrent episodes, last several minutes to hours	History of migraine	Central or peripheral characteristics	Migraine headache accompanying or following vertigo, positive visual phenomena	Usually none	All tests are normal
Superior Semicir-cular Dehiscense Syndrome	Episodic	Noise or pressure induced vertigo	Peripheral characteristic	None	Noise induced vertigo, autophany	CT, Reduced VEMPs, low freq cond hearing loss with retained stapedial reflex,

II. Aeromedical Concerns.

The aeromedical issues associated with vertigo revolve around the risk of incapacitation and the risk of recurrence of symptoms in flight following an initial event. The threat posed by ongoing vertigo in the flying environment is self-evident. Spatial disorientation, perhaps including vertiginous symptoms, is postulated to be responsible for 10-20% of fatal aircraft mishaps.[17] Since all vertigo is potentially incapacitating (albeit to varying degrees), whether a syndrome is likely to recur or not following apparent resolution of symptoms is the key to whether a flying waiver may be considered.

Vertigo of any cause may be incapacitating, although the vertigo associated with BPPV may rapidly extinguish if provocative maneuvers can be avoided. All forms of vertigo may be aggravated by head movement, but classic posterior canal BPPV is most commonly provoked by rolling over in bed, bending forward, and extending the neck to look up. Horizontal canal BPPV is provoked by lateral head turns when supine and sometimes when sitting. The "check-six" maneuver in aviation may be a particularly problematic provocative maneuver for a flyer with BPPV. Other forms of vertigo are likely to be more incapacitating in flight.

Vestibular neuronitis is likely to be more incapacitating than BPPV in the short term, but once resolved, should not pose a significant risk of recurrence. Symptoms will usually be severe for several days, and then resolve gradually over a few weeks. Vestibular function may not completely normalize following a case of vestibular neuronitis, but this may be of little clinical significance in the asymptomatic patient, if central vestibular compensation has occurred.

The course of Ménière's disease may be highly unpredictable, with a risk of relentless progression in at least 10% of cases and of recurrence in the other ear in another 30%. Symptoms are usually much more prolonged than with BPPV, typically lasting for hours. Individuals with Ménière's may experience acute attacks of vertigo, nausea, and sometimes vomiting lasting from minutes to hours during which they are unable to perform normal activities, including flight duties. Hearing loss can fluctuate (and will usually worsen over time), interfering with communications.

Migraine associated vertigo may be diagnosed during the dizzy work up, but aeromedical considerations are discussed elsewhere under Headaches.

Superior Canal Dehiscense Syndrome is potentially disabling in flight due to pressure or noise induced symptoms of dizziness, as well as the autophony that can effect communication. This is a less common form of vertigo, but is seen in a significant cohort of patients referred for work up of Meniere's disease. Symptoms range from mildly irritating and inconvenient to the patient to disabling in certain circumstances possibly induced in flight. Surgical treatment can resolve symptoms with resumption of flight duties.

III. Waiver Consideration.

Vertigo of any etiology is disqualifying for all classes of flying, RPA duties, ATC/GBC duties, and for SMOD personnel.

Vestibular neuronitis is the only major form of peripheral vertigo to have a minimal risk of recurrence, and is the only form of peripheral vertigo for which FC I and unrestricted FC II waivers

may be recommended. To be considered for waiver, all symptoms must have resolved, however, with sufficiently normal remaining vestibular function as to cause no clinical disability.

The likelihood of recurrence of BPPV (15-18% in the first year) is much greater than the maximum recurrence risk of 1% per year for potentially incapacitating conditions. The symptoms of BPPV pose a definite risk of incapacitation which may jeopardize flying safety, although the brief duration of symptoms (less than 20-30 seconds) and the fact that symptoms are provoked by only very specific head maneuvers may permit recovery from an in-flight occurrence and safe return if such provocative maneuvers can be avoided. BPPV may therefore pose more risk to mission completion than to flying safety, unless symptoms occur during particularly critical phases of flight. Therefore, waivers are usually only recommended for multi-crew aircraft. It may be appropriate to permit an unrestricted FC II waiver if there has been no recurrence of BPPV symptoms after several years of observation, although the literature suggests a cumulative recurrence rate of 50% for up to five years.

Because of the unpredictable and recurrent nature of symptoms associated with Ménière's disease and the treatment thereof, the potential for sudden incapacitation, and the lack of reliable treatment options, flying waiver (all classes) would be recommended only under exceptional circumstances. Recommended aeromedical dispositions for Ménière's disease, vestibular neuronitis and BPPV, are summarized in Table 2.

Table 2: Waiver potential for peripheral vertiginous disorders

Flying Class (FC)	**Condition**	**Waiver Potential Waiver Authority**
I/IA	Vestibular neuronitis	Yes[1] AETC
	BPPV, Ménière's, SCDS	No AETC
II	Vestibular neuronitis	Yes[1] MAJCOM
	BPPV SCDS	Yes[2] AFMSA
	Ménière's	No MAJCOM
III IIU ATC/GBC	Vestibular neuronitis, BPPV SCDS Ménière's	Yes[1] MAJCOM[3] No MAJCOM
SMOD	Vestibular neuronitis, BPPV SCDS Ménière's	Yes[1] AFSPC or GSC No AFSPC or GSC

[1] Waiver for vestibular neuronitis will be considered only if complete resolution of symptoms has occurred.
[2] Waivers (FC IIC) will generally be considered only for multi-crew aircraft if symptoms are well-controlled with low risk for recurrence.
[3] Waiver authority for FC IIU is AFMSA

AIMWITS search in Oct 2010 revealed a total of 123 individuals with a diagnosis of a vertiginous disorder. Breakout of the cases revealed 4 FC I/IA cases (1 disqualification); 66 FC II cases (18 disqualifications); 36 FC III cases (16 disqualifications); 4 FC IIU cases (2 disqualifications); 11 ATC/GBC cases (6 disqualifications); and 2 SMOD cases (1 disqualification). Of the 46 cases resulting in a disposition of disqualify, all but one were directly related to the vertiginous symptoms; the lone exception was for significant coronary artery disease.

IV. Information Required for Waiver Submission.

Aeromedical summary should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations.

The aeromedical summary for the initial waiver for peripheral vertiginous disorders should include the following:
A. Careful history describing: frequency, duration, severity and character of vertiginous attacks; type of maneuvers that provoke symptoms; presence or absence of associated symptoms such as hearing loss, aural fullness, tinnitus, headaches, or focal neurologic symptoms.
B. Past history of syphilis, mumps or other serious infections, inflammation of the eye, autoimmune disorder or allergy, and ear surgery.
C. Physical examination: thorough ENT and neurological evaluation including nystagmus and balance. Document results of Dix-Hallpike testing.
D. Laboratory testing: CBC, ESR, TFTs, lipids, glucose and syphilis serology.
E. Audiogram results including speech discrimination, tympanometry, and acoustic reflexes.
F. MRI of the Brain and Internal Auditory Canal (IAC) to rule out retrocochlear pathology such as cerebello-pontine angle (CPA) tumors, multiple slcerosis, anatomical variants etc.
G. Electronystagmography (ENG, VNG and calorics), vestibular evoked myogenic potentials (VEMP), computerized dynamic posturography (CDP), and rotary chair testing.
H. Otolaryngology consult which may include recommendation for further auditory system testing to include electrocochleography (ECOG) and/or auditory brainstem response testing (ABR).

The aeromedical summary for waiver renewal for peripheral vertiginous disorders should include the following:
A. Interval history since the last waiver submission with details of any vertiginous symptoms (to include pertinent negatives) and any treatment given with results.
B. All lab and test results since last waiver.
C. Otolaryngologist consult report if indicated.

ICD 9 codes for peripheral vertiginous disorders	
386.0	Ménière's Disease
386.10	Peripheral vertigo, unspecified
386.11	Benign paroxysmal positional vertigo
386.12	Vestibular neuronitis
386.19	Other peripheral vertigo
386.30	Labyrinthitis
386.43*	Superior Semicircular Canal Dehiscense

*semicircular canal fistula

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WAIVER GUIDE
Updated: Apr 2010
Supersedes Waiver Guide of Feb 2007
By: LtCol Joann Richardson (RAM 09B) and Dr Dan Van Syoc
Reviewed by Dr William Kruyer, ACS chief cardiologist

CONDITION:
Wolff-Parkinson-White (WPW) and Other Pre-Excitation Syndromes (Apr 10)

I. Overview.

Pre-excitation syndromes result from an accessory pathway of conduction from atria to ventricles. A portion of the electrical impulse "bypasses" the AV node (hence the term bypass tract) and depolarizes (excites) the ventricles prematurely (pre-excitation). In Wolff-Parkinson-White (WPW), the most common pre-excitation syndrome, the aberrant pathway links an atrium and ventricle. In Lown-Ganong-Levine (LGL) it links the atrium with the bundle of His. WPW is the only pre-excitation condition truly diagnosable by 12-lead electrocardiogram (ECG). Others may be suspected by ECG but are typically diagnosed only during an electrophysiologic study performed for documented/suspected tachyarrhythmia. Radiofrequency ablation is potentially curative for supraventricular tachycardia (SVT) associated with an accessory pathway. Please refer to the SVT and Ablation waiver guides for further guidance. This waiver guide addresses only the WPW ECG pattern.

WPW ECG pattern is the classic ECG findings of short PR interval and delta wave (slurred, widened QRS onset), but without documented or suspected SVT. The ECG findings are often only intermittently present. WPW syndrome is the ECG findings plus suspected or documented SVT. Approximately 30% of all SVTs involve an accessory pathway. In such cases, the SVT mechanism is a macro reentrant circuit involving the normal AV node pathway and the accessory pathway. In 80-85% of WPW syndromes, the impulse travels atria-to-ventricles down the AV node and ventricles-to-atria up the accessory pathway, resulting in a normal QRS pattern SVT. In the other cases the impulse travels in the opposite direction, resulting in a wide-QRS complex SVT (100% pre-excited), which may be mistaken for ventricular tachycardia.

According to the general cardiac literature, the WPW ECG pattern occurs in 1-3 per 1,000 population with an estimated 30-35% developing SVT over the next 10 years after initial diagnosis by ECG. Sudden death occurs in 1-6% over 10 years with an average of 0.1% - 0.15% per year occurring among all WPW patients. Atrial fibrillation with rapid ventricular response and subsequent deterioration to ventricular fibrillation is considered the likely cause of sudden death. Some studies report atrial fibrillation occurring in up to 40% of WPW subjects. However, such studies include data from tertiary care experiences and likely represent referral bias. Although it is not possible to identify which patients will develop SVT, atrial fibrillation, or sudden death, patients with WPW syndrome and continuous pre-excitation may be at higher risk.

Investigation of military aviators with WPW reveals much lower event rates than the general population. Among 228 military aviators followed for a mean of 21.8 years, initial presentations include 41 (18%) patients with WPW syndrome and 187 (82%) patients with WPW ECG pattern only. Overall, 20% of patients had SVT (first or recurrent episode) during follow-up. Of the 187 patients with WPW ECG pattern only, 28 (15%) patients developed SVT while the remaining 159

(85%) remained asymptomatic with WPW ECG pattern only. Of the 28 patients with SVT, 14 patients reported only one episode of SVT while the remaining 14 had recurrent episodes of SVT (5 with $\leq$ 2 episodes per year and 9 with > 2 episodes per year). Nineteen patients reported associated hemodynamic symptoms. Pre-excitation patterns among the 187 patients with WPW ECG only revealed 65 patients with continuous pre-excitation ECG pattern while 94 patients exhibited an intermittent pre-excitation pattern. Although no statistical significance was appreciated between patients with WPW ECG pattern only and continuous or intermittent pre-excitation in regards to the occurrence of a first episode of SVT, a higher rate of SVT was found in patients with continuous WPW ECG pattern (23%) as opposed to patients with an intermittent pre-excitation pattern (8.7%). The overall event rate for SVT was found to be 1.0% per patient-year. Of the 41 patients who presented with WPW syndrome, the event rate for additional SVT was only 2.0% per patient-year. For the remaining 187 patients with WPW ECG pattern only, first time SVT event rate was only 0.7% per patient year. The incidence of sudden cardiac death was consistent with other natural history studies and was found to be 0.02% per patient year. Generally, patients with intermittent pre-excitation are thought to have an accessory pathway with conduction characteristics that provide a lower risk for sudden cardiac death during atrial fibrillation. However, this study was underpowered to address this risk among military aviators with intermittent pre-excitation.

II. Aeromedical Concerns.

Aeromedical concerns involve risk of recurrent sustained SVT and symptoms that may incapacitate the aviator or otherwise adversely affect flying performance. Sudden cardiac death is the most compelling concern but is rare (0.02% per patient year). The more likely event is SVT with possible hemodynamic symptoms. The event rate for SVT in studied military aviators was 1% per patient year. For those aviators who presented with WPW ECG pattern only, the first episode SVT event rate was 0.7% per patient-year. Aviators who initially presented with WPW syndrome had an additional SVT rate of only 2.0% per year.

III. Waiver Consideration.

WPW pattern is disqualifying for all classes of flying duties in the US Air Force.

Table 1: Waiver potential for Wolff-Parkinson-White and other pre-excitation syndromes

Flying Class (FC)	**Waiver Potential** **Waiver Authority**	**ACS Evaluation/Review**
I/IA	Yes* AETC	At the request of AETC
II	Yes* MAJCOM	Yes
IIU	Yes* AFMSA	Yes
III	Yes* MAJCOM	Yes

*Initial flying training candidates with WPW will only be considered for a waiver if successfully ablated and with no symptoms.

Review of AIMWITs in March 2010 identified 108 waivers submitted for WPW conduction disorder or WPW anomalous atrioventricular excitation. Of the total, 8 were FC I/IA cases, 54 were FC II, 1 was FC IIU, and 45 were FC III; 50 were ablated and not evaluated further, 44 aviators were waived with WPW ECG pattern only, and 14 were disqualified. Of the 14 disqualified cases, 3 were FC I – one due to the fact the candidate had not been ablated, another for keratoconus, and the last one was for a history of an eating disorder. There were 2 FC II aviators disqualified – one was an initial FC II candidate disqualified for LASIK and the other was symptomatic and refused ablation therapy. The remaining 9 disqualifications were FC III – one was an initial FC III candidate disqualified due to the fact there was no ablation; the others were disqualified for other various medical problems.

IV. Information Required for Waiver Submission.

Aeromedical disposition and waiver request should only be submitted after clinical disposition has been completed and all appropriate treatments have been initiated using best current clinical guidelines/recommendations. ACS review is required for waiver recommendation.

The aeromedical summary for initial waiver for WPW and other pre-excitation syndromes should contain the following information:
A. Complete history and physical exam – to include description of symptoms before and after the acute episode, blood pressure, medications, and activity level.
B. Cardiology consultation report to include all ECGs.
C. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

The aeromedical summary for waiver renewal should contain the following information:
A. History – brief summary of previous symptoms and treatment, any interval symptoms, medications, and activity level.
B. Physical – blood pressure and cardiac, and ECG.
C. Copies of reports and tracings/images of any other cardiac tests performed locally for clinical assessment (e.g. treadmill, Holter monitor, cardiac cath, cardiac CT or MRI). If reports not attached in AIMWTS, send to the ACS. (Notes 1 and 2)

Note 1: Call the ACS to get the current mailing address for the ACS
Attn: Case Manger for (patient's MAJCOM)

For expediting case, recommend sending via FedEx. Include patient's name, SSN and POC at base.

Note 2: State in AMS when studies were sent to ACS.

ICD 9 codes for WPW	
426	Conduction Disorders
426.7	Anomalous atrioventricular excitation

V. References.

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