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."

Last Update: 7 May 2007

Acne (Acne Vulgaris) 5
Acoustic Neuroma 9
Adjustment Disorders 12
Alcohol Abuse and Dependence 14
Anemia/Blood Loss/Bone Marrow Donation 18
Ankylosing Spondylitis 20
Antimalarials 22
Anxiety Disorders 27
Aortic Insufficiency/Regurgitation 29
Aortic Valve Stenosis 33
Asthma 36
Atrial Fibrillation/Flutter 44
Atrial Septal Defect (ASD) 47
Atrioventricular Conduction Disturbance 49
Back Pain 51
Benign Prostatic Hypertrophy 54
Bicuspid Aortic Valve 60
Bladder Cancer 63
Breast Cancer 65
Breast Implants 67
Carcinoid Tumors 70
Cataract, Capsular Opacification, and Intraocular Lens Implant 74
Central Retinal Artery/Vein Occlusion 83
Cervical Cancer 85
Cholesteatoma 87
Chronic Obstructive Pulmonary Disease 88
Color Vision Deficiencies 90
Colorectal Cancer 93
Coronary Artery Disease 95
Coronary Artery Revascularization 100
Cranial Neuralgia 103
Crohn's Disease 105
Deep Venous Thrombosis/Pulmonary Embolism 109
Diabetes Mellitus 115
Diverticular Disease of the Intestine 119
Dysmenorrhea 121
Eating Disorders 123
Ectopy and Pairing, Superventricular and Ventricular (PACs, PJCs, PVCs) 125
Eczematous Dermatitis (Eczema) [Atopic & Contact Dermatitis, Nummular, Dyshidrosis] 130
Endometriosis 136
Endometritis 139
Excessive Height 140
Gastroesophageal Reflux Disease 142
Gastrointestinal Polyps 146
Gastrointestinal Tumors, Other 148
Guillain-Barré Syndrome (Acute Inflammatory Demyelinating Polyradiculoneuropathy) 150
Head Injury 154

Headache 158
Hematuria 163
Hepatic Cirrhosis 165
Hepatitis 167
Herniated Nucleus Pulposus (HNP) and Spinal Fusion 170
Hodgkin's Disease 177
Human Immunodeficiency Virus (HIV) Infection 179
Hypertension 184
Hyperthyroidism 190
Hypothyroidism 195
Impulse-Control Disorders 199
Irritable Bowel Syndrome 202
Joint Replacement 204
Keratoconus 206
Kidney Tumors 209
Laryngeal Cancer 211
Lattice Degeneration 213
Learning Disabilities/Attention-Deficit Hyperactivity Disorder (ADHD) 216
Left Bundle Branch Block 219
Leukemia 221
Liver Function Testing (Transaminases) 223
Lung Cancer 227
Lyme Disease 229
Malignant Melanoma 231
Medullary Sponge Kidney 235
Meningitis 238
Mitral Regurgitation 240
Mitral Stenosis 242
Mitral Valve Prolapse 244
Mood Disorders (Mania and Depression) 247
Multiple Sclerosis 249
Neurological Tumors 251
Non-Hodgkin's Lymphoma (NHL) 252
Ocular Histoplasmosis (Presumed Ocular Histoplamosis Syndrome) 254
Ocular Hypertension, Glaucoma and Enlarged Optic Nerve Cupping 256
Primary Idiopathic Optic Neuritis (PION) 260
Oral Cancers 262
Osteoporosis/Osteopenia 264
Otosclerosis/Stapedectomy/Stapedotomy 272
Ovarian Cancer 275
Overweight Aircrew Members 277
Pancreatitis 279
Pelvic Inflammatory Disease 282
Peptic Ulcer Disease 284
Personality Disorders 286
Pituitary Tumors 289
Plasma Cell Dyscrasias 291
Pneumothorax 293

Pregnancy....296
Prostate Cancer....298
Prostatitis....300
Psoriasis and Psoriatic Arthritis....302
Psychological Factors Affecting Medical Conditions....307
Psychotic Disorders....310
Radiofrequency Ablation (RFA) of Tachyarrhythmias....312
Raynaud's Phenomenon....317
Refractive Errors (Myopia, Hyperopia and Astigmatism) and Anisometropia....319
Reiter's Syndrome....327
Renal and Ureteral Stones (Nephrolithiasis)....329
Retained Hardware....337
Retinal Breaks (Holes and Tears), Retinal Detachment and Retinoschisis....339
Right Bundle Branch Block and Fascicular Blocks....344
Salivary Gland Disorders....347
Sarcoidosis....349
Seizures/Epilepsy/Abnormal EEG....352
Sexual Dysfunctions, Paraphilias, Gender Identity Disorders....355
Sexual Dysfunctions due to a General Medical Condition....355
Short Stature....358
Sickle Cell Disease/Trait....360
Sleep Disorders....364
Somatoform and Factitious Disorders....368
Spinal Curvature, Abnormal....370
Spinal Fracture....372
Splenectomy....374
Subarachnoid Hemorrhage, Non-Traumatic....378
Suicide Attempt....381
Supraventricular Tachycardia....384
Syncope....386
Testicular Tumors, Nonseminomatous (NSGCT)....391
Testosterone Replacement for Hypogonadism....393
Thallassemia....399
Thrombocytopenia, ITP, and TTP....401
Thyroid Cancer....408
Transient Ischemic Attack (TIA)....411
Ulcerative Colitis....415
Uterine Cancer....419
Uterine Fibroids....421
Uveitis....423
"V" Code Diagnoses....425
Valve Surgery - Replacement or Repair....428
Valvular Disorders, Other....432
Ventricular Tachycardia....434
Vertiginous Disorders, Peripheral (Ménière's disease, benign paroxysmal positional vertigo, vestibular neuronitis [labyrinthitis])....436
Wolff-Parkinson-White (WPW) and Other Pre-Excitation Syndromes....445

WAIVER GUIDE
Updated: Mar 07
By: Dr Karen Fox

CONDITION:
Acne (Acne Vulgaris)

I. Overview.

Acne is a disease of the pilosebaceous unit which typically appears at puberty and becomes less active as adolescence is ending. 85% of adolescents are affected by this disease.[2, 6] It can persist into middle age in 12% of women and 3% of men. It appears to be influenced by stress. The role of diet in acne is controversial. Cosmetics may contribute to the development of acne; water-based products are less comedogenic. Soaps, detergents and astringents remove sebum from skin surface but do not alter sebum production. Repetitive mechanical trauma caused by scrubbing with these agents may promote the development of inflammatory lesions.[6]

There are four recognized pathogenic factors: hyperkeratinization (plugging) of the pilosebaceous follicles, increased testosterone levels which induces hyperseborrhea, colonization with the bacterium *Propionibacterium acnes*, and inflammation.

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. There are numerous classification systems for acne but generally they describe the following categories:

<u>Mild</u> – Mainly comedones with occasional small inflamed papule or pustule; no scarring.
<u>Moderate</u> – Comedones and more numerous papules and pustules (mainly facial); mild scarring.
<u>Moderately Severe</u> – Numerous comedones, papules and pustules, spreading to the back, chest and shoulders with an occasional cyst or nodule; moderate scarring.
<u>Severe</u> - Numerous large cysts on the face, neck and upper trunk; severe scarring.

Treatment modalities for acne include cleansing, topical agents, systemic therapy, hormonal therapy, acne surgery, and intralesional glucocorticoids. Adverse effects of some topical agents include development of an irritant reaction. Systemic agents such as erythromycin, tetracycline, or doxycycline 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, 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.

Generally noninflammatory lesions are treated by extraction or gentle expression and topical therapies, such as topical retinoid, benzoyl peroxide, or salicylic acid. Mild inflammatory is usually treated with a gradation of topical retinoid, benzoyl peroxide, azelaic acid or salicylic acid. Moderate inflammatory is usually treated with a gradation of topical retinoid, benzoyl peroxide, topical antibiotic or combination.

Moderately severe acne usually adds to the previous regime oral antibiotics. Oral antibiotics are also used when acne is on back, chest and shoulders or when inflammatory acne is not controlled/tolerated with topical combinations. Severe/nodulocystic (cysts/tracts/abscesses) acne requires aggressive treatment usually best evaluated and treated by a dermatologist. Typical treatment options in severe acne include isotretinonin (Accutane®), oral corticosteroids, intralesional steroid injection and oral antibiotics. 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.

Tropical acne may occur, typically after several months' exposure to a hot, humid environment and can be a major cause of disability. Patients often feel quite ill with tropical acne, antibiotic therapy is not effective, and removal from the environment is often necessary as the only effective treatment.

III. Information Required for Waiver Submission.

Waiver is required if acne is controlled on oral antibiotics, oral contraceptives or if the acne interferes with the wearing of flying equipment. Waiver is not required if acne is controlled on only topical antibiotics, benzoyl peroxide, topical salicylic acid, azelaic acid and/or topical retinoids (tretinoin, adapalene, tazarotene). Waiver will not be granted if acne is controlled on isotretinonin (Accutane®) or minocycline.

The aeromedical summary should include the following:

A. Extent of lesions, locations, and a description of current therapy - all medications including dosage, and frequency, and side effects.
B. Comments addressing interference with use of aviation equipment.
C. Dermatology consult if individual has recalcitrant moderate to severe inflammatory or severe/nodulocystic acne.

IV. Waiver Considerations.

The table below is a summary of the waiver requirements based upon flying class and treatment of acne.

FLYING CLASS	TREATMENT OF ACNE	POTENTIAL WAIVER WAIVER AUTHORITY	TREATMENT WAITING PERIOD AND SPECIAL REGULATIONS
FC I, IA	Topical treatment – topical retinoids (tretinoin, adapalene, tazarotene), benzoyl peroxide, salicylic acid, azelaic acid, topical antibiotics (clindamycin, erythromycin, sulfacetamide-sulfur)	N/A	No documented adverse effects from medication and no difficulty with wearing of aviation equipment
	Oral contraceptive (female only)	Yes AETC	7-day ground trial No documented adverse effects from medication and no difficulty with wearing of aviation equipment
	Oral antibiotics - tetracycline, erythromycin, doxycycline, and trimethoprim-sulfamethoxazole.*	Yes AETC	No documented adverse effects from medication and no difficulty with wearing of aviation equipment
FC II FC III	As above	Yes MAJCOM	As above
FC IIC	Usually related to scarring from severe/nodulocystic acne	Yes AFMOA	Usually granted so aviator does not have to wear helmet/mask on routine basis

*Minocycline is not approved for flying duties.

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, doxycycline, and trimethoprim-sulfamethoxazole require a waiver. 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. 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.

Review of AIMWTS from October 2003 through October 2006 showed 64 cases of acne. All received waivers except one and that was due to another medical condition; the vast majority being for the use of doxycycline.

Reviewed by Maj Sylvia Parra, Dermatologist at Wilford Hall Medical Center.

V. References.

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WAIVER GUIDE
Upated: Mar 00
By: Dr Lisa Black

CONDITION:
Acoustic Neuroma

I. Overview.

Acoustic neuroma (AN) is a histologically benign lesion felt to be the result of over-proliferation of Schwann cells, covering the vestibular branch of the eighth cranial nerve as it passes through the internal auditory canal. Two distinct clinical presentations exist for ANs, unilateral sporadic, and bilateral hereditary tumors found in individuals with neurofibromatosis type 2, an autosomal dominant disorder with a high degree of penetrance. The more common type of AN, unilateral sporadic, accounts for more than 95% of ANs and usually later in life. Annual incidence of AN is one case in 100,000 persons with a female to male ratio of 1.5:1. A recent study of 164 patients undergoing surgery for AN found no clear relationship between tumor size, signs and symptoms, and level of hearing loss. This variation in growth rate makes it difficult for clinicians to predict how long a tumor has been growing or how fast it will grow in the future. The axial cross-sectional diameter of an AN usually falls into one of three growth patterns: slow (0.02cm/year), medium (0.2cm/year), or fast (1.0 cm/year). The majority of individuals will have either a slow or medium growth rate; however, the fast growth rate may be underrepresented because many patients become symptomatic and require surgery. The AN typically compresses the cochlear (acoustic) branch, causing hearing loss, tinnitus and dysequilibrium. Further growth of the lesion results in expansion into the cerebellopontine angle, where the trigeminal and facial nerves may be affected. Inferior extension leads to compression of the glossopharyngeal, vagus, and spinal accessory nerves. Larger tumors may encroach upon the brain stem and cerebellum, resulting in signs of increased intracranial pressure. While asymmetric sensorineural hearing loss is the classic presentation of AN, about 15% have normal audiograms, while up to a third of patients initially present with symptoms of unilateral tinnitus, imbalance, headache, fullness in the ear, otalgia, or facial nerve weakness.

The traditional treatment for AN is surgical removal via a middle fossa, translabyrinthine or suboccipital approach. Middle fossa surgery is best reserved for small tumors that are limited to the internal auditory canal, while a suboccipital approach allows removal of larger tumors with less risk to the facial nerve. The translabyrinthine approach necessitates sacrifice of hearing on the operated side. The ACS now has experience with an aviator that elected to undergo Fractionated Stereotactic Radiosurgery (FSR), a promising non-invasive treatment modality. His vestibular system was well compensated. Hearing was adequate for all flying duties except those that would require stereo acusis in future cockpits.

Our outlook on this landmark case is very positive and supported by the literature that reports that the vast majority of patients treated non-invasively maintain hearing, avoid facial trigeminal neuropathy and remain in remission years after treatment. Johns Hopkins experience of treatment of over 85 patients over the span of 6 ½ years, have had no failures.

AN growth has been divided into three stages: intracanalicular, cisternal, and brain stem compressive. The intracanalicular stage is typified by hearing loss, tinnitus, and vertigo. In the

cisternal stage, auditory symptoms are worsened, vertigo transitions to dysequilibrium, and headaches can occur secondary to local dural irritation. Midfacial and corneal hypesthesia is also noted during the later phases of this stage. In the brain compressive stage, all previous symptoms worsen; facial twitch and weakness can occur, and hydrocephalus develops with resultant headache, visual loss, and diplopia. In the typical case, the symptoms of AN evolve gradually over months or years. However, studies over the past thirty years report a 3-15% incidence of sudden hearing loss in patients with AN. Tinnitus in AN is most commonly high pitched, continuous, localized toward the lesion side, and not particularly bothersome to the patient. Vertigo in the patient with AN is frequently abrupt in onset, and usually occurs early in the clinical course. Vertigo is exacerbated by head movement and other forms of exertion. Dysequilibrium replaces vertigo late in the course of tumor growth, and is steady and unremitting. Cerebellar symptoms are manifested as uncoordination, ataxia, and dysequilibrium. Headaches occur in a minority of patients, and present with great variability in location, duration, and intensity. Headache pain can be found in any region of the head, although there is a predilection for the frontal and occipital regions of the involved side. In a recent UCSF study, 20% of patients with tumors from 1-3 cm, and 43% of patients with tumors larger than 3 cm in size, had headache during their illness. No patients with tumors smaller than 1 cm experienced headaches during their clinical course.

II. Aeromedical Concerns.

Cochlear and vestibular symptoms are of obvious importance in the aviator. Hearing loss and tinnitus impact communications, while vertigo and dysequilibrium may affect control of the aircraft. Because of the wide range of progressive and sometimes abrupt symptomatology, conservative (nonsurgical or wait and see) therapy is not consistent with safe performance of cockpit duties.

III. Information Required for Waiver Submission.

Initial evaluation of AN should include a thorough history and physical examination, with special emphasis on the head and neck and neurological exams. The head and neck exam is usually normal, but unrelated pathology that may interfere with the workup should be corrected. Cranial nerves V and VII are evaluated to document corneal reflexes, facial sensation, and motor function of the face. Cerebellar testing, to include Romberg, tandem-Romberg, and finger-to-nose, should also be performed. Audiometric assessment should include air, bone, speech reception threshold, speech discrimination, and acoustic reflex testing. High frequency hearing loss is almost universal in cranial nerve VIII lesions, and when found with an abnormal drop in discrimination scores, is highly suggestive of a significant lesion. Findings consistent with acoustic neuromas (1) poor discrimination in relation to the hearing loss, or a score below 65%, (2) reflex decay or absent reflexes; and (3) severe unexplained hearing loss. The most reliable audiologic tool in the diagnosis of AN is the auditory brain stem response (ABR). Measured characteristics are wave amplitude, latency, and interval difference between ears. An AN is suspected if the I-V latency is prolonged, if the wave V amplitude is reduced, or if the wave V latency is prolonged. ABR has a sensitivity of 93-98% and a specificity of 90% in diagnosing ANs. Roentgenographic evaluation normally provides the definitive diagnosis of AN. Gadolinium-enhanced MRI has become the gold-standard, replacing the high resolution CT.

IV. Waiver Considerations.

Waiver requests may be submitted six months after successful treatment of the AN provided any post-treatment sequelae are within acceptable 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. Psychomotor testing must meet aircrew standards. Neurosurgical and ENT consultations are required for waiver consideration. AFIP confirmation of tumor pathology is requested in surgical cases and MRI with follow-ups are needed in cases treated non-invasively, since acoustic neuromas have charicteristic findings on MRI. USAF experience is increasing, with several aircrew having been evaluated at the Aeromedical Consultation Service for AN since 1978. Waivers have been granted in only 50%. All those disqualified had residual neurological deficits. Of note, the usual time from initial substandard hearing waiver to AN diagnosis was between 4-6 years.

We have recently reviewed a case treated with Fractionated Sterotactic Radiosurgery that was well compensated evidenced with normal posturography, ENG, VOR / Optokinetic, and Eye tracking. Some hearing was maintained on the involved side as well.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Adjustment Disorders

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. The severity of the disorder is indicated by distress that is in excess of that expected from a given stressor or by significant social or occupational impairment. By definition, an 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 the consequences thereof. Stressors may be single, multiple, recurrent, or chronic. Adjustment disorders may be either acute or chronic. Chronic adjustment disorders are characterized by persistence of symptoms for six months or longer in response to an enduring stressor or its consequences.

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. If the symptoms represent bereavement, the diagnosis of adjustment disorder should not be used. Adjustment disorders are characterized according to the predominant symptoms. Recognized subtypes are: with depressed mood, with anxiety, with mixed anxiety and depressed mood, with disturbance of conduct, with mixed disturbance of emotions and conduct, and unspecified.

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, insomnia, fatigue, temporary changes in social relationships and problems with decision making. These impairments are all incompatible with aviation duties.

Note: If the adjustment disorder appears mild and improves in the first few weeks the flight surgeon may choose to manage the case with consultation from mental health. However, if the disorder is more severe and/or fails to improve in 1-2 weeks consider referring the case to mental health. Early mental health treatment can lead to early symptom resolution and possible return to flying status without the need for a waiver.

III. Information Required for Waiver Submission.

If the DSM-IV 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.

The waiver package should include: copies of mental health evaluation and treatment summary, an aeromedical summary outlining any social, occupational, administrative or legal problems associated with the case, and letters from the aviator's supervisor and treating psychiatrist or psychologist supporting a return to flying status.

IV. Waiver Considerations.

The ACS has accumulated considerable experience in the evaluation and recommendations for adjustment disorders in pilots and navigators. Based on a 15 year (1981-1996) review of the USAF Waiver file and ACS Cover Sheet File, 60 FC II aviators were diagnosed with adjustment disorders of greater than 60 days duration; 41 (67%) were waived to return to fly.

V. References.

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WAIVER GUIDE
Updated: Aug 06
By ACS Neuropsychiatry Staff

CONDITION:
Alcohol Abuse and Dependence

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. The current DSM gives 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, vague GI problems, and frequent minor injuries. Laboratory abnormalities such as elevations of MCV, GGT, SGOT, SGPT, uric acid, triglycerides, or carbohydrate deficient transferring (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, McAndrew) are available for use by the flight surgeon or through the Life Skills Support Center. None of these make 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 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.

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 then in the office; performance in the cockpit may be the last area to be noticed. One of the 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. Information Required for Waiver Submission.

An initial waiver request will be considered no sooner than 90 days after the member has "demonstrated recovery" (defined below) as determined and documented by the medical treatment facility (MTF) ADAPT Program treatment team. Note that AFI 44-121, Chapter 3.13.2 states that if the patient is on flight status, a flight surgeon will be included in the treatment team meetings. The 90-day waiting period begins once all treatment including medication and initial rehabilitation program has been completed and includes successful participation in the post-treatment aftercare program.

Demonstrated recovery is defined as:

1. Successfully completed American Society of Addiction Medicine (ASAM) indicated treatment.
2. Maintained a positive attitude and unqualified acknowledgement of his/her alcohol disorder.
3. Remained abstinent without the need for medication.

The member must document participation in an organized alcohol recovery program (Alcoholics Anonymous (AA), Rational Recovery (RR), Secular Organizations for Sobriety (SOS), or other program approved by the USAF Substance Abuse Prevention & Treatment Program Manager) and meet with the designated professionals at the intervals specified in Table 1 below.

Table 1. 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 Recovery Program	3x weekly	1x weekly	Recommended not required

The flight surgeon and ADAPT representative are responsible for collecting and maintaining the appropriate documentation. The flight surgeon has primary responsibility for collecting and submitting the required documentation for waiver submission. The ADAPT representative collects and maintains alcohol recovery program attendance documentation and should provide the flight surgeon with a summary of aftercare meetings and organized alcohol recovery program attendance.

Temporary modification of aftercare requirements resulting from operational demands must be documented by the flight surgeon.

Flight surgeon aftercare appointments must be documented and include appropriate physical examination, laboratory values, and other pertinent comments. Laboratory tests such as the BAT, CBC with MCV, GGT, SGOT, SGPT, triglycerides, and carbohydrate deficient transferring (CDT) may be considered by the flight surgeon as indicated. Pertinent comments should address significant areas of the patient's life, such as 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.

Waiver packages for FC II and FC III should include:
1. Aeromedical summary containing a physical and laboratory values such as BAT, CBC with MCV, GGT, SGOT, SGPT, triglycerides, and CDT. 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.
2. Copy of alcoholism treatment program summary (first time only).
3. ADAPT statements documenting aftercare and AA or other approved alcohol recovery program attendance.
4. Copy of annual psychiatrist/psychologist examination while in aftercare.
5. Letter of recommendation from individual's commanding officer.
6. 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.

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

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 member should be re-evaluated by the flight surgeon and ADAPT, with input from the Alcohol Treatment Facility, if attended, to determine potential for re-treatment. If re-treatment is appropriate, follow the initial waiver and aftercare processes. A waiver request may be considered after the member has demonstrated recovery again as determined and documented by the MTF ADAPT Program treatment team, but, no sooner than 12 months from the last date of documented non-compliance with the aftercare program. Demonstrated previous non-compliance indicates the need for further observation in the post-treatment aftercare program prior to waiver request. Second waiver requests are considered on a case by case basis only and waiver authority for these individuals is AFMOA/SGPA.

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.

IV. Waiver Considerations.

The majority of waiver recommendations for alcohol related diagnoses in aviators is managed through base and command level interaction; ACS evaluation is seldom required. Review of AIMWTS for the past three years showed 34 waiver submission for alcohol abuse/dependence, of which 27 (79%) were granted waivers.

V. References.

1. American Psychiatric Association, Committee on Nomenclature and Statistics. *Diagnostic and statistical manual of mental disorder*, fourth edition. Washington DC, American Psychiatric Association, 1994.

2. Air Force Instruction 44-121, Alcohol and Drug Abuse Prevention and Treatment (ADAPT) Program, 2001.

3. Air Force Instruction 48-123, Aerospace Medicine Medical Examination and Standards, 2006.

4. DeHart RL, ed., *Fundamentals of Aerospace Medicine*, 3rd ed. Williams and Wilkins, Baltimore MD, 2002.

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WAIVER GUIDE
Updated: Apr 99
By: Lt Col Goldhagen

CONDITION:
Anemia/Blood Loss/Bone Marrow Donation

I. Overview.

Anemia is a common problem affecting as many as 30% of the world's population. Most cases are due to iron deficiency, particularly in the very young, those with poor nutrition, and women of childbearing age. In the latter group, the prevalence can be as high as 14%. Other less common etiologies include hemoglobinopathies, abnormal red cell membranes, and disturbed B_{12} absorption.

II. Aeromedical Concerns.

Irrespective of cause, anemia can reduce tissue oxygenation and compromise organ function manifesting as 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. For any given hemoglobin level, an acute drop is more likely to cause symptoms than a more gradual one. Acute blood loss between 200-400ml (including blood donation) requires DQ for at least 72 hours. Fliers who donate bone marrow should be DNIF until the surgical site has healed and follow up blood work demonstrates a normal hematocrit. Oral iron supplements are compatible with flying status. Iron injections may be administered to flying personnel while they are DNIF. Return to flying can be permitted after four days provided the original condition allows the hematocrit > 32.

III. Information Required for Waiver Submission.

Evaluations are required for hematocrit values below 38% in men and 36% 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.

IV. Waiver Considerations.

Of 245 individuals in the waiver file, 11 were disqualified for coexisting diagnoses, one was disqualified for the anemia (details unknown), and all others were given waivers. Among the specific diagnoses listed were iron deficiency, thalassemia minor, sickle cell trait, anemia from blood loss (through the genitourinary or gastrointestinal tracts), spherocytosis, hemolysis, B_{12} deficiency, and etiology unknown.

Waiver criteria include a stable or increasing hematocrit above 32% and a clear etiology (or exclusion of the non-iron deficiency anemias).

V. References.

1. DeHart RL. *Fundamentals of Aerospace Medicine*, Philadelphia, Lea & Febiger, 1985:584-6.

2. *Harrison's Principles of Internal Medicine*, 12th Ed., Wilson JD, et. al. (ed.). New York, McGraw-Hill, Inc. 1991:381-400.

3. Uthman E. *Understanding Anemia*, University Press of Mississippi, 1998.

4. *Williams' Hematology*, 5th Ed., Beutler E (ed.). New York, McGraw-Hill, Inc. 1990.

WAIVER GUIDE
Updated: Mar 99
By: Col Capell

CONDITION:
Ankylosing Spondylitis

I. Overview.

Ankylosing spondylitis (AS) is a form of arthritis which always involves the sacroiliac (SI) joint, often the spine and sometimes peripheral joints. The cardinal symptom is low-back pain, frequently awakening patients at night, accompanied by morning back stiffness which lasts more than 30 minutes and improves with movement. Symptoms last longer than three months and a family history of back pain is common. In 20% of patients, asymmetric oligoarthritis also involves the large joints of the lower extremities causing pain, erythema, warmth, swelling and/or effusion. Extraarticular manifestations of AS can include weight loss, fatigue, fever, chronic prostatitis, conjunctivitis, and/or uveitis. Uveitis can progress from acute, unilateral eye pain and photophobia to loss of vision if untreated. The presence of uveitis and low back pain strengthens the diagnosis.

Examination often reveals an abnormal erect posture with slightly flexed hips and decreased motion of the lower spine. With progression, stiffness of the cervical spine and loss of the normal lumbar lordosis may become evident. Heel tenderness due to Achilles tendonitis or plantar fasciitis is common.

AS is the most common inflammatory disorder of the axial skeleton. The prevalence is between 0.2 and 1%, affecting people under 35 years of age and involving men more frequently than women (up to 5:1). Men generally have more severe disease with greater SI and lumbar spine involvement. Women tend to have more severe cervical spine and earlier peripheral joint involvement. The natural history of AS is variable, but 20% of patients experience a progression of symptoms leading to spinal deformity due to increased ossification and fusion.

While there are no diagnostic serologic tests, radiographs will show characteristic changes in the SI joints, usually bilaterally, and other involved extraspinal joints after several years. The HLA-B27 histocompatibility antigen is suggestive, being present in 90% of Caucasian patients with AS but in only 7% of normals. The ESR or CRP may be elevated, but the level does not correlate well with disease activity.

Goals of AS therapy include relief of pain and stiffness, prevention or delay of deformity, and maintenance of function. Nonsteroidal anti-inflammatory drugs, particularly indomethacin, control inflammation. A life-long, individualized, therapeutic exercise program is essential to prevent deformity and maintain function. Participation in sports, such as swimming and bicycling, help maintain flexibility and strength.

II. Aeromedical Concerns.

Cramped cockpit conditions for prolonged periods may exacerbate eventual disability. Spinal rigidity in later cases is incompatible with ejection, may interfere with emergency ground egress,

and can limit vision due to restricted neck motion. Concomitant uveitis/iritis occurs in up to 25% of cases.

III. Information Required for Waiver Submission.

Orthopedic and optometric/ophthalmologic evaluations are necessary. Rheumatologic follow-up and physical therapy are important following waiver determination. MEB may be required if necessary. Results of laboratory testing, such as lumbosacral spine radiographs and HLAB27 antigen should be forwarded with waiver package.

IV. Waiver Considerations.

USAF Waiver File results: of the 42 aviators referred to the Aeromedical Consult Service for evaluation, 33 were ultimately granted waivers for AS. Specific waiver criteria do not exist; each case will be considered individually.

V. References.

1. Bennett JC and Plum F (ed). *Cecil Textbook of Medicine.* Philadelphia, Saunders Co. 1996:1467-9.

2. DeHart RL. *Fundamentals of Aerospace Medicine*, 2nd Ed. Baltimore, Williams and Wilkins. 1996:659-661.

3. Oh TH, et. al. Rehabilitation in joint and connective tissue diseases. and Inflammatory and degenerative spine diseases. Archives of Physical Medicine and Rehabilitation. May 1995; 76(Suppl): S-41-45.

4. Weinstein SL, et.al. (ed). *Turek's Orthopedics: Principles and Their Application*, 5th Ed. Philadelphia, Lippincott, Inc. 1994: 173-4.

WAIVER GUIDE
Updated: Apr 06
By: Major Vix

CONDITION:
Antimalarials

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, proper prescribed use of antimalarials is a necessity.

Chemoprophylaxis is not 100% effective in preventing malarial infection and truly the second line of defense. The first line of defense for malaria prevention is personal protective measures that includes 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.

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 AFMOA 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.** If an aircrew takes mefloquine by mistake, it is recommended that the flyer be DNIF for a period of four weeks while being observed for neuropsychological side effects.

III. Medication Details:

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, pruritis, and fatigue.

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 atovaquine/ 100 mg proguanil) starting one day prior to exposure and continued for seven days after exposure. 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, pruritis, interference with accommodation, leukopenia, agranulocytosis, anemia, and methemoglobinemia.

IV. 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 then an average traveler. Often there are already 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 Armed Forces Medical Intelligence Center (AFMIC) (register at http://mic.afmic.detrick.army.mil), and the CDC traveler's website at http://www.cdc.gov/travel/regionalmalaria/index.htm. 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 provide a guide for your decisions.

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. For example, CENTAF's "Policy on Malaria Chemoprophylaxis" dated Jan 2004 stated that unless a person would be exposed for seven days they would not need prophylaxis in Iraq. 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.

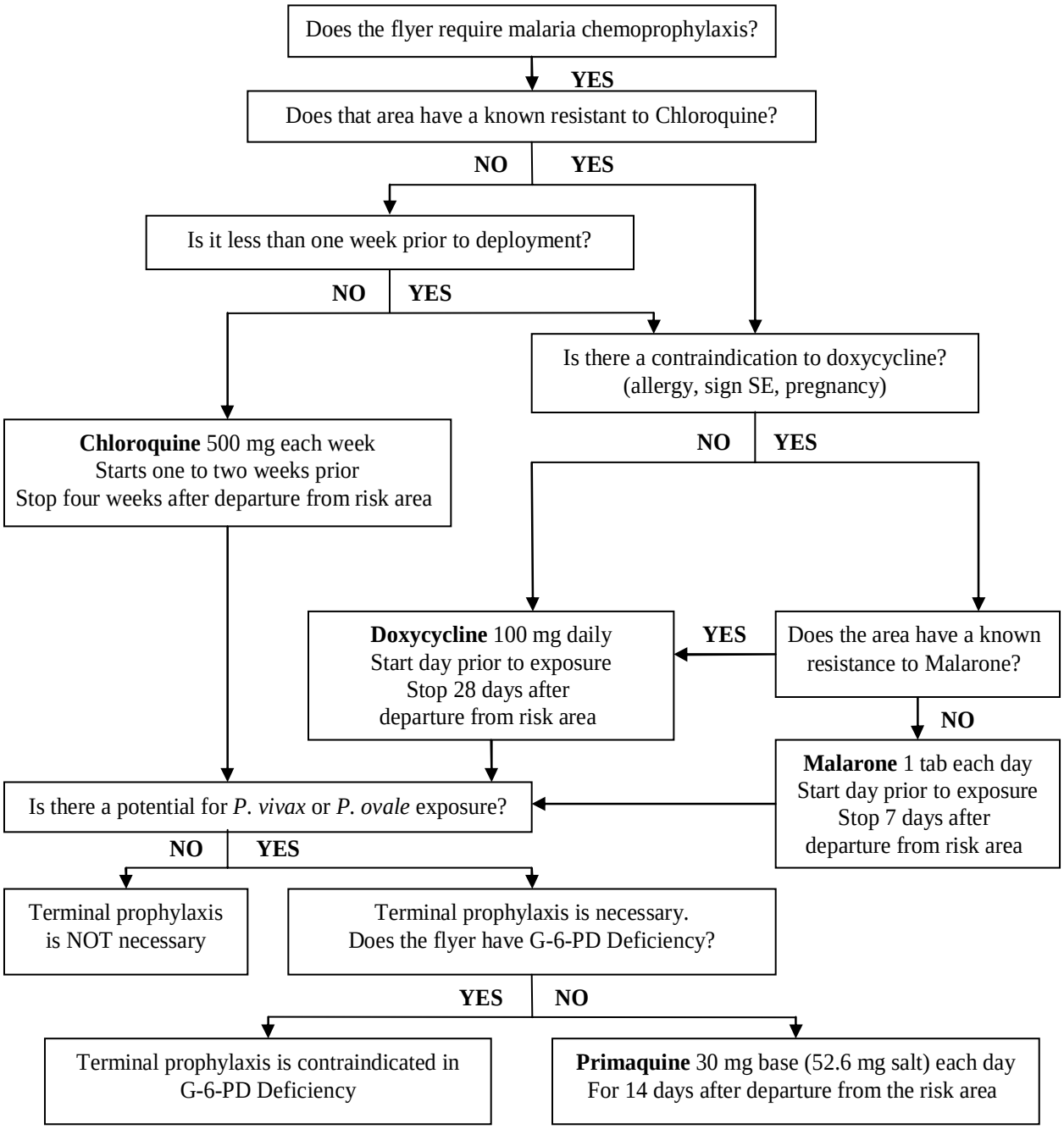
If the area is resistant to chloroquine, doxycycline is the first line agent for malaria chemoprophylaxis for aircrew. For individuals with a contraindication to taking doxycycline, such as previous significant allergic reaction, photosensitivity, GI intolerance or pregnancy, Malarone is approved as 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.

V. Information Required for Waiver Submission.

Waiver is not required for malaria chemoprophylaxis with approved medications. Aircrew that contract malaria need to be grounded until cured and recovered, without exceptions.

Decision Tree for Malarial Prophylaxis in Aircrew



VI. Waiver Considerations.

Not applicable.

VII. References.

1. 311 HSW/CC. Evaluation of Malarone for use as an Operational Drug in Aviation Personnel. Obtained on 27 Sept 2005 from https://kx.afms.mil/ctb/groups/dotmil/documents/afms/knowledgejunction.hcst?doctype=subpage&functionalarea=AerospaceMedicine&docname=CTB_024007

2. Armed Forces Pest Management Board Technical Guide. Personal Protective Measures against Insects and other Arthropods of military significance. http://www.afpmb.org/coweb/ppm.htm.

3. CDC. Prevention of Specific Infectious Diseases; Malaria. Traveler's Health: Yellow Book. Obtained on 27 Sept 2005 from http://www2.ncid.cdc.gov/travel/yb/utils/ybGet.asp?section=dis&obj=index.htm&cssNav=browsecyb.

4. CENTAF/SG. 2004 CENTAF Policy on Malaria Chemoprophylaxis. Obtained on 30 Sept 2005 from http://www.afpmb.org/coweb/guidance_targets/vector_and_pestcontrol/CENTAF%20Policy%20on%20Malaria%20Chemoprophylaxis%2020050112.pdf.

5. Chen LH, Keystone JS. New Strategies for the prevention of malaria in travelers. Infectious Disease Clinics of North America. 2005; 19(1): 185-210.

6. Siedenburg J, Perry IC, Stuben U. Tropical Medicine and Travel Medicine; Medical Advice for Aviation Medical Examiners Concerning Flight Operations in Tropical Areas. Aviation, Space, and Environmental Medicine. 2005; 76(3 Sec II, Supp): A12-A17.

WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Anxiety Disorders

I. Overview.

The anxiety 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. 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.

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) 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 UPT/UNT equivalent). A mental health consultation may be helpful to clarify the issues in MOA and FOF. 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 return to flying when the disorder is resolved. Persistence of anxiety symptoms despite adequate treatment should raise questions about the aviator's motivation to fly.

Two anxiety disorders, acute stress disorder (ASD) and posttraumatic stress disorder (PTSD), warrant special concern in the deployed/operational environment. Both occur after exposure to a life-threatening event in which one experiences intense feelings of horror and/or helplessness. Symptoms include blunting or absence of emotional responsiveness ("thousand-yard stare"), insomnia, diminished awareness of surroundings, depersonalization, derealization, dissociation, and amnesia for the traumatic event. ASD is similar to the combat stress syndrome, and is diagnosed if the symptoms have been present for less than four weeks. After four weeks the diagnosis is changed to PTSD. In this case signs of autonomic hyperarousal, such as an exaggerated startle response, flashbacks or other intrusive, disturbing recollections of the traumatic event, and efforts to avoid settings or situations which remind one of the traumatic event, are seen. Treatment of ASD is intended to return the member to duty and avert the development of PTSD. Critical Incident Stress Management (CISM) is intended to diminish the incidence of ASD and PTSD in populations at increased risk (e.g. mass casualty survivors/medical personnel).

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 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, can be 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 disabling. Anxiety is often a factor in depression and psychosomatic complaints as well as being associated with substance misuse, particularly alcohol.

III. Information Required for Waiver Submission.

If the diagnostic criteria for an anxiety disorder are met, the aviator is disqualified. Note that non-phobic fear of flying is treated as an administrative rather than a medical matter. A waiver may be requested once the aviator has completed treatment successfully, and has remained asymptomatic without medications for six months.

The waiver package should include: a recent (within three months of package submission) mental health evaluation, a copy of the medical evaluation board (MEB) narrative if applicable, an aeromedical summary outlining any social, occupational, or administrative problems connected with the condition, and a letter from the aviator's supervisor supporting a return to flying status.

IV. Waiver Considerations.

The ACS has accumulated considerable experience in the evaluation and recommendations for anxiety disorders in pilots and navigators. Based on a 15 year (1981-1996) review of the USAF Waiver file and ACS Cover Sheet File, 57 FC II aviators were diagnosed with anxiety disorders; 34 (60%) were waived to return to fly.

V. References:

1. American Psychiatric Association. (300.01 Panic Disorder without Agoraphobia, 300.21 Panic Disorder with Agoraphobia, 300.22 Agoraphobia without History of Panic Disorder, 300.21 Specific Phobia, 300.21 Social Phobia, 300.3 Obsessive-Compulsive Disorder, 309.81 Posttraumatic Stress Disorder, 308.3 Acute Stress Disorder, 300.02 Generalized Anxiety Disorder, 293.89 Anxiety Disorder Due to…(*Indicate the General Medical Condition)*-- Substance Induced Anxiety Disorder *(refer to Substance-Related Disorders for substance-specific codes),* 300.0 Anxiety Disorder NOS). *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition. Washington DC, 1994.

WAIVER GUIDE
Updated: May 05
By Dr Kruyer

CONDITION:
Aortic Insufficiency/Regurgitation

I. Overview.

Aortic insufficiency (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. Clinically, symptoms generally do not become apparent until some degree of left ventricular 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 physiological normal variant in the absence of an accompanying AI murmur and with a 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.

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 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.

Treatment for AI should always include adequate therapy for any significant hypertension present to decrease afterload (though this may preclude the possibility of waiver) and antibiotic prophylaxis for all dental and potentially bacteremic procedures.

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 is restricted to FC IIA. Severe AI is disqualifying without waiver 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.

II. Aeromedical Concerns.

The aeromedical concerns include:

1) Subacute bacterial endocarditis (SBE).
2) Related symptoms such as exertional dyspnea, orthopnea and paroxysmal nocturnal dyspnea.
3) 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.
4) Any requirement for medical therapy, such as vasodilators.

III. Information Required for Waiver Submission.

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

Aviators diagnosed with AI require ACS evaluation. Therefore local evaluation of AI should be directed by clinical necessity only. The ACS performs a local review of all echocardiograms done to confirm all abnormal findings. If accomplished during the routine workup, provide the following documents with the AMS: routine labs, ECG, chest X-ray, echocardiogram, 24-hour Holter, and/or treadmill.

IV. Waiver Considerations.

The ACS considers trace AI without the murmur of AI, and in the presence of a normal three-leaflet valve, as a normal variant.

- Mild AI, in the presence of a normal trileaflet valve, is considered for FC I/IA and FC II waivers.
- Moderate AI is considered for FC IIA waiver only if the member is asymptomatic, left ventricular function and chamber dimensions are normal, and there is no evidence of aortic root dilation or significant dysrhythmia. FC III is similarly restricted to low performance aircraft.
- Severe AI, or AI associated with LV enlargement or dysfunction is disqualifying with no waiver recommended.
- Procedures performed during the ACS evaluation include a lipid panel, ECG, chest x-ray, echocardiogram, pulmonary function testing, 24-hour Holter, treadmill, and, for evaluees over the age of 35, thallium imaging and coronary artery fluoroscopy. Centrifuge evaluation

is no longer required based on an ACS review showing no evidence of +Gz induced arrhythmias or decreased G tolerance.

Degree of Aortic Insufficiency (AI)	**Condition**	**Flying Class**	**Waiver Potential** **Waiver Authority**	**Required ACS Review and/or ACS Evaluation**
Trace	Structurally normal trileaflet BAV	Unrestricted for all classes Unrestricted waiver for all classes	Not required (Normal variant) Yes AETC for FCI, IA and initial FCII (FS) MAJCOM for FCII/ III	Not required FC I/II: ACS evaluation. FC III: ACS review if trace AI and no AS, otherwise ACS evaluation
Mild	Structurally normal, trileaflet or BAV	Unrestricted waiver for all classes	Yes AETC FCI, IA and initial FCII MAJCOM for FCII/III	FC I/II/III: ACS evaluation.
Moderate	Asymptomatic or with nondisqualifying ventricular dysrhythmias. No LV enlargement or dysfunction	FCI/IA FC IIA (low G-aircraft) FC III	No AETC Yes AFMOA Yes MAJCOM	FC I/IA: ACS review FCII/III: ACS evaluation
Severe	Severe AI or AI associated with LV enlargement or dysfunction	All Flying Classes	No	N/A MEB required if symptomatic; associated with left ventricle dilatation or dysfunction

ACS follow-ups vary from 1 to 3 years based on severity, aircraft performance and flying class. Waiver will generally be granted for trace AI with BAV and mild AI for three years. Waiver will be granted for moderate AI for one year.

V. ACS Checklist.

1. No studies are required except for echocardiogram on initial ACS evaluation.
2. If studies were accomplished during routine work-up, submit to ACS.

VI. References.

1. AGARD Aerospace Medical Panel Working Group 18. Echocardiographic Findings in NATO pilots: Do Acceleration (+Gz) stresses damage the Heart? Aviat Space Environ Med, Jul 1997; 68(7): 596-600.

2. Bonow, RO, Carabello B, DeLeon AC, et al., 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). JACC, Nov 1998; 32(5): 1504–1508.

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WAIVER GUIDE
Updated: May 05
By: Dr William Kruyer, USAFSAM/FECI

CONDITION:
Aortic Valve Stenosis

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 will still be unusual in military aviator/aircrew with bicuspid aortic valve because this complication usually occurs in middle-aged or older patients.

II. Aeromedical Concerns.

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. Aeromedical concerns for AS include infective endocarditis, progression to significant stenosis and requirement for aortic valve replacement or repair. The prognosis of mild AS is good 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. Dyspnea is due to 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 concern, prompting restriction from high performance flying duties.

III. Information Required for Waiver Submission.

An <u>initial</u> waiver can be considered following the review and/or evaluation by the Aeromedical Consultation Service (ACS). Please refer to items A through D, listed below, as the most commonly requested clinical data.
A. Aeromedical summary (AMS).
B. Copy of the local echo report and videotape or CD copy of the echo (required for ACS confirmation of the diagnosis).
C. Additional local cardiac testing is not routinely required but may be requested in individual cases.

D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram (ECG), treadmill, Holter monitor).

Waiver renewal requires an interval AMS with particular attention to clinical signs and symptoms. No studies are required prior to the ACS evaluation for renewal. If studies were accomplished during routine work-up, submit with waiver package.

IV. Waiver Considerations.

Table 1 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties.

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

Associated Levels of Aortic Stenosis (AS)	**Flying Class**	**Waiver Issued** **Waiver Authority**	**Required ACS Review and/or ACS Evaluation**
mild AS	FCI and IA FC II and FC III	No AETC Yes MAJCOM	FCI/IA: ACS evaluation FCII/III: ACS evaluation
mild-to-moderate AS	FC IIA (low G-aircraft) FC III (low G-aircraft)	Yes AFMSA Yes MAJCOM	FC II: ACS evaluation FC III: ACS evaluation
≥ moderate AS	All Flying Classes	No	N/A MEB required

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

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WAIVER GUIDE
Updated: Apr 07
By: Dr Jeb Pickard and Dr Karen Fox

CONDITION:
Asthma

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, the increase in prevalence is unlikely to be an artifact of inconsistent diagnostic criteria.

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. For practical purposes, it is reasonable to view asthma as inflammation of the airways in response to trivial or enigmatic stimuli, typically manifesting in chronic or intermittent fashion with bronchospasm and/or cough. 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, asthma affects about 5-8% of the adult population. 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 and 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, 12] 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.[1] 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.[9] 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.[12] 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.[6] 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.[5]

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. Assuming adequate effort by the individual, a ratio of FEV1/FVC less than 0.75 indicates airflow obstruction, while an increase of 15% or more in absolute FEV1 after treatment with an inhaled bronchodilator denotes reversible airflow obstruction. A 15% or greater change in FEV1 over time (an interval that may be anywhere from minutes to months) also indicates 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 15% improvement or more 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.[10]

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.[4]

A number of studies have shown that airway inflammation and/or hyperreactivity frequently persist in adolescents who have clinically remitted.[2, 13, 14] 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.[3] A study of allergic rhinitis patients showed no difference in the risk of developing asthma between those with positive and negative bronchoprovocation tests.[7] 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.[11] 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. 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. Montelukast, a leukotriene receptor antagonist, has 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. 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, recent 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 no longer recommended as first-line therapy. 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. Information Required for Waiver Submission.

The aeromedical summary 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 have a bronchodilator challenge, 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 challenge after three months on current therapy [ICS +/- montelukast (possibly cromolyn)]
C. Internal medicine or pulmonary consult
D. Allergy consult if individual also has allergic rhinitis
E. MEB results

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 consistent with control.

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

IV. Waiver Considerations.

Any type of asthma or history of asthma is disqualifying for flying class (FC) I/IA, II or III. Although data supports lowering the age of waiverable childhood asthma, recent discussion at the Aircrew Standards Working Group led to the decision to leave policy as stated in AFI 48-123. 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. Solitary EIB may be waivered for FC IIA 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. Should such a flare occur, the

individual should remain DNIF for one week after stopping use of SABA, to allow the inflammatory process to resolve.

Table of waiver potential and required ACS evaluations 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	Initial FC II, history of childhood asthma ≤12-years-old	Yes AETC	No
	Initial FC II, history of childhood asthma ≥13-years-old	No AETC	No
	Solitary exercise-induced bronchospasm (prophylaxed with albuterol*)	Yes – FC IIA AFMOA	Yes
	Asthma controlled on inhaled corticosteroids +/- montelukast or cromolyn	Yes – FC IIA AFMOA	Yes†
	Asthma treated with beta-agonists‡, theophylline, systemic corticosteroids	No AFMOA	No
III	Initial FC II, history of childhood asthma ≤12-years-old	Yes AETC	No
	Initial FC II, 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 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.

A review of AIMWTS through February 2007 showed 202 cases of asthma including history of asthma in FCI/IA, II and III flyers. The aeromedical summaries (155) for all disqualified (67) and 88 randomly selected cases were reviewed. Of the 67 asthma cases disqualified, 14 were FCI/IA, 16 were FC II and 37 were FC III. Of the 67 disqualified asthma cases, 63 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 three were disqualified for other medical conditions [ophthalmologic (3), syncope (1)]. Of the 88 randomly selected approved waivers, 62 were for history of childhood asthma, the other 26 were for asthma controlled on medications (17), exercise-induced asthma (5), and asthma induced by preventable triggers [cat, dog, horse] (4).

Dr Jeb Pickard is the ACS pulmonologist and AF/SG Consultant for Aerospace Internal Medicine.

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WAIVER GUIDE
Updated: Dec 03
By: Lt Col Nick Lezama

CONDITION:
Atrial Fibrillation/Flutter

I. Overview.

History of symptomatic major dysrhythmia, including atrial fibrillation and atrial flutter is disqualifying for all classes of flying duty. Asymptomatic major dysrhythmias require ACS review. (AFI 48 –123 A7.17.1.5.9, 22 May 2001). Atrial fibrillation (AF) is the most common sustained cardiac dysrhythmia, affecting approximately 1.5 to 2.2 million Americans. The incidence of AF is strongly age-dependent, affecting 4% of individuals older than 60 years and 10% of persons older than 80 years. AF is a powerful risk factor for stroke. The rate of ischemic stroke among elderly patients not treated with warfarin is approximately 5% per year. Effective anticoagulation in AF reduces the risk of stroke significantly. Patients with no structural heart disease and younger than 65 years have an extremely low risk for stroke, less than 1% per year, and generally do not need warfarin anticoagulation. Aspirin at 325 mg/qd is recommended.

AF is often associated with other disease processes, including cardiovascular disease, chronic lung disease, hypertension, pulmonary embolus, pericarditis, and thyrotoxicosis. AF may therefore be an indicator of a serious underlying medical disorder. Stress, surgery, exercise, and alcohol intoxication may also precipitate AF. The “holiday heart” syndrome is AF associated with binge alcohol consumption. Cardiac events, including thromboembolism, are increased with associated underlying disease. In the general population, approximately 5-10% of patients diagnosed with AF do not have underlying cardiovascular or thyroid disease. Lone AF is defined as AF without structural heart disease, hyperthyroidism or hypertension in patients under age 60 at presentation. Clinical literature typically reports cardiac event rates less than 1% per year for lone AF. Lone AF may manifest as one isolated episode, as paroxysmal or recurrent episodes or as chronic persistent AF. Many aviators may have only a single episode of AF that is converted spontaneously or by medical providers within 1-2 days of presentation. Paroxysmal and chronic AF often require AV node blocking medication for ventricular rate control.

Atrial flutter rarely occurs as an isolated rhythm; it is usually associated with atrial fibrillation. 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 of 100-150 beats per minute, persistent or frequent atrial flutter requires AV blocking medication for ventricular rate control.

II. Aeromedical Concerns.

From a medical standpoint, the issues of hemodynamic stability and thromboembolic risk in addition to the effects of any underlying disease must be addressed locally prior to aeromedical concerns. The majority of AF patients referred to the ACS have had lone AF and waiver considerations will primarily be limited to cases of lone AF. Lone AF may be asymptomatic, and

monitoring studies in patients with paroxysmal AF demonstrate that asymptomatic episodes occur more frequently than do symptomatic ones.

Loss of atrial contribution to cardiac output, loss of AV synchrony, and rapid ventricular rate response may impair cardiac performance, especially during exertion. 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 blocking medications, such as beta blockers, add 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. This effect was felt to be drug specific with atenolol and nadolol being most efficacious.

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 Consult Service (ACS) reviewed its AF experience. From 1957 to 1993, 300 male aviators 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. Arrhythmic 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. Information Required for Waiver Submission.

Aviator should be DNIF for an observation period of at least 3 months after conversion to sinus rhythm, including a minimum of 2 months off antiarrhythmics. One month of prophylactic therapy with beta blocker, calcium channel blocker or digitalis preparation is thus possible without prolonging the observation period and waiver consideration. This may be desired clinically to suppress short-term recurrence of AF. A history of cardioversion or short-term use of antiarrhythmic medications does not preclude waiver. Local evaluation should be performed as clinically indicated to rule out underlying disease. Aeromedically required tests include: 1) Thyroid function tests, 2) Echocardiogram and repeat ECG after conversion to sinus rhythm and 3) one Holter monitor during the final month of medication-free observation. If hyperthyroidism is determined to be the cause of the AF, waiver may be considered per policy after correction of the hyperthyroidism. For ACS evaluation/review, submit results of all local evaluations, including an aeromedical summary, laboratory reports, reports of all noninvasive and invasive tests, and all associated films and tracings for ACS interpretation.

IV. Waiver Considerations.

Any AF is disqualifying without waiver recommended for FC I/IA. AF associated with hemodynamic symptoms is disqualifying for all classes of flying duties without waiver recommended. Single episode of lone AF without hemodynamic symptoms is eligible for unrestricted FC II/III waiver after ACS evaluation/review. Paroxysmal and chronic AF, with or without beta blocker therapy for ventricular rate response control, will be considered for waiver on

a case-by-case basis, waiver restricted to low performance aircraft and, in the case of pilots, with another qualified pilot at redundant controls. Recommended beta blocker is atenolol. Chronic use of calcium channel blocker or digitalis preparation for ventricular rate response control will not be considered for waiver. Radiofrequency ablation of paroxysmal or chronic lone AF may be considered for waiver on a case-by-case basis. Please refer to the ablation waiver guide for further details.

Atrial flutter is disqualifying for all classes of flying duties. Because of the concern regarding rapid ventricular rates at rest, waiver is not recommended in the absence of successful radiofrequency ablation. Radiofrequency ablation of atrial flutter may be considered for waiver on a case-by-case basis. Unless the procedure is clinically indicated urgently, recommend ACS review prior to ablation consideration. One significant clinical and aeromedical concern is the risk of paroxysmal or chronic AF after successful ablation of atrial flutter. Please refer to the ablation waiver guide for further details.

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WAIVER GUIDE
Updated: Nov 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Atrial Septal Defect (ASD)

I. Overview.

Atrial septal defect is one of the most common cardiac congenital anomalies in adults, and it occurs more frequently in females. It is the most common shunt lesion. Autopsy series document a patent foramen ovale in about 30% of cases in the 20-30 year age group. The incidence decreases as age advances. Ostium secundum is the most common form of atrial septal defect found in adults, and it is often an isolated lesion. It involves the fossa ovalis and is mid septal in location. It should not be confused with a patent foramen ovale, which does not require a waiver.

Sinus venosus and ostium primum defects are less common. Sinus venosus defects occur high in the atrial septum near the entry of the superior vena cava. Ostium primum defects are a form of atrioventricular septal defect. These two defects are often associated with other abnormalities and are less likely to be waivered.

II. Aeromedical Concerns.

Most patients with ASD are asymptomatic. Patients not surgically corrected, who develop symptoms, usually do so by the 3rd or 4th decade. Their symptoms include exercise intolerance, fatigue; and orthopnea secondary to the development of pulmonary hypertension, a common complication of all left to right cardiac shunts.

Significant pulmonary hypertension rarely occurs before age 20 but may happen at earlier ages in those individuals living in higher altitudes. Supraventricular dysrhythmias are not uncommon in patients with ASD and may persist even after successful repair of the ASD. Dysrhythmias follow repair in 3 to 15% of cases, and more than half have atrial fibrillation or flutter.

III. Information Required for Waiver Submission.

For an initial waiver request cardiology consultation is required. An echocardiogram with doppler flow is required. Waiver is possible after surgical closure of an atrial septal defect. ACS evaluation is required six months after surgical closure of the atrial septal defect.

IV. Waiver Considerations.

The Aeromedical Consultation Service database contains 12 aircrew who were evaluated for atrial septal defect. Six (50%) had an atrial septal defect and six (50%) were found to have a normal exam. Twelve aircrew had an incidental finding of a patent foramen ovale on echocardiogram exam for another medical condition, and three aircrew were found to have an atrial septal defect while being evaluated for another condition. Aircrew should be grounded until the ACS evaluates them. Only those aircrew who are asymptomatic and have had surgical closure of the atrial septal defect will be considered for waiver. The data is limited on the number of waivers granted for this

condition. The USAF aircrew medical waiver database indicates one waiver has been granted for atrial septal defect, and one aircrew member has been disqualified for this condition.

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WAIVER GUIDE
Updated: Apr 99
By: LtCol. Levin

CONDITION:
Atrioventricular Conduction Disturbance

I. Overview.

Most cases of first degree block (PR interval prolonged >0.22s) and Mobitz type I second degree heart block (Wenkebach - where AV conduction is progressively more delayed with each beat until there is a blocked beat, then the cycle starts again) are normal variants related to increased vagal tone. Presentations due to underlying heart disease would be very unusual in our population, but should at least be considered. The site of the conduction delay is most commonly in the AV node. Exercise reduces vagal tone and frequently reverses the block. Mobitz type I second degree block has long been considered a normal variant and as such required no further evaluation. 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, hopagram is no longer routinely required and first degree AV block is considered to be a normal variant. Third degree heart block and Mobitz II second degree AV block generally require pacemaker placement and are not compatible with continued flying status.

II. Aeromedical Concerns.

In some types of conduction disturbance, there is a risk of bradycardia with decreased +Gz tolerance, sudden incapacitation (syncope) or sudden death. Heart blocks may be a sign of other underlying cardiac disease.

III. Information Required for Waiver Submission.

As noted above, first degree AV block and Mobitz I second degree AV block are generally considered normal variants and therefore do not require a waiver. The USAF Central ECG Library may request further local evaluation for unusual individual cases.

IV. Waiver Considerations.

The great majority of aviators previously referred to the Aeromedical Consultation Service (ACS) for first degree AV block, and Mobitz type I second degree block were waived for these conditions. Significant coronary artery disease diagnosed incidentally was the most common reason for the aviator not being recommended for waiver. The requirement for pacing and risk of hemodynamic symptoms is not compatible with flying status, therefore few aviators with Mobitz II second degree or third degree AV block are seen at the ACS. Waiver for these diagnoses is unlikely.

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WAIVER GUIDE
Updated: Mar 99
By: Col Towle

CONDITION:
Back Pain

I. Overview.

Lower back pain is one of the most frequent and disabling conditions affecting workers in their productive years. Incidence is maximal between the ages of 35 to 55. Recurrences are frequent, and three or more episodes have been reported in 30 to 70% of afflicted patients. It is generally recognized that probably up to 80% of all people will experience back pain to some extent in their active life. It is the most common cause of restricted activity for those under age 45, and third after heart disease and arthritis in those 45 to 64 years of age. A study on backache in RAF pilots between the ages of 20 and 50 reported a 13% incidence of backache while flying. Mechanical low back pain is a diagnosis of exclusion. It is generally a self-limited condition. Typically it is of short duration with complete recovery. The combination of lifting, bending, and twisting is believed to be the most frequent cause of back injuries. Unexpected maximal efforts and repetitive heavy lifting are also harmful. Prolonged sitting in one position is thought to increase the risk. Motor vehicle driving and exposure to other forms of whole body vibration are detrimental to the spine. Many vehicles (including aircraft) vibrate at a fundamental frequency similar to the body's natural frequency (4 to 6 Hz), and amplification of imparted motion occurs in this range (resonance). Exposure to these vibrations can cause fatigue of the paraspinal muscles and ligaments and disk herniations. The main goal of the clinician is to rule out more serious etiologies. Back pain is a symptom, not a disease, and the pathological basis of the pain may originate from areas other than the spine. It is one of the most common complaints for primary care visits. Among patients with acute back pain, 1% have nerve root symptoms. 95% of diseased disks are localized to L4-5 and L5-S1. Less than 2% of patients with low back pain have infections, neoplasms, or inflammatory spondyloarthropathies. The prognosis for a single episode of acute regional low back pain is excellent. With conservative therapy, 80% will be better in two weeks, and 90% will resolve in one month. Prospective studies have suggested that an insidious onset of symptoms versus an acute onset (as with an accident) indicates a poor prognosis for those having low back pain. Back pain has accounted for thousands of lost duty days. In the Army it has accounted for at least 20% of discharges from military service.

The most common cause of nonspecific low back pain is thought to be degeneration of the intervertebral disk. Disk degeneration per se is not symptomatic and is essentially a physiologic aging phenomenon. Degenerative disks are found in 10% of persons between the ages of 20 to 29, and this percentage increases to 96% in those over the age of 60. A musculoskeletal injury can be triggered by direct trauma, repetitive loading, or a single overexertion. The strengths of the various tissues within and around the spine are affected by factors such as age, fatigue, and concomitant diseases.

Multiple therapeutic modalities are available for back pain. These include initial short-term bedrest, short-term analgesics, NSAID's, physical therapy, and manipulation. When appropriate, weight reduction, posture and body mechanics training ("back school"), and strengthening and flexibility programs should be instituted.

II. Aeromedical Concerns.

Final aeromedical disposition is dependent on the degree of functional residual impairment that remains once treatment and rehabilitation are completed. The flight surgeon must ascertain that the examinee can safely perform all cockpit duties. There should be no significant limitation of motion, loss of strength, or functional impairment that may compromise safe operation of the aircraft, and safe egress. If the patient responds well to medical therapy and there are few or no recurrences, the Airman should be eligible for continuation of flying duties. If it is recurrent and disabling it is disqualifying regardless of the cause.

High-G aircraft have frequently induced neck injuries in aircrew. Serious injuries have included compression fractures, herniated discs, and torn ligaments. Twisting of the neck under G makes the neck most vulnerable to injury. The C5-C6 level tends to be the most susceptible to injury. Back seat crew are at higher risk of injury when exposed to unexpected G-loads.

III. Information Required for Waiver Submission.

Clinical correlation with the specifics of the history is desirable. Obvious minor musculoskeletal injury requires no additional studies. In cases of greater severity, longer duration, or gradual onset further investigation to exclude specific etiologies in the differential diagnosis are appropriate. Diagnoses to consider would include: Neoplasms (primary tumor, metastases, myeloma); inflammation (ankylosing spondylitis, rheumatoid arthritis, vertebral osteomyelitis, discitis); structural (HNP, degenerative disc disease, spondylolisthesis, spinal stenosis, fractures); and referred pain (from hip, SI joints, GI, GU, GYN, CV etiologies). Orthopedic, neurosurgical, or rheumatologic consultation may be required. Laboratory testing is generally negative and not typically indicated with initial presentation. It is indicated when the age is over 50 years, pain is nonmechanical, or atypical in pattern, distribution, or nature, and symptoms are persistent despite conservative treatment measures. Suggested labs could include CBC, sedimentation rate, alkaline phosphatase, acid phosphatase, PSA, serum calcium, serum protein electrophoresis. Suggested imaging would be plain radiographs to exclude a fracture though these studies have limited sensitivity for soft tissue pathology such as herniated discs. Bone scan, CT, or MRI could be considered depending on differential diagnosis, chronicity, and likelihood of surgical intervention.

IV. Waiver Considerations.

Waiver can be granted when the diagnosis is clearly delineated and the pain is controlled by conservative, nonpharmacological means.

The USAF waiver file has 128 rated aviators with the diagnoses attributable to back pain by the ICD-9-CM classification. Among these aviators, 112 of these flyers had low back pain, and 30 were disqualified. There were 8 aviators with cervical pain and 8 with thoracic level pain, and none of these were disqualified.

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WAIVER GUIDE
Updated: Dec 05
By: Maj Nassir

CONDITION:
Benign Prostatic Hypertrophy

I. Overview.

Benign prostatic hypertrophy (BPH) is a common disorder with increasing progressive frequency in men older than 50 years. The average prostate weighs 20 gm in normal 20-year-old males and hypertrophy increases in direct correlation with age: 8% hypertrophy in men aged 31-40 years, 40-50% in men aged 51-60, and 80% in men by age 80. BPH can cause bladder outlet obstruction by two mechanisms: a reversible dynamic/physiologic component related to smooth muscle, and a fixed/structural component related to prostate bulk impinging the urethra. BPH develops primarily in the periurethral or transitional zone of the prostate. Obstructive symptoms are not always related to the size of the gland on clinical exam, since compression of the prostatic urethra can occur even in glands of relatively normal size.

Common symptoms of BPH include: increased frequency of urination, nocturia, hesitancy, urgency, and weak urinary stream. Other disorders which can cause similar symptoms to BPH include: urethral stricture, contracture of the bladder neck, carcinoma of the prostate or bladder, bladder calculi, urinary tract infection, prostatitis, and neurogenic bladder. BPH is not generally believed to be a risk for prostate cancer.

The natural history of BPH is an age-related increase in symptoms, however not always progressive. Age, symptoms, urinary flow rate and prostate volume are risk factors for acute urinary retention. Men with symptomatic BPH who are not treated have approximately a 2.5% per year risk of developing acute urinary retention.

The American Urologic Association (AUA) symptom score was developed to measure quantitative outcomes from different BPH treatments. It consists of scoring seven questions to evaluate frequency, nocturia, weak urinary stream, hesitancy, intermittence, incomplete emptying, and urgency.

Questions to be answered	(Circle one number on each line) 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
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 a night until the time you got up in the morning?	0 (None)	1 (One time)	2 (Two times)	3 (Three times)	4 (Four times)	5 (Five times or more)

Sum of circled numbers (AUA Symptom Score):_____

0 to 7 = mild symptoms
8 to 19 = moderate symptoms
20 to 35 = severe symptoms

Therapy is normally started when symptoms exceed the patient's tolerance. Non-invasive lifestyle modifications include reduced evening fluid intake, sitting to urinate, and avoidance of salt, caffeine, alcohol, and adrenergic decongestants.

Two classes of medications are approved in the United States to treat BPH. Alpha-1-adrenergic antagonists such as terazosin, doxazosin, tamulosin, and alfuzosin work against the smooth muscle dynamic component of bladder outlet obstruction. The side effects of the alpha-1-adrenergic antagonists are not compatible with flying.

5-Alpha-reductase inhibitors such as finasteride (*Proscar*) and dutasteride work against the structural component of bladder outlet obstruction by reducing the size of the prostate gland. Although the listed side effects of finasteride include impotence, decreased libido, weakness, postural hypotension, dizziness, somnolence, and ejaculation disturbances, large clinical trials (over 14,000 patients) revealed that only the sexual side effects (3.1%) exceeded placebo. As a precautionary note, women of childbearing age are advised to avoid touching crushed or broken finasteride tablets due to the potential for adverse pregnancy implications.

Finasteride 5 mg/day appears to be effective long-term and a minimum of six months therapy is generally recommended. It significantly reduces obstructive symptoms, the need for surgery, and the incidence of acute urinary retention (50-74% reduction compared to placebo) especially in men with moderate to severe symptoms and significant prostate gland enlargement. In men with mild disease, other therapy such as alpha-1-adrenergic antagonists may be at least or more effective than finasteride. Finasteride 1 mg/day has also been used for male pattern baldness.

Herbal therapies, such as saw palmetto, are commonly used in Europe for BPH. The exact mechanism of saw palmetto is not known. Although they may be effective, side effects include headache, nausea, and dizziness.

Regarding invasive treatment for BPH, transurethral prostatectomy (TURP) has been the primary therapy for many years. In general, men with moderate to severe BPH are candidates for invasive therapy. Newer invasive therapies include transurethral incision of the prostate, open prostatectomy, urethral stent, laser prostatectomy, microwave therapy, electrovaporization, and transurethral needle ablation of the prostate.

Although each case warrants individual assessment, general treatment guidelines can be considered. Mild symptoms (AUA symptom score < 7) may be treated by watchful waiting. Moderate symptoms (AUA scores 8 to 19) may be candidates for medical treatment. Severe symptoms (AUA scores > 20) may be candidates for invasive therapy.

II. Aeromedical Concerns.

The presence of BPH 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. Chronic urinary retention can be relatively painless, however it can lead to enuresis, hypertension, urinary tract infections, hydronephrosis, and renal impairment.

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 (4%), dizziness (>10%), and somnolence (1-10%). As such, alpha-blockers are not acceptable for use in the aerospace environment. Furthermore, herbal extracts such as saw palmetto should be considered cautiously with the knowledge and approval of the flight surgeon. Regarding the 5-Alpha-reductase inhibitors, specifically finasteride, a detailed aeromedical medication review of in Sep 04 concluded it to be both effective and safe in the aeromedical environment.

III. Information Required for Waiver Submission.

At a minimum, a local evaluation should include a thorough history and physical examination to rule out other causes of urinary symptoms or urinary obstruction. Physical exam should include a digital rectal examination of the prostate. Consultation with an urologist is important for patients

with BPH symptoms, unless minimal. A detailed description of symptoms, clinical course, history of retention, absence of treatment side effects, and urologic follow up are important for a successful waiver.

A minimum urological workup for BPH should include:

- urinalysis
- PSA
- urine flow rate
- post-void residual

Depending on the individual case, additional urological workup could include:

- cystoscopy
- 24-hour urine for creatinine clearance and protein
- IVP
- renal/prostate ultrasound
- serum creatinine

IV. Waiver Considerations.

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.

Finasteride was recommended by the USAF Aircrew Standards Working Group in Oct 04, and subsequently approved. The Air Force Approved Aircrew Medications list effective 14 Mar 05 allows finasteride for treatment BPH with waiver. DNIF for 72 hours is required to rule out idiosyncratic reactions. Of note, DoD policy prohibits the purchase of finasteride for hair-loss treatment using DoD funds.

Refer to the table below for specific treatments, flying class and their waiver authorities.

Symptomatic BPH treated with:	**Flying Class**	**Waiver Issued/Waiver Authority**	**ACS Review and/or ACS Evaluation required**
Watchful waiting	II/III	Waiver not required if: symptoms are mild and no evidence of urinary retention	Not required
Medication (finasteride)	II/III	Yes MAJCOM/SGPA	Not required
Invasive/surgical (after recovery and no evidence of urinary retention)	II/III	Waiver not required	Not required
Medication (finasteride) or invasive/surgical (after recovery and no evidence of urinary retention)	All initial FC	No waiver (exceptions considered only on case-by-case basis) / AETC	Not required

As of Aug 05, a 10-year retrospective review (1995-2005) of AIMWTS and the USAF ACS waiver file revealed the following:
- 5 aviators were diagnosed with BPH treated with finasteride 5mg/day (3 were granted a FC II waiver, one was granted FC IIA waiver, and one was disqualified due to a concurrent cardiac condition).
- 1 aviator was diagnosed with BPH treated with an invasive procedure (FC II waiver was granted).
- 1 aviator was diagnosed with prostatitis treated with finasteride 5mg/day (FC III waiver was granted).
- 2 aviators were diagnosed with BPH treated with alpha-blocker medication (no waivers were granted due to medication side-effects).
- 7 aviators were diagnosed with male-pattern baldness treated with finasteride 1mg/day (6 were granted FC II waiver and 1was granted SMOD waiver).

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WAIVER GUIDE
Updated: May 05
By: Dr William Kruyer

CONDITION:
Bicuspid Aortic Valve

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. 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. 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.

II. Aeromedical Concerns.

Aeromedical concerns include development and progression of AS and/or AI and the risk of infective endocarditis. Risk of a sudden incapacitating event is very low and aeromedically acceptable in the absence of significant AS or severe AI. 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. Please refer to the AS and AI waiver guides for further details.

III. Information Required for Waiver Submission.

An <u>initial</u> waiver can be considered following the review and/or evaluation by the Aeromedical Consultation Service (ACS). Please refer to items A through D, listed below, as the most commonly requested clinical data.
A. Aeromedical summary (AMS).
B. Copy of the local echo report and videotape or CD copy of the echo (required for ACS confirmation of the diagnosis).
C. Additional local cardiac testing is not routinely required but may be requested in individual cases.
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram (ECG), treadmill, Holter monitor).

Waiver <u>renewal</u> requires an interval AMS with particular attention to clinical signs and symptoms. No studies are required prior to the ACS evaluation for renewal except for FCIII renewal for BAV with trace AI and no AS. In that case a local echocardiogram needs to be sent to the ACS for review. If studies were accomplished during routine work-up, submit with waiver package.

IV. Waiver Considerations.

BAV is disqualifying for all classes of flying duties. ACS review/evaluation is required for waiver consideration. As stated above, waiver recommendations are primarily dependent on the presence

and severity of associated AS and AI. Table 1 is a summary of the clinical manifestations and most common requirements for the separate flying class (FC) duties.

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 evaluation
BAV with ≤ mild AI and/or ≤ mild AS	FC II and FC III	Yes MAJCOM	FC II: ACS evaluation. FC III: ACS review if ≤ trace AI and no AS. FC III: ACS evaluation if mild AI and/or any AS
BAV with moderate AI and/or mild-to-moderate AS	FC IIA (low G-aircraft) FC III (low G-aircraft)	Yes AFMOA Yes MAJCOM	FC II: ACS evaluation FC III: ACS evaluation
BAV with severe AI only	All Flying Classes	No	N/A MEB required if symptomatic; associated with left ventricle dilatation or dysfunction
BAV with ≥ moderate AS only	All Flying Classes	No	N/A MEB required

FC I and IA will only be waived for BAV with ≤ mild AI and no AS; any greater AI or AS is not waiverable. FC II requires ACS evaluation for waiver consideration. FC III with trace or no AI and with no AS may receive a waiver recommendation after ACS review; formal ACS evaluation will be requested if there is mild or worse AI or any degree of AS. 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.

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WAIVER GUIDE
Updated: Oct 98
By: Aeromedical Consultation Service (ACS)

CONDITION:
Bladder Cancer

I. Overview.

Aviators with a diagnosis of carcinoma of the urinary bladder are to be placed DNIF. Bladder cancer is the fourth most common cause of cancer in males and ninth in females with a 2.5 M:F ratio. The median age at diagnosis is 65. In North America, transitional cell is the most common type (95%) with pure squamous making up 3% and adenocarcinomas 2%. Fifty percent of bladder cancers may be related to cigarette smoking. Hematuria is the first sign of bladder cancer in 80 to 90% of cases, followed by urinary frequency and irritative symptoms. Depending on location of the tumor, ureteral obstruction may result in flank pain or discomfort. Diagnosis and staging is made by contrast visualization of the entire urinary system and biopsy of the bladder to include deep muscle. Pelvic CT or MRI evaluates for invasive disease and suspicious lymph nodes while CT of abdomen, MRI of brain, radionuclide imaging of the skeleton and chest x-rays assesses for metastatic disease. Seventy five percent of tumors present as superficial lesions, 20% have muscle invasion, and 5% are metastatic at diagnosis. Superficial disease (TNM classification: Tis, Ta, and T1) including CIS, stage 0a, and stage I have a 90% 5-year survival. Transuretheral resection is 80% curative but has a 30 to 80% chance of recurrent disease. Intravesical therapy may be indicated for treatment of recurrences or for prophylaxis but is associated with toxicities of bladder irritation, frequency, dysuria, contact dermatitis, and rarely systemic infection with BCG. Invasive stage II disease that does not extend beyond the muscle layer (TNM: T2, and T3a) has a 70% 5-year survival. Stage III disease (TNM: T3b) involves invasive bladder cancer that penetrates through the muscle layer into the perivesical fat and has a 35 to 50% 5-year survival depending on presence or absence of positive nodes. Standard therapy for all invasive disease is radical cystectomy with urinary diversion. In the case of metastatic (TNM: T4 N+ M+) or stage IV disease, the 5-year survival drops to less than 15%. Bone, lung, and liver are the most common sites. Standard treatment regimens include chemotherapy with a cisplatin combination (M-VAC or CMV) with significant side effect profiles. Prolonged survival after chemotherapy has been associated with increase in brain metastases.

II. Aeromedical Concerns.

Impairment may result from urinary frequency/urgency and tumor or clots may cause urinary tract obstruction with resultant pain. Recurrent superficial disease is unlikely to result in sudden incapacitation. Metastatic disease can occur at presentation or after initial treatment affecting visceral or bony sites with resultant impairment to incapacitation. Brain metastases could result in significant unrecognized cognitive impairment and invariably will lead to incapacitation. Ongoing therapy is generally incompatible with flying duties due to the above-described toxicity's affecting physical performance. Consider for waiver after two years disease-free.

III. Information Required for Waiver Submission.

Aeromedical summary should include (1) initial presentation, (2) all cystoscopy/surgical reports, (3) AFIP confirmation of histology, (4) chronology of therapy and results, (5) remarks that patient is in remission, off all medications, and free of physical limitations, (6) remarks concerning future follow-up including tumor board and oncology or nephrology recommendations. Upgrading of flying category requires full flying physical, CXR, contrast studies of entire urinary tract, and CT or MRI of the abdomen, pelvis, and any involved viscera. A bone scan is required if past history positive or suspicious bone pain warrants. Medical evaluation board (MEB) results should be included in initial package.

IV. Waiver Considerations.

Review of waiver files and ACS data reveals most requests for waivers have been favorably acted upon but essentially all were superficial disease. History of cystectomy or urinary diversion as well as presence of active recurrent or persistent disease is disqualifying.

V. References.

1. Dhote R, Beuzeboc P, Thiounn N, Flam T, Zerbib M, Christoforov B, Debre B. High incidence of brain metastases in patients treated with an M-VAC regimen for advanced bladder cancer. Eur Urol. 1998; 33(4): 392-5.

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WAIVER GUIDE
Updated: Mar 99
By: Col Barnes-Rivera

CONDITION:
Breast Cancer

I. Overview.

Breast cancer is one of the most common human malignancies and happily, one of the most treatable. The cumulative lifetime probability of developing breast cancer is 12% for American women. The frequency among males is approximately 1 percent of the rate for women. Carcinoma in situ of the breast can be either lobular (requiring more extensive surgical procedures) or ductal (often confined to one breast or even to one quadrant allowing more limited surgical procedures). Invasive breast cancer is most often of the invasive ductal type (80%). Less common types include infiltrating lobular (10%) and medullary carcinoma (5%).

At the time of detection, about half of breast carcinomas have already metastasized. Lymph node involvement has proven to be the most accurate and reproducible prognostic factor; recurrence-free survival has been reported to be as high as 72% in those who are node negative at diagnosis but only 25% in those with positive nodes. In general, the number of positive nodes correlates with both the probability of recurrence and the timing of same.

There are a number of other factors used to predict tumor recurrence including estrogen and progesterone receptors. Other factors still to be validated include the percentage of cells undergoing mitosis and various growth factors and genetic alterations.

II. Aeromedical Concerns.

Two issues are relevant in considering the aeromedical implications of a history of breast cancer. Firstly, the likelihood of recurrence must be quantified to the extent possible. Brain metastases while less common than bone, lung, or liver metastases, are of greatest aeromedical significance as they may cause headache, behavior change, and seizure. Secondly, any residual effects of therapy should be identified and their impact on the flying environment assessed.

III. Information Required for Waiver Submission.

Before waiver can be considered for a history of breast cancer, the full extent of the disease must be known and the probability for recurrence quantified. Clinically, the individual should be disease-free and fully recovered from all treatments, and must undergo MEB, tumor board evaluation, and AFIP confirmation of the histology. Surgical and oncology consultations are also required. Finally, MRI of the brain, bone scan, CT scan of the liver, and mammography of the contralateral breast are required.

IV. Waiver Considerations.

The USAF has limited experience with breast cancer in aviators. Two of three individuals in the waiver file were given waivers (one FC II and one FC IIA).

Specific waiver criteria do not exist at this time. Individuals who are disease-free and fully recovered will be considered on a case by case basis.

V. References.

1. DeHart RL. *Fundamentals of Aerospace Medicine.* Philadelphia, Lea & Febiger. 1985: 584-6.

2. Frykberg ER. Overview of the biology and management of ductal carcinoma in situ of the breast. Cancer. 1 Jul 1994; 74(1 Suppl): 350-61.

3. Mansour EG, et. al. Prognostic factors in early breast carcinoma. Cancer. 1 Jul 1994; 74(1 Suppl): 381-400.

4. Wilson JD, et. al. (ed). *Harrison's Principles of Internal Medicine*, 12th ed. New York, McGraw-Hill, Inc. 1991: 1840-50.

WAIVER GUIDE
Updated: May 06
By: Dr. Lowry

CONDITION:
Breast Implants

I. Overview.

Breast implants were developed and first marketed in the 1960s for cosmetic breast augmentation or reconstruction following cancer, trauma, or congenital defects. There were nearly 255,000 breast enhancement implant surgeries in the United States in 2003 alone, with an overall prevalence of 8.08 per 1000 American women.

There are two primary types: saline-filled and silicone gel-filled. Implants filled with other substances, such as soybean oil, are also being developed. 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. To date, no manufacturer has provided what the FDA deems sufficient evidence for or against the safety of silicone implants. They have remained available on a limited basis in the US and overseas to women enrolling in clinical studies but are still considered "investigational" devices. Reliable data regarding long-term safety (rate of rupture, health consequences, etc.) is lacking.

Depending on the type of implant, the shell is either pre-filled with a fixed volume of saline/silicone, or saline-filled through a valve interoperatively. 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 often 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. Some note a slight decrease, which is typically not functionally significant.

Health concerns: Postoperative and cosmetic complications include asymmetry, inflammation, pain, necrosis, changes in nipple sensation, infection, scarring, hematoma, skin dimpling and capsular contracture. Approximately 24-33% of women with breast implants have complications resulting in a reoperation during the first five years after implantation. Causes of implant rupture include trauma, overcompression of the breast, manufacturing defects, and deterioration of the implant shell.

Complications at 3 years post-op:

	Overall	Silicone	Saline
Rupture	0.2-71%		
Nipple sensation change	5-9%		
Breast pain	5-16%		
Capsular contracture		36-81%	8-41%
Rupture/deflation		0.3-77%.	3-5%
Post-op removal		8%*	

*Removal 14% at 5 years

Some women with breast implants have reported health problems that they believe are related to their implants, especially connective tissue diseases (fibromyalgia, rheumatoid arthritis, polymyositis, and chronic fatigue syndrome). Most studies have failed to show an association with breast implants. Studies have shown that some women with silicone gel-filled breast implants produced collagen autoantibodies; however, there are no data that show that the presence of these antibodies increases a woman's risk of developing connective tissue disease. Mammography and palpation are more difficult with implants. However, a recent Institute of Medicine report indicates that breast cancer is no more common in women with breast implants than those without.

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. Bubbles resolved spontaneously. Postoperative complications may result in prolonged DNIF, which could negatively impact the mission. Long-term health effects are not fully known.

III. Information Required for Waiver Submission.

Information provided to MAJCOM should include the clinical indications for the procedure, the operative report and copies of the postoperative course notes. Comment on incision site healing, postoperative complications, and ability to wear life support equipment. The surgical sites should be well-healed and at least 8 weeks post-surgery prior to waiver submission. If the procedure was indicated for reconstruction following mastectomy for breast cancer, waiver submission should also follow breast cancer waiver guide requirements.

IV. USAF Waiver Experience (extracted from AIMWTS, March 2006).

From Sep 01 to Mar 06, there have been 23 initial waiver requests for breast implants and 3 renewals. Of the 23, 20 were approved and 3 were disqualified (for concomitant conditions unrelated to the implants). Of the 20 approvals, 12 were granted indefinitely. The remaining 8 initial waivers and three renewals were granted for 1-3 years due to other concomitant conditions, including PRK, herpes requiring suppressive therapy, and adenocarcinoma of the breast. Of the 23 initial requests, 17 were saline, 3 were silicone, and 3 failed to specify the type. Only one of 23 had

known complications from the initial surgery resulting in reoperation. At least three of the women had breast augmentation without disclosing the surgery to Flight Medicine; two were discovered at the annual PHA, and one was disclosed several years postoperatively. There were no documented complications or incapacitation resulting from the aviation environment.

V. References.

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2. National Cancer Institute website at: http://www.nci.nih.gov/newscenter/siliconebreast

3. Inamed consumer website: http://www.inamed.com/con_info/us/con_information.html

4. Safety of Silicone Breast Implants, Institute of Medicine, National Academy Press, Washington, D.C. 2000. Available at www.iom.edu.

5. Inamed patient labeling at FDA's website at http://www.fda.gov/cdrh/breastimplants/.

6. Mentor patient labeling at FDA's website at http://www.fda.gov/cdrh/breastimplants/.

7. Air Force Instruction 48-123 22, Medical Examinations and Standards, A3.12.26, A7.16.1.22.

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WAIVER GUIDE
Updated: Mar 99
By: Dr. Withers

CONDITION:
Carcinoid Tumors

I. Overview.

Carcinoid tumors are neoplasms which secrete vasoactive chemicals. The majority of all carcinoid tumors are found incidentally in the appendix, and most of the remainder occur in the ileum. They may occasionally arise elsewhere in the gastrointestinal tract, bronchi, gonads, pancreas, or thyroid. Among gastrointestinal tumors, carcinoids account for only 1% of total neoplasms, but make up 20% of all malignant tumors. Although all carcinoid tumors are potentially malignant, appendiceal carcinoids smaller than two centimeters are typically benign.

Under certain conditions, carcinoid tumors that are actively producing excessive amounts of serotonin, histamine, bradykinin, prostaglandins, or polypeptide hormones may bring about the carcinoid syndrome. This clinical entity reflects the effects of the secreted vasoactive substances and features episodic flushing, cyanosis, abdominal cramping, and diarrhea. Exposure of the right heart to high serotonin levels leads to endocardial fibrosis and distorted pulmonic and tricuspid valves. Carcinoid crisis, consisting of intense flushing, abdominal pain, CNS depression, and hypo or hypertension, may occur in the patient with marked 5-HIAA elevation.

Intestinal carcinoid usually does not cause carcinoid syndrome unless it has metastasized to the liver, because its tumor products are rapidly neutralized on the portal circulation side. Tumor secretion in the liver, however, gets released directly into the systemic circulation. As alluded to, metastasis of carcinoids is clearly related to size. Usual sites of metastasis are mesenteric lymph nodes, liver, bones, myocardium, breast, and eye.

Carcinoid tumors of the respiratory tree represent less than 5% of all primary lung cancers. The large majority of these tumors are endocrinologically silent and are believed to demonstrate low-grade malignancy. Pulmonary nodal metastases are seen in about 5%-10% of resected specimens. Distant organ metastasis, primarily to the brain or liver is seen less commonly.

Treatment for primary carcinoid tumors is surgical resection. For the incidentally found appendiceal carcinoid, surgical management is curative. For more advanced carcinoids, resection accomplishes a five year cure in about half of patients. If resected mesenteric nodes are involved, the disease usually recurs. Median survival times are five years with unresectable abdominal metastases and three years with liver metastases. Five year survival for bronchial carcinoids is 70% if regional lymph nodes are involved and much higher if there is no evidence of metastasis.

II. Aeromedical Concerns.

Active carcinoid syndrome is obviously incompatible with flying duties due to its serious impact on physical performance. More importantly, the underlying malignancy must be located and adequately resected. Patients presenting with carcinoid syndrome are unlikely to receive a waiver. An incidentally discovered primary carcinoid tumor that has been adequately excised is highly

curable and waiverable. For cases intermediate to these extremes, the location and extent of tumor infiltration and any systemic harm wrought by vasoactive secretions would need to be assessed.

III. Information Required for Waiver Submission.

Surgical consultation and AFIP confirmation of diagnosis is required. Work-up must include a metastatic search to clear the liver. If the primary is a lung lesion, cerebral metastasis must be excluded. Cardiology consultation and echocardiogram may be required if the possibility of secondary valvular pathology exists.

IV. Waiver Considerations.

A command pilot was evaluated at Aeromedical Consultation Service (ACS) in 1978 for a carcinoid tumor of the proximal ileum that had metastasized to the peritoneum. Following surgical resection the pilot was found to be permanently disqualified for flying status.

V. References:

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2. Moertel CG, Weiland LH, Nagorney DM, et al. Carcinoid Tumor of the Appendix: Treatment and Prognosis. New England Journal of Medicine. 1987; 317: 1699.

3. Rubin E, Farber JL. *Pathology*, 2nd Ed. 1994, pp. 613, 694-5.

4. Skarin, AT. Scientific American Medicine. Subsection 12: ONCO, VI Respiratory Tract and Head and Neck Cancer. 1994, p. 7.

WAIVER GUIDE
Updated: Nov 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Cardiomyopathy

I. Overview.

The World Health Organization has functionally classified the idiopathic cardiomyopathies (diseases of the myocardium associated with cardiac dysfunction) into four broad categories – dilated, hypertrophic, restrictive, and arrhythmogenic right ventricular. The term "specific cardiomyopathy" is now reserved to define heart muscle disease associated with specific cardiac or systemic disorders. The specific cardiomyopathies include ischemic, valvular, hypertensive, etc. Some authors disagree with this classification scheme and prefer to retain a purely functional system qualified by "primary" for idiopathic and "secondary" for specific heart muscle diseases clinically closely simulating the former.

The natural history of dilated cardiomyopathy (DCM) is not well established but the 5 year mortality rate ranges from 20-50%. It may be difficult to predict the clinical course and outcome in a given individual. However, greater ventricular enlargement and worse dysfunction tend to correlate with a poorer prognosis. DCM is most common in middle-aged men; the onset may be chronic, subacute, or acute. The incidence is estimated at 5-8/100,000/year. Symptoms are generally progressive and include those of left ventricular failure (fatigue, exercise intolerance, dyspnea, etc.). Secondary right heart failure is a late sign. Arrhythmias, thromboembolism, and sudden death are common and may occur at any time.

Likewise, the clinical course in hypertrophic cardiomyopathy (HCM) is variable. In about 50% of patients it is transmitted in an autosomal dominant pattern; in the remaining 50% the cause is unknown. The prevalence of HCM is broadly estimated at 20-200/100,000. It is most commonly diagnosed in the 4th and 5th decades although it has been identified in all age groups including stillborns. Although a distinctive clinical feature, a pressure gradient of the left ventricular outflow tract is present in only about 25% of patients. Symptoms, when present, commonly include dyspnea, angina pectoris, fatigue, presyncope, and syncope. Arrhythmias and premature sudden death are common. Athlete's heart must be ruled out. Lists of risk factors associated with sudden death are available.

Restrictive cardiomyopathy (RCM) is distinctly uncommon in Western countries. The hallmark of RCM is abnormal diastolic function; the ventricular walls are excessively rigid and impede filling. It must be differentiated from constrictive pericarditis, which can be successfully surgically treated. Relentless symptomatic progression and high mortality are common.

Arrhythmogenic right ventricular cardiomyopathy is rare. It is characterized by progress fibrofatty replacement of right ventricular myocardium. Familial disease is the common, with autosomal dominant inheritance and incomplete penetrance. Ventricular arrhythmias and sudden death are frequent.

II. Aeromedical Concerns.

The primary concern is one of sudden incapacitation. In the aeromedical environment dyspnea, angina pectoris, palpitations, and presyncope can result in fatalities, not to mention syncope, arrhythmias, thromboembolic phenomena, and sudden death. Even in mild/early cases, lack of physical stamina may be an issue.

III. Information Required for Waiver Submission.

Cardiology consultation is required to include necessary diagnostic tests. Consideration should be given to routine labs, ECG, PFTs, CXR, echocardiogram, 24-hour Holter monitoring, ETT, thallium scintigraphy, and cardiac catheterization. Underlying causative diseases/conditions must be excluded. MEB may also be required.

IV. Waiver Considerations.

Generally the cardiomyopathies are not waiverable. Only mild cases of DCM which resolve over time might be considered for waiver after ACS evaluation. Less than 25% of aviators with cardiomyopathy have returned to military flying duties.

V. References.

1. Circulation. 1996; 93: 841-2.

2. Braunwald E, ed. *Heart Disease*, W.B. Saunders Co., Philadelphia, PA, 5th edition, 1997: 1404-34.

WAIVER GUIDE
Updated: May 07
By: Capt Roger Thomas (ACS staff), Dr Karen Fox and Lt Col John Gooch (Chief, Aerospace Ophthalmology at ACS)

CONDITION:
Cataract, Capsular Opacification, and Intraocular Lens Implant

I. Overview.

A cataract is an opacity of the lens or the surrounding lens capsule in the eye. 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. Further, these changes increase the refractive index leading to slightly induced myopia, and lens hardening leads to a decrease in the lens' accommodative ability. These nuclear sclerotic changes are a normal occurrence in adults middle age 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 surgery is extraction of the cataract leaving the lens capsule intact in the eye, an extracapsular extraction. The modern version of this procedure is called phacoemulsification. Phacoemulsification 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. 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.

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 have been designed to help mitigate this problem. The 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] Since the natural lens filters ultraviolet light, some IOLs have been developed with tints added to help filter ultraviolet light and prevent retinal damage.

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. One piece silicone IOLs are <u>not</u> approved for aircrew use because they do not fix well to the capsular bag. The multifocal IOLs and the newer accommodating IOLs are also <u>not</u> approved for aircrew use. Finally, any IOLs with plate designs, tints in the visual spectrum including blue-blocking chromophores and positioning holes are <u>not</u> 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 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 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 threaten 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; however, often the distortion of vision that accompanies aphakic spectacles or contact lenses is intolerable.[2]

II. Aeromedical Concerns.

The decreased visual acuity, contrast sensitivity or symptoms of glare associated with cataracts has the potential to adversely affect the safety of an aircrew member and the mission. Even if a lenticular opacity does not significantly impact vision at present, most acquired opacities progress, some relatively quickly. This progression necessitates, at a minimum, monitoring of any potentially progressive cataract or lenticular opacity to ensure visual functioning remains unaffected.

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]

III. 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) 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** <u>without</u> 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) 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) 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.

IV. Waiver Considerations.

Figure 1: Outlines the initial waiver work-up decision path for ocular opacities and cataracts.

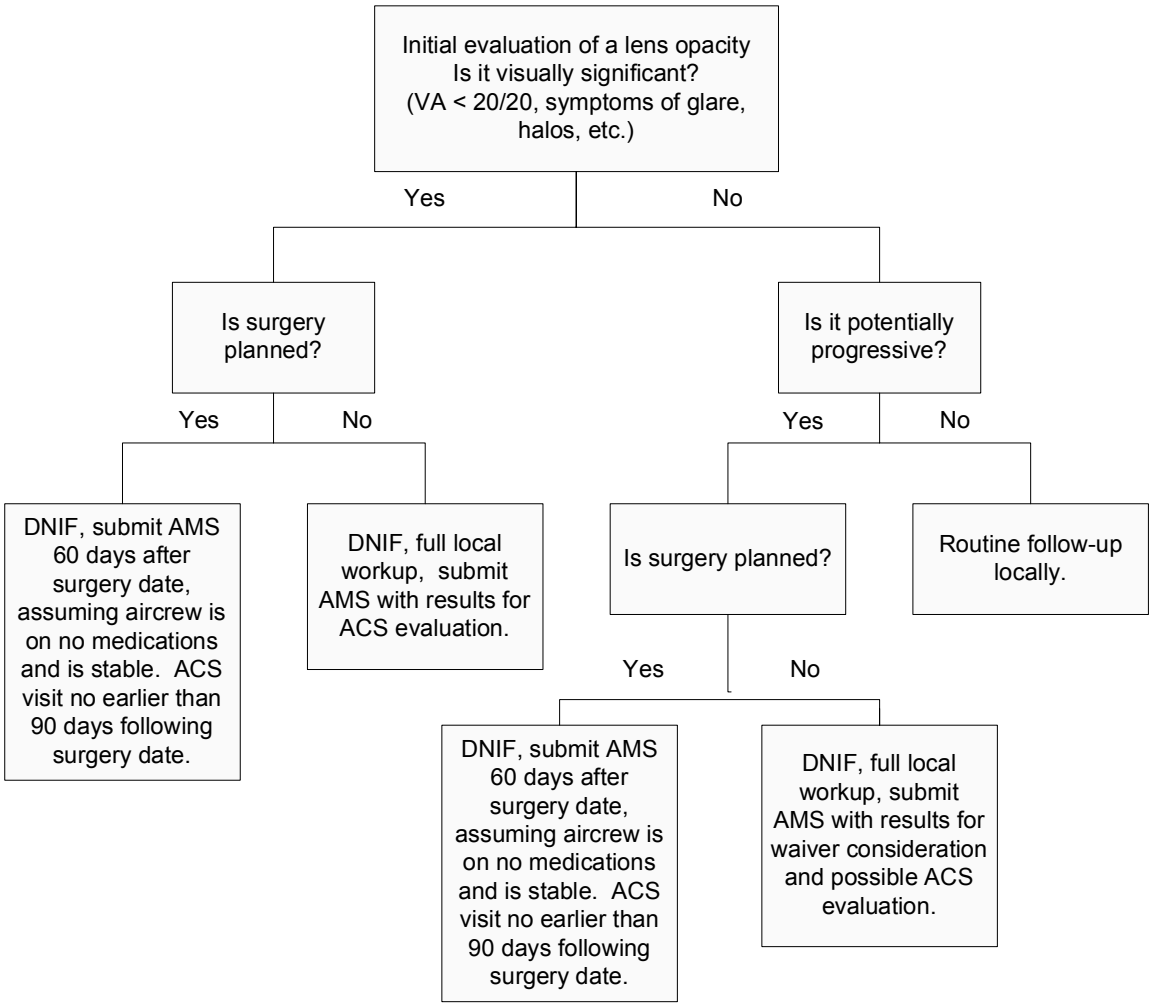

Figure 2: Outlines the waiver workup decision path for cataract or IOL renewal waivers.

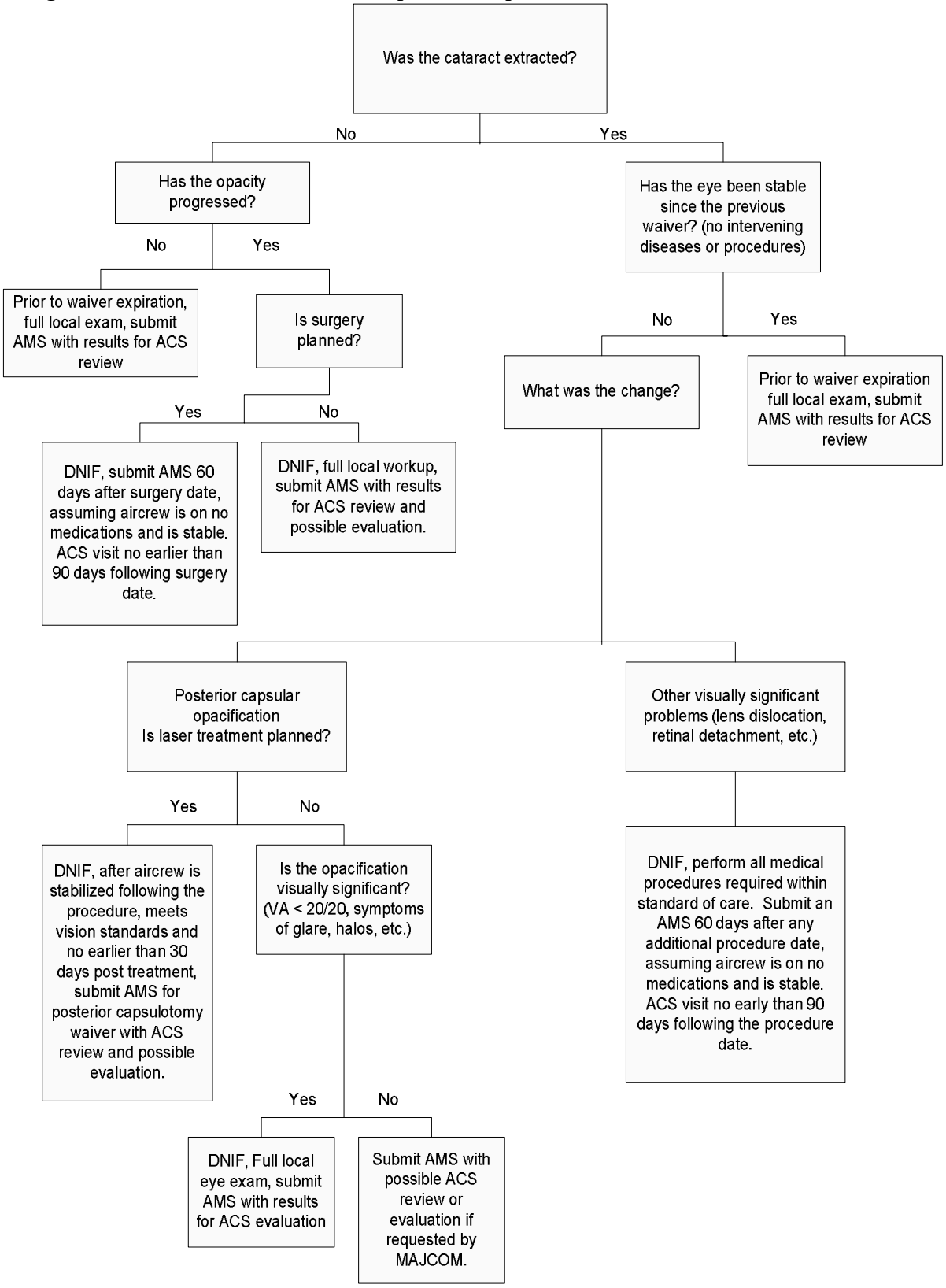

Table 1: Waiver potential and required ACS evaluation for cataracts and lenticular opacification.

Flying Class	Condition/Treatment	Waiver Potential Waiver Authority	ACS Evaluation/Review
I/IA	Asymptomatic, visually insignificant, non-progressive lenticular opacity	N/A AETC	No†
	Symptomatic, visually significant, or potentially progressive lenticular opacity or cataract, pseudophakic, aphakic, or capsular opacification	No AETC	No
II/III*	Asymptomatic, visually insignificant, and non-progressive lenticular opacity	N/A	No
	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, possibly review only on subsequent renewals

† ACS evaluation may be requested if questions on progressiveness or significance
* For initial flying class II and III physicals, waiver is not likely for cataracts deemed potentially progressive or for history of cataract surgery.
‡ Waiver can be submitted 30 days post laser treatment.

Review of AIMWTS through mid March 2007 showed 110 cases of cataracts for FC I/IA, II and III flyers, all aeromedical summaries were reviewed. Twenty-five (25/110 – 23%) were disqualified;

seven FC I/IA, eight FC II and ten FC III. Of the seven disqualified FC I/IA, six were for cataracts and the seventh was for another eye condition. Of the eight disqualified FC II, five were for cataracts (initial or not correctable to 20/20) and the other three were for other medical conditions (e.g. rheumatoid arthritis, alcohol abuse). Of the ten disqualified FC III, four were for cataracts (initial or not correctable to 20/20) and the other six were for other medical conditions (e.g. sleep apnea, hemochromatosis, hearing, ARMA, multiple sclerosis).

V. References.

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WAIVER GUIDE
Updated: Jun 99
By: Lt Col O'Toole

CONDITION:
Central Retinal Artery/Vein Occlusion

I. Overview.

Central retinal artery occlusion (CRAO) is an uncommon and irreversible condition, which typically occurs unilaterally in atherosclerotic and hypertensive individuals, resulting in sudden painless loss of vision. Branch forms may also occur. Ophthalmoscopy reveals a pale, opaque posterior retina, often with emboli present at the bifurcations of the retinal artery (Hollinhorst plaques). The choroid will remain visible behind the fovea as a cherry red spot. The direct pupillary response to light is reduced or absent, however, the consensual response remains intact. Blood flow may sometimes be restored to parts of the retina by acutely massaging the globe through closed eyelids or rebreathing CO_2 to dilate peripheral retinal vessels.

Another possible cause for CRAO is giant cell (temporal) arteritis of the central retinal artery but this is usually in older patients. Other less common causes are collagen vascular disease, hypercoagulation disorders, sickle cell disease, syphilis, Behcet's disease, and sustained vasospasm from migraine.

Central retinal vein occlusion (CRVO) is also an uncommon and usually unilateral problem. It presents with gradual, painless loss of vision. Branch forms may also occur. Predisposing conditions include diabetes, hypertension, cardiovascular disease, collagen vascular disorders, syphilis, hyperviscosity states (polycythemia, multiple myeloma, leukemia, cryoglobulinemia, sickle cell disease), optic nerve compression by tumor or thyroid ophthalmopathy, and medications, such as diuretics and oral contraceptives. Patients may be divided into two subgroups: ischemic and nonischemic. The non-ischemic group may have mild loss of visual acuity and normal peripheral vision. The ischemic group is felt to have deficient retinal arterial supply compounding the venous obstruction. Their visual acuity and peripheral vision loss is often more pronounced.

CRVO may cause progressive loss of visual acuity. In one study, 50% of non-ischemic eyes and 93% of ischemic eyes had a final visual acuity of less than 20/200. In addition, eyes with CRVO are at risk for developing anterior segment neovascularization, which leads to neovascular glaucoma. This usually develops within 90 days, but ischemic eyes may remain at risk for years. Vascular occlusion in the fellow eye is reported to occur in 16% to 25% of patients. In addition, macular edema is reported to occur in approximately 50% of cases of occlusion of the temporal branch of the retinal vein. At present there is no treatment that has been proven to improve vision in eyes with CRAO or CRVO. Hyperbaric oxygenation treatment is also being investigated following central or branch retinal vein occlusion.

II. Aeromedical Concerns.

With prolonged CRAO, the retina becomes infarcted, resulting in loss of vision. The presence of this condition also indicates that the individual may be at risk for stroke. Even if vision is 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.

III. Information Required for Waiver Submission.

Refer the individual for ophthalmologic consultation. The specialist should assess visual acuity, visual fields, and the status of the fellow eye. Additionally they should determine the presence or absence of macular edema, significant retinal hemorrhage, neovascularization, and glaucoma. The complete evaluation should also exclude consideration of any potential underlying etiologies, such as hypertension, heart disease, diabetes, hematologic disease, or collagen vascular disorders.

IV. Waiver Considerations.

Waiver is dependent on the final visual acuity and the absence of other significant pathology. The consequences of CRAO and CRVO are generally too serious to waiver, but some branch forms may be waiverable after Aeromedical Consultation Service (ACS) evaluation.

V. References:

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WAIVER GUIDE
Updated: Mar 98
By: Aeromedical Consultation Service (ACS)

CONDITION:
Cervical Cancer

I. Overview.

Cancer of the cervix is the third most common malignant neoplasm in women (after lung and breast). Of all cervical cancers, 85-90% are squamous cell.[1] It is thought by many researchers to be, in part, caused by human papilloma virus (HPV). The Third National Cancer Survey by Cramer and Cutler found an age-adjusted annual incidence rate of 15.0 invasive cervical cancers per 100,000 white women and over double that number, 33.6/100,000 in African American women.[2] Another study, by Davis found *prevalence* rates in excess of 1,000/100,000 for intraepithelial cancer in the 30- to 45-age group.[3] The incidence and prevalence rates can vary even more considerably between different population and geographic localities; for example, in Israel the incidence rate is 12 per 100,000 and in Columbia is 15 times as high, or 180 per 100,000.[4] The median age in the US for carcinoma in situ is 35-40 years, while it is 10 years later for invasive cancer.[5]

Risk factors include early age of first vaginal intercourse, multiple sex partners, low socioeconomic status, and history of either HPV or Herpes Simplex II viral infection.[6] The advent of the annual gynecological examination, to include the Papaniculoau (Pap) smear, has resulted in much earlier detection of this disease, thus dramatically increasing cure rates. Localized disease can be treated with laser, cautery or cone biopsy; more invasive cases may necessitate a hysterectomy. For simple dysplasia and carcinoma in situ (CIN), considered Stage 0 cancer by the International Federation of Obstetrics and Gynecology (FIGO) classification, there is an almost 100% survival rate with therapy. For more established cervical cancer at diagnosis, Stages I through IV, the post-treatment survival rates are estimated at 85%, 50-60%, 30%, and 5-10%, respectively.[7]

II. Aeromedical Concerns.

Within the typical age group of aviators, it is noteworthy that cervical cancer is the most common invasive cancer in women aged 25-29 years; it is the second most common in the 30-34 year age group.[8] While CIN and early-stage carcinoma usually are asymptomatic and do not pose a significant threat in the aerospace environment, manifestations of advanced disease, especially metastatic, include anemia, weakness and weight loss. Additionally, distracting pain may be caused by invasion of the pelvic nerves. For these reasons, cervical cancer, upon diagnosis, is disqualifying for aviation duties. Waiver may be considered, however. A search of the Defense Technical Information Center (DTIC) reference base revealed no documents concerning cervical cancer and aeromedical ramifications.

III. Information Required for Waiver Submission.

Medical evaluation board (MEB), tumor board recommendations and AFIP confirmation of the histology are required. Waiver requests should be accompanied by gynecology and oncology opinions and must include a thorough description of curative procedure(s) and clinical course.

Local, instead of ACS, evaluation may be acceptable in selected cases; however, a chart review of the specific case by ACS is required.

IV. Waiver Considerations.

Continuation of therapy is incompatible with flying status. There are no cases in the ACS database, although waiver has been granted without ACS evaluation for at least one individual. However, waiver is not required for dysplasia or carcinoma in situ or for those cases treated as outpatients by laser or cautery. For other patients without evidence of spread, waiver can be considered three months after operation. Aircrew with evidence of metastasis are grounded but may be considered for waiver two years after completion of therapy as long as there is no evidence of recurrence.

V. References.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Lavellee

CONDITION:
Cholesteatoma

I. Overview.

Aural cholesteatoma consists of accumulations of desquamating keratinized epithelium within the middle ear or other pneumatized portions of the temporal bone. When localized in the middle ear it is a menacing disease and frequently results in hearing loss due to erosion of the ossicular chain. Untreated, there is a risk of labyrinth and cochlear involvement resulting in vertigo and sensorineural hearing loss. Cholesteatoma is difficult to distinguish from chronic otitis, and definitive diagnosis is usually made at the time of surgery. Presenting symptoms may include ear discharge (otorrhea-75%), otalgia (<50%), and vertigo(<50%). Hearing loss may be insidious. Previous operations on the middle ear and/or history of otitis as a child increase the risk of developing cholesteatoma as an adult.

II. Aeromedical Concerns.

The aeromedical concerns include: 1) hearing loss, and 2) development of a serious complication such as labyrinthitis, facial paralysis, or intracranial suppurations (due to the ability of cholesteatomas to harbor bacteria and destroy bone, and the risk of recurrence after surgery). Improved surgical techniques have reduced the incidence of recurrence.

III. Information Required for Waiver Submission.

Full evaluations by an audiologist and an otolaryngologist are required, including prognosis. A copy of the surgery report should also be forwarded to the Aeromedical Consultation Service (ACS).

IV. Waiver Considerations.

100% of the individuals on record with ACS evaluations for cholesteatoma have received waivers (as of 1 Nov 97). The ACS evaluation will include flight medicine and audiology evaluations, with otolaryngology consultation as needed.

V. References.

1. Aberg B, et al. Clinical characteristics of cholesteatoma. American Journal of Otolaryngology. Sept 1991; 12: 254-8.

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WAIVER GUIDE
Updated: Feb 00
By: Aeromedical Consultation Service (ACS)

CONDITION:
Chronic Obstructive Pulmonary Disease

I. Overview.

Chronic obstructive pulmonary disease (COPD) affects over 15 million people in the US alone. The mortality rate has actually risen, and it is now the fourth leading cause of death. While there is occasional disagreement regarding classification, COPD as used here encompasses emphysema, chronic bronchitis, or a combination of the two. Asthma is sometimes classified as a form of COPD, and some cases are virtually indistinguishable from chronic bronchitis, but asthma is covered in a separate section of this Waiver Guide. The pathogenesis of COPD involves destruction of the alveoli (emphysema) or obstruction of the large and small airways (chronic bronchitis); most cases have elements of both.

II. Aeromedical Concerns.

There are numerous risks associated with chronic obstructive pulmonary disease. The disease process results in reduction of maximal oxygen uptake and exercise tolerance. There is some evidence that those with COPD may be more prone to cardiac dysrhythmia and output compromise. Emphysematous bullae may trap air, resulting in respiratory compromise, even pneumothorax, upon descent. However, the primary concerns center around the effects of airflow obstruction and hypoxemia.

The commonest result of airflow obstruction is dyspnea. Dyspnea is a distressing, even frightening, symptom, and if of any significant degree is likely to be aeromedically incapacitating. For such a common symptom, the cause and even the exact definition of dyspnea are hard to pin down. 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, a critical determinant is the rapidity with 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 increasing exercise intolerance to inactivity or age, and not present for evaluation until the disease has become severe.

Arterial hypoxemia is of obvious concern, affecting cognition, special senses, and exercise tolerance. The aircraft environment is devised with the normally oxygenated individual in mind; cabin altitudes that allow acceptable oxygenation in the normal individual may well be insufficient for the person with lung disease. While several papers have addressed the tolerance of patients with COPD to commercial cabin altitudes, they 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 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.

III. Information Required for Waiver Submission.

Aviators with a diagnosis of COPD require evaluation by an internist or pulmonary specialist. The submitted package should include results of CXR, spirometry pre- and post-bronchodilator challenge, static lung volumes (preferably plethysmographic), and room air blood gases with calculated A-a gradient.

IV. Waiver Considerations.

The major considerations are adequate oxygenation, and a lack of airway reactivity by history and spirometry. There has almost certainly been a heavy selection bias in the waiver file; with only 188 waiver requests across all flying classes since 1973, it is likely that only those with a reasonable chance of waiver were submitted for consideration. The majority received a waiver, in most cases for minimal COPD.

V. References.

1. Berg BW, Dillard TA, Derderian SS, Rajagopal KR. Hemodynamic effects of altitude exposure and oxygen administration in chronic obstructive pulmonary disease. Am J Med. Apr 1993; 94: 407-12.

2. Lategola MT, Flux M, Lyne PJ. Altitude tolerance of general pilots with normal or partially impaired spirometric function. Aviat Space Environ Med. Sep 1978; 49(9): 1123-5.

3. Lategola MT, Flux M, Lyne PJ. Spirometric assessment of potential respiratory impairment in general aviation Airmen. Aviat Space Environ Med. Jun 1977; 48(6): 508-1.

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WAIVER GUIDE
Updated: Jun 99
By: Major Knight

CONDITION:
Color Vision Deficiencies

I. Overview.

Normal color vision requires normal amounts and functioning of all 3 cone types and is called normal trichromasy. An individual who has a reduced amount of one cone type is an anomalous trichromat and is regarded to be "color weak" in a certain area. An individual who is missing one cone type completely is color blind and is called a dichromat or deutan, eg. protanope or deuteranope. All color defectives are unique given the degree, type, and allelic expression of the defect.

Defective color vision is most commonly a male congenital disorder. In Caucasians, over 8% of males have inherited red-green color defective vision and over 2% are dichromats with severe deficiency. Congenital blue-yellow disturbances are very rare as are any congenital color deficiencies in females. The largest group is actually trichromatic, ie. color weak instead of color blind. Dichromats are classified as: protanopes, when there is a red-green deficiency related to red-sensitive cone absence; deuteranopes, when there is a red-green deficiency related to green-sensitive cone absence; and tritanopes, when there is a blue-yellow deficiency related to blue-sensitive cone absence. Protanopes and deuteranopes have difficulty with VASI lights, which require recognition of small changes in red-white end marker lights. In addition, dichromats may be further reduced to monochromaticity when the physiological phenomenon of small field tritanopia is added or color filters are used; this is of relevance when spotting navigation and anticollision lights or when wearing a color filter visor such as the High Contrast Visor (yellow) or Laser Eye Protection (LEP). It also is operationally relevant with respect to ground target discrimination and performance on multicolored displays. Acquired color vision deficits are estimated to exist in 5-15% of the population, and they affect males and females equally. They can result from a variety of ocular diseases such as optic neuritis, macular degeneration, central serous retinopathy, multiple sclerosis, and heavy metal poisoning or as a side effect of medication, such as antimalarials. Color vision deficiencies of any type are no longer acceptable for pilot applicants (UPT).

Current USAF selection policy accepts only testing with pseudoisochromatic test plates (VTS-CV; PIP). The FALANT test has been dropped. Furthermore, only certain PIP versions are acceptable: Dvorine, Ishihara, and the original version of the AO. The Richmond and Beck Engraving plates are no longer accepted. The PIP I test only screens for red/green deficiencies. A new PIP II screens for blue/yellow deficiencies and is being used along with other tests to evaluate and baseline all UPT candidates at Enhanced Flight Screening (EFS-M). In addition, current USAF testing policy in trained aircrew is being revised to require repeat color testing annually in order to diagnose acquired conditions such as from disease or phototoxicity (lasers). The key to all testing is proper administration. All plate tests should be administered monocularly in a dark room utilizing the standardized Illuminant C light source or approved equivalent. Any other lighting, or method of administration, invalidates the test. Test scores are recorded as the number correct over the number administered. To pass the PIP, a score of 10/14 is required (no more than 4 incorrect).

Inherited color vision deficits are not correctable, but the person can be educated generally to know what limitations the condition imposes upon the individual in normal life, as each color defective is different. The acquired conditions include a broad list of ocular diseases, and any resolution of the color deficiency is dependent on the success of the treatment of the underlying condition. In many cases, when the underlying condition resolves, so does the acquired color deficiency, but not always.

II. Aeromedical Concerns.

Intact color vision is required for accurate identification and interpretation of warning lights and information transfer from multi-colored visual displays in the cockpit as well as for the perception and utilization of information from other visual cues such as VASI lights during night and low visibility flying, ground targeting, visual identification of other aircraft, and air-to-air refueling. Laser protective visors other and colored filters, such as the yellow High Contrast Visor (HOV), induce color defects that can interact with other optical appliances required for flying and may compound a given problem. They also further degrade color weak individuals and may render color defectives to become totally color blind.

A collision on the River Elbe in 1902, causing 107 deaths, was found to be the result of a defect of color vision and was an early example of an accident related to defective color discrimination. This and other events led to the traditional requirement for red/green/white color standards within the transportation industries. Those traditional red/green/white requirements were later adopted and carried forward into aviation even to the present day. Recently, in 1996, an acquired red-green deficiency was the causative factor in a fatal train accident in the USA as well. Although more information can be presented faster and more effectively by using color displays, that information transfer relies on normal color trichromacy. In addition to hue discrimination problems, color defectives take longer to interpret color-based data, must be closer to the color-based target, and make significantly more mistakes than color normals interpreting such color-based information. Their abilities have been shown to deteriorate disproportionately even further under visually deprived conditions, such as decreasing illumination levels or under degraded contrast conditions. Traditional color screening in aviation was based on congenital red-green disturbances in males and sought to eliminate the moderate-to-severe color weak and true color blind from flying in the past, but now, because of increasing color demands in modern operational environments, all color defectives are being disqualified from military flying raining. Identification of a color deficiency in a trained aviator requires complete color testing, a review of proficiency in the current aircraft, and reassessment prior to a change in aircraft assignment. Color defectives are not authorized to use either the HCV or other colored filters such as LEP visors.

III. Information Required for Waiver Submission.

For FC II and FC III, if the aviator identifies less than 10 out of 14 plates on the standard PIP, then an Aeromedical Consultation Service (ACS) evaluation is needed for categorization of type and degree of color deficiency. The FALANT is no longer utilized by the USAF as a selection test, however, it may be utilized by the ACS and waiver authorities to help determine a trained color defective's stability and operational abilities.

Due to the variability in testing in the field, unwaiverability of alternate tests results, and the requirement for further qualitative and quantitative determination of specific color deficiencies, aviators will be required to be tested at the ACS.

IV. Waiver Considerations.

Waivers for flying training will not be recommended for any category of color deficiency.

V. References.

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2. Peters, DR, Tychsen L. A brief guide to color vision testing for ophthalmology residents. USAFSAM-TP-87-6, Feb 1988.

3. Pokorny and Smith.

WAIVER GUIDE
Updated: Nov 03
By: Maj Beyer

CONDITION:
Colorectal Cancer

I. Overview.

Colorectal cancer (CRC) is the most common gastrointestinal malignancy and the second leading cause of cancer death. The incidence in the U.S. averages 130,000 cases per year and generally occurs in individuals 50 years of age or older with peak incident at age 75. The vast majority of colorectal cancers are adenocarcinomas, although other large bowel malignant tumors include: anal carcinoma, lymphoma, leiomyosarcoma, malignant carcinoid tumor and Kaposi's sarcoma. The large bowel may also be involved via direct invasion from adjacent organs. Several histopathologic staging systems are used to evaluate the extent of the malignancy, such as Duke's or TMN, that classify the cancer by depth of invasion, lymph node involvement, and presence of metastasis. The extent of disease at diagnosis correlates directly to outcome.

Current therapy involves multidisciplinary approach with consideration given to immediate management, postoperative adjuvant therapy (radiation and/or chemotherapy), plans for future assessment for local recurrence or distant metastasis, and the evaluation of family members at increased risk. Initially surgical resection of the affected segment of bowel, including omentum and lymph nodes, is the primary goal. In the majority of cases, adjuvant therapy will be required.

While the Preventive Services Task Force, Gastrointestinal Consortium, American College of Gastroenterology, and American Cancer Society have not reached a consensus on which method of screening should be utilized (occult blood exam x 3, sigmoidoscopy, both, or colonoscopy), or how often, all agree, and multiple studies bear out, the significant decrease in CRC mortality (15-33%) based on utilization of any of the mentioned screening methods.

II. Aeromedical Concerns.

Of significant concern with CRC is the potential for sudden incapacitation as the initial presentation; emergent obstruction or perforation may occur in up to 30% of cases. Chronic anemia presents more insidiously and can cause in flight problems if undetected. Also, while CRC preferentially metastasizes to the liver (20-30% of cases) or lung (10-20%), the potential exists for intracranial lesions. At initial diagnosis, 2-3% of patients may have brain metastases and up to 10% will develop brain lesions during the course of their disease. Alternately, CRC has a late age onset and slow progression, thereby removing most patients from the USAF flying window. Regular screening (variable but instituted within the USAF) 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. Overall survival at ten years is 50%, however the extent of the disease at the time of treatment will provide a more accurate correlation. Cancer confined to the mucosa has an 80-90% 10 year survival, cancer extending through the bowel wall has a 70-80% 10 year survival, and cancer involving the regional lymph nodes has a 30-55% 10 year survival. The five-year

survival point can be used as a reliable mark of cure as most CRC recurrences do so within the first four postoperative years.

III. Information for Waiver Submission.

Before a waiver for history of colorectal cancer can be considered, the full extent of the disease must be known and the probability of recurrence quantified. Waiver will be considered where the tumor has not invaded the free peritoneal cavity, has not metastasized, and only after successful resection and completion of adjuvant therapy. Preoperative radiation therapy is often combined with fluorouracil and leucovorin in an effort to decrease local recurrence and distant spread and may also be used to reduce tumor size increasing resectability. The postoperative administration of radiation and chemotherapy is often now standard therapy and has been shown to decrease local recurrence and distant metastasis. Similarly, patients with resected CRC with lymph node spread have improved survival if treated with the combination for 6 months, and waiver will be considered two years after completion of adjuvant therapy. Patients with metastasis will generally not be considered for waiver. The presence of colostomy or ileostomy is not compatible with military aviation.

Clinically, the individual should be disease-free and fully recovered from all treatments. Medical evaluation board (MEB) and tumor board evaluation reports must be included. Armed Forces Instituted of Pathology (AFIP) must confirm the histopathologic diagnosis. Surgical and oncology consultations are required, as are liver function tests and serum carcinoembryonic antigen (CEA) measurement. Abdominal CT/MRI scan and colonoscopy results are required. Colonoscopy should be repeated 1-year post treatment completion and every 3 years thereafter (new adenomas require 3 or more years to develop into large adenomas with malignant potential).

IV. Waiver Considerations.

US Air Force Experience: In the past 10 years, 1 patient has been evaluated for CRC at the Aeromedical Consultation Service (ACS) and has been returned to flying duties. Outside the ACS, 12 patients have been evaluated (presumably at the MAJCOM level), and 10 have been returned (83%).

V. References.

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2. DeHart RL, ed. *Fundamentals of Aerospace Medicine*. 3rd ed. Philadelphia. Lippincott W&W. 2002: 316, 449-450.

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4. Wronski M, Arbit E. Resection of Brain Metastases from Colorectal Carcinoma in 73 Patients. Cancer. 1998; 85(8): 1677-85.

WAIVER GUIDE
Updated: Mar 06
By: Dr William Kruyer and Dr Jeb Pickard

CONDITION:
Coronary Artery Disease

I. Overview.

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 are 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* disease.

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 identified 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.

Because aggregate successfully stratified cardiac risk, the combined SCAD50-70 and MCAD groups, consisting of all aviators 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; 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 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 minimal CAD 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.

III. Information Required for Waiver Submission.

All aviators/aircrew with suspected or known CAD diagnosed locally, require ACS review/evaluation prior to waiver consideration. For ACS evaluation of initial waivers for FC II or FC III, submit:

1. Aeromedical summary.
2. Reports of any local consultations.
3. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, stress nuclear imaging).

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.

IV. Waiver considerations.

CAD is disqualifying for all classes of flying duties. Waiver is not recommended for FC I/IA or for unrestricted FC II/III duties. Waiver may be considered for categorical FC II/III duties depending on the severity and extent of disease.

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/III[1]	MAJCOM	ACS evaluation initially and four years later, then annually
MinCAD Aggregate <50%	FC IIA rated aviators[2] Categorical FC III[4]	Yes AFMOA Yes MAJCOM	ACS evaluation initially and annually ACS evaluation initially and annually
ModCAD Aggregate ≥50% and <120%	FC IIC pilots[3], FC IIA navigators, flight surgeons[3] Categorical FC III[4]	Yes AFMOA Yes MAJCOM	ACS evaluation initially and annually ACS evaluation initially and annually
SCAD Aggregate ≥120% or max lesion >70%	All Flying Classes[5]	No AFMOA	N/A
Any CAD	FC I and FC IA	No AETC	N/A

1. Luminal irregularity only (LI) is eligible for unrestricted FC II/III waiver.
2. MinCAD is eligible for FC IIA waiver.
3. 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.
4. MinCAD and ModCAD are eligible for categorical FC III waiver, limited to low performance aircraft.
5. 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.

Individuals with a waiver for LI only will be reevaluated at the ACS four years after diagnosis, then every year 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 three years routinely, or sooner for symptoms suggestive of ischemia or deterioration in noninvasive testing.

These waiver considerations apply to ***asymptomatic*** aviators/aircrew who have not had a coronary artery revascularization procedure (e.g. stent, angioplasty, bypass surgery). Coronary revascularization is addressed in a separate waiver guide chapter.

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WAIVER GUIDE
Updated - Mar 06
By Dr William Kruyer

CONDITION:
Coronary Artery Revascularization

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 infraction (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.

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. 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).

IV. 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 FC III aircrew and for nonpilot rated aviators (FC IIA) (navigators, flight surgeons and air battle managers). Waiver policy is not approved for pilots. 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.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Sumpter

CONDITION:
Cranial Neuralgia

I. Overview.

Cranial neuralgia includes trigeminal neuralgia (TN) and glossopharyngeal neuralgia (GN). Pain is the chief symptom in these conditions and can be incapacitating in severity. In TN, the pain is unilateral and occurs at a site in the distribution of the trigeminal nerve. The pain may be confined to a single branch of the nerve or may involve any combination of the branches. In addition to unilateral pain involving the throat and/or ear, syncope may also occur with an attack of GN.

Although most cases are idiopathic in origin, studies may need to be done to rule out underlying diseases as causes of TN or GN. Causes can include: MS, aneurysm, tumor, or infection.

Anticonvulsant drugs can reduce the intensity and duration of an attack of TN in 70-80% of the victims but they eventually lose effectiveness in half of the patients. Vascular decompression via craniotomy had a success rate of 70% in a series of 1185 patients with a recurrence rate of less than 1% per year over 10 years. Radio-frequency ablation has also been done for TN. Vascular decompression done for GN was successful in 32 of 40 patients for an average follow-up period of 4 years in one series. Surgical sectioning of the glossopharyngeal nerve and upper rootlets of the vagus nerve has also been done for GN.

II. Aeromedical Concerns.

Incapacitation by pain or syncope can cause loss of aircraft control. Anticonvulsant medications commonly used for treating these conditions are currently not waiverable.

III. Information Required for Waiver Submission.

Neurological and ENT consultations are required. Aviators who had Raeder's neurovascular syndrome as a concurrent diagnosis also require a CT scan.

IV. Waiver Considerations.

Central waiver file review found 6 well documented cases of trigeminal neuralgia and one of glossopharyngeal neuralgia in military aviators. FC II waivers were granted for non-recurrent, non-incapacitating TN following DNIF observation periods off medications of at least two months (6 months if treated surgically). RTFS required absence of both underlying disease and symptoms although a stable-improving Horner's syndrome with only a small amount of miosis was acceptable. Small areas of post-surgical facial anesthesia were also acceptable if functional testing was passed (such as a chamber flight to test oxygen mask wearability). A FC II waiver (flight surgeon) was granted for a case of recurrent but non-incapacitating GN after a DNIF observation period of 6 months.

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WAIVER GUIDE
Updated: Nov 2005
By: Lt Col Eveline Yao

CONDITION:
Crohn's Disease

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 due to transmural involvement and the variability of the extent of disease. 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 5 per 100,000 persons/yr and the prevalence is 50-90 per 100,000 persons. Women have a slightly higher risk than men to develop Crohn's disease with a peak age at onset between 15 and 25-30 years of age. The absolute risk of Crohn's disease is 5-8% among first-degree family members. There is also a positive association with smoking, in contrast to UC, and with a diet high in refined sugar. Discontinuous ("skip lesions"), transmural granulomatous inflammation of the GI tract is characteristic of Crohn's disease. Pathologic findings include a thickened and rubbery bowel wall with a narrowed lumen which can progress to strictures. Noncaseating granulomas are characteristic but frequently absent. Aphthous ulcerations of the bowel mucosa may progress to transverse and linear ulcers giving rise to a cobblestone appearance. These linear ulcerations may deepen and fissure with transmural penetration leading to abscess and fistulae formation.

Clinically, Crohn's disease is characterized by intermittent exacerbations of disease with interludes of remission. Typical symptoms include diarrhea, colicky abdominal pain, weight loss, and a low-grade fever. Signs and symptoms are dependent on the pattern and severity of disease. The anatomic pattern of Crohn's disease is as follows: one third have small bowel involvement only, 40-50% have ileocolitis (distal ileum and cecum), and 25% have disease confined to the colon only. Thus, approximately 75% will have small bowel involvement. Involvement of the upper GI tract is rare and almost always occurs with disease elsewhere. Crohn's can also be categorized by three general patterns independent of anatomic location: fistulizing (perforating), fibrostenotic (stricturing) and inflammatory disease. Extraintestinal symptoms can include reactive arthropathies, ankylosing spondylitis, eye involvement with uveitis and episcleritis, skin disorders of erythema nodosum and pyoderma gangrenosum, thromboembolism, and primary sclerosing cholangitis. Malabsorption problems can lead to anemia, cholelithiasis, nephrolithiasis, vitamin deficiencies, and osteoporosis. Patients with long-term active Crohn's disease 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.

The diagnosis of Crohn's disease is based upon a composite of endoscopic and/or contrast radiographic findings and compatible clinical correlation. 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% of patients with colonic involvement alone will be diagnosed with indeterminate colitis when Crohn's disease cannot be distinguished from UC. Serologic markers (ANCA, p-ANCA, ASCA, and OMP-C,

available as a panel from Prometheus Labs called IBD First Step™) can now be used to aid in diagnosis.

Treatment is aimed at restoring well-being and lifestyle and should be appropriately individualized. Therapeutic recommendations depend upon anatomic location, severity, and complications. Medical management is used to treat acute disease and for maintenance of remission, 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, mesalamine) compounds, maintenance therapy with 5-ASA is of questionable value in Crohn's disease, unlike the situation with UC. However, recent analyses of treatment trials do suggest some benefit for these drugs in preventing relapse of Crohn's disease. If 5-ASA therapy proves inadequate, antibiotics, or immunosuppressive drugs such as corticosteroids, 6-mercaptopurine, or anti-TNF therapy may be indicated. Immunomodulating therapy has been shown to result in endoscopic healing, though unlike in UC, this is not the primary determinant of remission in Crohn's. The majority (80%) of patients will require surgical intervention, and of these, 50% will require subsequent surgery. 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.

II. Aeromedical Concerns.

Crohn's disease is incurable. 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. Drug therapy has not been particularly effective in preventing relapse. Problematic in the management of Crohn's disease is the possible discrepancy between symptoms and objective signs of disease activity; intestinal obstruction can occur acutely in the apparent absence of disease activity. Issues related to the aerospace environment include unpredictable fluctuating symptoms, abdominal pain, bowel obstruction, abscesses, chronic diarrhea, anemia, predilection to gallstones and kidney stones, GI perforation, and chronic medication usage with their inherent side effects. All of the issues can lead to impairment secondary to pain and GI upset. 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. Abscesses occur in 15-20% of patients. Fistulas occur in 20-40% of patients. Gallstones occur in 25% of Crohn's patients and their relative risk for gallstones is almost double compared with the general population. Dose-related toxic effects of sulfasalazine include headache, nausea, vomiting. Hypersensitivity reactions 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. Information Required For Waiver Submission.

Medical evaluation board (MEB) disposition must be accomplished prior to waiver submission regarding continuation of service and world-wide qualification. The following recommendations apply to initial and renewal waivers, although imaging studies are not automatically required for renewal waivers. History should not only address gastrointestinal symptoms, but also the presence or absence of any symptoms that might suggest extraintestinal disease. Internal medicine or

gastroenterology ± general surgery consultation is required for each waiver submission, to address disease course, current therapy, and documentation of related complications. 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. (Endoscopy +/- biopsy often aids in the initial diagnosis, but is not particularly useful for follow-up; unlike the case with UC, endoscopic findings in Crohn's disease do not correspond well to disease activity.) Ophthalmologic evaluation should be obtained to rule out uveal involvement at time of initial waiver and thereafter if symptoms develop. Lab results including CBC, ESR, B_{12}, iron studies (if anemic), folate, LFT's, and albumin should be reported. ESR may be used to follow disease activity. Hypoalbuminemia is an indicator of malnutrition and chronicity of disease.

IV. Waiver Consideration.

Aviation personnel need to fulfill all of the following applicable qualifying criteria for waiver request (Crohn's colitis refers to involvement of the colon alone, with no small bowel involvement):

General criteria:

Crohn's COLITIS	Crohn's with SMALL BOWEL disease	
Unrestricted FC II Pilot, Nav, FC III	Unrestricted FC II Pilot	Pilot (FC IIC)*, Nav, FC III
• No worse than mild disease (< 4 bowel movements / day) • Stable symptoms for three months • No fistulas,† strictures, abscess • Authorized medications include steroid enemas and / or topical (Rowasa) or oral (Pentasa, Asacol) aminosalicylates	• Asymptomatic for 2 years • No fistulas,† strictures, abscess • No history of surgical resection • Authorized medications consist of oral (Pentasa, Asacol) aminosalicylates	• Asymptomatic for 6 months • No fistulas,† strictures, abscess • No history of multiple surgical resections • Authorized medications consist of oral (Pentasa, Asacol) aminosalicylates
• Any extraintestinal manifestation should be addressed as a separate diagnosis and will require individual work-up.		

*Categorical waiver for Pilot FC II: May operate only with another qualified pilot.
†Consideration for waiver may be given to cutaneous fistula only.

After a second exacerbation of Crohn's with small bowel involvement, FC IIC waiver may be considered after 12 months remission. Crohn's disease is disqualifying for FC I/IA; waiver is not recommended.

Since the implementation of AIMWTS, the waiver file reports 16 waiver requests for Crohn's disease (ICD-9 559.XX) with 10 waivers granted (62.5%); of course, the denominator only consists of those considered candidates for waiver. ACS experience with Crohn's disease is limited and reveals 7 finalized cases with 3 receiving waiver recommendation (43%).

Special thanks to Dr. Kevin Franklin, GI consultant to AF/SG and Dr. Jeb Pickard, Aeromedical Consultation Service

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WAIVER GUIDE
Updated: May 06
By: Jeb Pickard, M.D.

CONDITION:
Deep Venous Thrombosis/Pulmonary Embolism

I. Overview.

That venous thromboembolic disease (VTED) is such a familiar entity to most medical personnel is to a certain extent an artifact of the training environment. VTED is a frequent complication in hospitalized medical and surgical patients; stasis, hypercoagulability, and damage to the vascular intima (the classic Virchow's triad) are common to a number of conditions. VTED is considerably less common in outpatients, though hardly a rarity. In the Longitudinal Investigation of Thromboembolism Etiology, or LITE, which combined data from two prospective cohorts, the age-standardized incidence of VTED among over 21,000 participants was 1.92 per 1,000 person-years.[1] Since the incidence increases with age, and the members of the study population were all over the age of 45, the incidence in the aviator population is likely to be considerably lower.

VTED manifests clinically as deep venous thrombosis (DVT), pulmonary embolism (PE), or both, but at a pathophysiologic level the disease is a single entity. (Note that superficial thrombophlebitis is excluded from this discussion.) In a patient presenting with PE, the probability of documenting DVT depends in large part on how thoroughly one looks, and conversely the great majority of patients with DVT can be shown to have at least subclinical evidence of PE. Furthermore, treatment considerations vary little between the two entities. Of more importance is the identification of the underlying etiology, or the lack of one. Secondary VTED occurs in response to a variety of conditions, which may be acute and self-limited, or chronic. Idiopathic VTED is that occurring in the absence of such evident risk factors.

Malignancy, major (especially lower extremity) surgery, and prior VTED itself constitute the major risk factors for development of VTED. Other less potent risk factors include immobilization (e.g., bedrest, lower extremity casting, prolonged air travel), obesity, use of oral contraceptives or estrogen replacement therapy, and pregnancy. Air travel is a risk of obvious aeromedical interest. Two large studies conducted at major airports found that PE was very rare (0-0.01 case per million) on relatively short duration flights. The larger study, involving passengers at Charles de Gaulle Airport, found that the rate rose to 1.5 cases per million for flights exceeding 5,000 km (3100 mi), and to 4.8 cases per million for flights exceeding 10,000 km (6200 mi).[2] The other study, conducted at Madrid-Barajas Airport, determined the incidence of PE to be 0.25 cases per million for flights lasting 6-8 hours, while flights lasting longer than 8 hours were associated with an incidence of 1.65 cases per million passengers.[3] Given the apparent dose-response, the association appears to be real, but the absolute risk is quite small. Whether aviation as an occupation is attended by increased risk is unknown. In both studies, most of the patients with PE had underlying risk factors that with rare exceptions (such as age over 40) would be absent in military aviators. In the French study, 75% reported never having left their seats during the flight, whereas in military aviation some activity is present even in long-haul "heavy" flights. Anecdotally, in the rare cases referred to the Aeromedical Consultation Service where aviators had developed VTED after long flights, the individuals had been passengers rather than aircrew.

The likelihood of developing idiopathic VTED, or that a minor risk factor such as immobilization will be complicated by VTED, depends in part on the presence of inherited or acquired disorders of the clotting cascade, i.e., thrombophilias. (Note that the identification of an underlying thrombophilia does not change the classification of a VTE from idiopathic to secondary.) Inherited thrombophilias currently recognized include, in roughly decreasing order of prevalence among patients presenting with thrombosis, factor V Leiden, protein S deficiency, prothrombin 20210A, antithrombin deficiency, and protein C deficiency. The classic acquired thrombophilia is antiphospholipid antibody. (Malignancy-associated VTED is almost certainly due to an acquired disorder of clotting factors as well, but the specific defect or defects are unknown.)

Since the identification of various inherited thrombophilias in the last twenty years, screening for these disorders has been frequently recommended in patients with VTED, but the value of such screening is difficult to demonstrate. Few would advocate such screening in patients with known major risk factors, such as recent surgery, but whether or not to screen those with minor or no apparent risk factors is controversial. Heritable defects are common in idiopathic VTED; Baglin et al. found one or more defects in 27% of such patients. However, studies have consistently found no significant difference in recurrence rates between those with and without identifiable thrombophilias.[4,5] Some authorities would recommend indefinite therapy after one unprovoked thrombotic episode in a patient with antithrombin deficiency, or possibly protein C deficiency, but these are the rarest abnormalities, and 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 VTED.[6] Current treatment guidelines are based on idiopathic versus secondary etiologies, and primary versus recurrent episodes, and are not altered by the finding of inherited defects.

The major aeromedical concern is recurrence. The likelihood of recurrence following appropriate therapy depends heavily on the reversibility of the predisposing condition. At one extreme, underlying malignancy has been associated with a recurrence rate of over 14% per year. At the other end of the spectrum, the risk of late recurrence after a post-operative thrombosis is minimal; in one recently published study, there were no recurrences over two years in 86 patients who had developed a postoperative thrombus.[4] The recurrence rate of idiopathic VTED falls halfway between, at about 7-8% per year.

Anticoagulation with a vitamin K antagonist (VKA) such as warfarin clearly reduces the risk of recurrence when employed for the first three months, which perhaps allows time for vascular remodelling, and such therapy is nearly always indicated regardless of underlying etiology. Attempts to shorten secondary prophylaxis to less than three months have been unsuccessful.[7,8] Prolongation of therapy beyond three months in those with an ongoing risk of recurrence has been shown to significantly reduce the risk of recurrence.[9] However, patients who receive prolonged VKA therapy seem to be at equivalent risk of recurrence once treatment is stopped.[10] Thus, a longer course of secondary prophylaxis appears to delay rather than prevent recurrence, at least for the first several years and possibly much longer. Nonetheless, recent consensus guidelines do recommend extending secondary prophylaxis for idiopathic VTED to 6-12 months of VKA therapy.[11]

Evaluation of the aviator with VTED is complicated by the treatment itself. Usually, waiver will be delayed until after therapy is completed, and thus any laboratory studies that were not obtained at initial presentation and that could not be obtained on VKA therapy may be delayed until therapy is

concluded. For most cases of VTED, diagnostic laboratory evaluation should consist of complete blood count, coagulation studies (PT, aPTT), hepatic and renal function tests, and urinalysis. For reasons noted earlier, screening for inherited thrombophilia is not routinely recommended. Evaluation for acquired thrombophilia should depend on the setting. The identification of antiphospholipid syndrome would likely alter treatment, but confirming such a diagnosis is not as simple as a serologic study. Anticardiolipin antibodies may be found in 5-21% of DVT cases, but it isn't clear that the presence of the antibody per se confers any greater risk of recurrence. Furthermore, about 10% of healthy subjects may be transiently positive for the antibody. Screening is recommended in those with other suggestive findings, such as thrombocytopenia, abnormal baseline coagulation studies, or, in females, a history of premature deliveries or spontaneous abortions.

Though apparently idiopathic clots can occasionally prove to be due to underlying neoplasia, such associated thromboses usually occur in patients with known malignancies. If a careful history and physical examination and baseline laboratory studies fail to suggest a malignant etiology for the thrombosis, further workup for occult neoplasm is rarely warranted. One reasonable exception, because of the frequently occult and indolent nature of the carcinoma, is to obtain a prostate-specific antigen (PSA) in men over the age of 50 with an initial idiopathic thrombosis.

Therapy of VTED consists of acute treatment with some form of heparin followed by secondary prophylaxis with a VKA. The internationalized normalized ratio (INR) should be maintained in the range of 2.0-3.0. Recommended length of secondary prophylaxis is three months for those with a first episode of VTED associated with a transient risk factor; six to twelve months for those with a first episode of idiopathic VTED; and lifelong for a second episode of VTED.

The risks during secondary prophylaxis are primarily hemorrhage and recurrence. Maintenance of the correct INR is vital. The risk of bleeding correlates with the INR even within the therapeutic range, and rises steeply when the INR exceeds 5.0.[12] Maintenance of the INR within the therapeutic range may be affected by concomitant illness, drugs, or food. The patient should be followed by a specialized anticoagulation management service; such specialized care reduces the annual rate of adverse events by more than 60%.[13]

Even with the use of an anticoagulation service, hemorrhage is still a significant risk, and this is particularly true in the first three months of therapy. A recent meta-analysis of complications of anticoagulation found annualized event rates for major bleeding of 8% in the first three months, and 2.74% thereafter. Corresponding rates for intracranial hemorrhage (ICH) were 6% and 0.65%. Other than ICH, it is difficult to determine the percentage of bleeds that would cause incapacitation, but it appears that only a very small proportion of extracranial bleeds would qualify.

II. Aeromedical Concerns.

DVT is often accompanied by pain and localized edema. PE causes dyspnea and hypoxia, and may rarely cause hypotension, though massive embolism is distinctly uncommon in a reasonably healthy outpatient. Though it is difficult to define percentages, it appears that only a small minority of recurrences would present as acute incapacitation. Anticoagulation is associated with hemorrhage, which depending on location and blood loss, can be anywhere from clinically silent to acutely incapacitating.

III. Information Required for Waiver Submission.

Waiver submission should be accompanied by details of the initial event, especially any pertinent risk factors. History and physical should focus on signs and symptoms that might suggest underlying malignancy. Lab studies should consist of complete blood count, coagulation studies (PT, aPTT), liver function tests, and urinalysis. In a male over the age of 50 with a first episode of idiopathic thrombosis, prostate-specific antigen should be obtained. Other workup for malignancy is not routinely indicated unless history, physical exam, or laboratory evaluation suggests pathology. Thrombophilia workup is not routinely required, though screening for antiphospholipid antibody syndrome is indicated in patients with suggestive findings.

IV. Waiver Considerations.

Waiver is not allowed during the first three months of VKA therapy. In the case of VTED associated with a temporary risk factor such as lower extremity surgery, secondary prophylaxis will be finished by the time waiver could be considered. An aviator with idiopathic VTED will require at least six months of VKA therapy; waiver might be considered three months after initiation of treatment, subject to the restrictions listed in the following paragraph.

In the event of recurrence, heparin and VKA therapy must be restarted, and the latter is expected to be lifelong. Waiver may be considered after three months, subject to the following restrictions:

1) ***The individual must be followed by a specialized anticoagulation management service. Usual care is not acceptable.***
2) Anticoagulation is incompatible with deployment. In the unlikely event that the medical board process were to allow worldwide qualification, flying would remain proscribed; because tight control of anticoagulation would be impossible, the event rate for sudden incapacitation would considerably exceed 1% per year.
3) A multipilot cockpit is presumed. Unlike intracranial hemorrhage, an extracranial hemorrhage is unlikely to cause sudden incapacitation. However, it is also unlikely to be stable enough to allow a single pilot to successfully divert the flight to a nearby airfield.
4) High-performance aviation cannot be recommended. Major hemorrhage by most definitions presumes a >10% loss in intravascular volume, and yet may often be clinically silent in the early stages (e.g., gastrointestinal hemorrhage). Though unlikely to be suddenly incapacitating in routine flight, such volume loss could hardly fail to impair Gz tolerance.

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 minimal.

	Positive (reversible) risk factor	***Idiopathic***	***Recurrent episode***
FC I/IA	FC I waiver*	No waiver	No waiver
FC II	Unrestricted waiver after completion of 3 months VKA therapy	Unrestricted waiver after completion of 6 months VKA therapy***	FC IIC waiver (non-high performance, with another qualified pilot, non-WWQ) on chronic VKA therapy****
FC III	Unrestricted waiver after completion of 3 months VKA therapy	Unrestricted waiver after completion of 6 months VKA therapy***	FC III waiver (restricted to non-high performance, non-WWQ) on chronic VKA therapy****

*If associated with major reversible risk factor, such as surgery or major lower extremity trauma. A history of thrombosis associated with minor risk factors such as immobility or contraceptive steroids would be considered individually.
**FC IIC waiver on VKA therapy could be considered after 3 months of therapy, subject to restrictions noted under recurrent episode.
***Restricted FC III waiver could be considered after 3 months of therapy, subject to restrictions noted under recurrent episode.
****Must be followed by an anticoagulation clinic.

All patients with single episodes of deep venous thrombosis and 87% of those with pulmonary embolism have received waivers. Anticoagulation was recently approved for limited waiver, and no data currently exist.

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WAIVER GUIDE
Updated: Nov 03
By: Major Hilton

CONDITION:
Diabetes Mellitus

I. Overview:

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. Diabetes can be divided into:
Type-1: Absolute insulin deficiency related to pancreatic beta cell destruction. In general these folks are younger, thinner and have a family history of autoimmune diseases. This is rare, <1% of the US population.
Type-2: This is what was traditionally called adult onset diabetes. It is seen in 6-7% of the US population. There is usually a strong family history. It is caused by insulin resistance and/or relative insulin deficiency.
Impaired Glucose Tolerance (IGT) / Impaired Fasting Glucose (IFG): intermediate metabolic state between normal glucose homeostasis and diabetes.

Diagnostic Test/criteria	Normal (mg/dl)	IGT/IGF (mg/dl)	Diabetes (mg/dl)
Casual with symptoms			≥200
Fasting Plasma Glucose	<110	≥110 and <126	≥126
Oral Glucose Tolerance Test (2 hour plasma glucose)	<140	≥140 and <200	≥200

1. In the absence of unequivocal hyperglycemia with acute metabolic decompensation, these criteria should be confirmed by repeat testing on a different day.
2. Casual is defined as any time of day without regard to time since last meal.

Note: Diabetes mellitus types 1 and 2 are disqualifying for continued military service and require a Medical Evaluation Board (MEB) within 90 days of diagnosis. Aircrew will not be considered for waiver until the MEB has been completed.

II. Aeromedical Concerns:

Hypoglycemia is the major aeromedical concern. It can be very disabling, causing autonomic symptoms of sweating, tremor, palpitations, and weakness, and neurologic symptoms of double vision, slurred speech, irritability, confusion, and even coma. Prolonged hyperglycemia is an additional concern as it can cause polyuria, dehydration, nausea, fatigue, and changes in visual acuity.

The use of insulin or oral hypoglycemic agents is not compatible with USAF aviation. Even the newer oral medication metformin in the UK Prospective Diabetes Study conducted over 6 years had an annual rate of hypoglycemic episodes at 7%, well above the current accepted risk level of 1% (1998).

Prevention of type-2 diabetes: Impaired glucose tolerance (IGT) is not a disqualifying diagnosis per AFI 48-123. However, the Diabetes Prevention Program (n=3234) study demonstrated that without intervention, eleven out of 100 people with IGT go on to develop type-2 diabetes within a 3 year period. But, of those who receive lifestyle modification (diet and exercise), only 5 out of 100 people with IGT go on to develop type-2 diabetes. This is a 58% relative reduction in the incidence of diabetes. Prevention of the development of Type-2 diabetes in the aviator with IGT is an important concept when looking at his long-term health, and at his future flying career. Aviators that have the diagnosis of IGT or IFG should be strongly counseled, for their own health and for the good of their flying careers, to undergo the appropriate lifestyle modification. Suggested lifestyle interventions include weight loss of 10-15% bodyweight, consultation with a dietician for weight loss, and a monitored exercise program such as offered at the HAWC. The control population in the prevention study was given a pamphlet that listed the exercise and weight loss goals, but did not provide more intensive counseling or guidance.

The NCEP ATP III defined the metabolic syndrome - a cluster of criteria that increase the risk of developing diabetes and therefore, coronary heart disease (CHD). Possessing more than 3 of the following criteria qualifies a patient as having the metabolic syndrome:

Risk Factor	Defining Level
Abdominal obesity (Waist circumference) Men Women	 > 40 inches > 35 inches
Triglycerides	≥150 mg/dL
HDL-C Men Women	 < 40 mg/dL > 50 mg/dL
Blood Pressure	≥130/≥85 mm Hg
Fasting glucose	≥110 mg/dL

CHD appears to be more prevalent in those with the metabolic syndrome than in non-diabetic patients, but less prevalent than in diabetics. So controlling the metabolic syndrome is considered an important prevention of CHD.

Cardiovascular Disease: the concept of diabetes as a major cardiovascular risk factor is not a new topic. The National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) reports that the risk of CHD is similar in diabetic subjects without pre-existing vascular disease as in non-diabetic subjects with known vascular disease.
And, glycemic control alone will not eliminate the excess risk of CHD in diabetic subjects. The NCEP ATP III therefore recommends for the diabetic population lowering the LDL to below 100 mg/dL, the total cholesterol below 200mg/dL, and the HDL above 40 mg/dL. (See the Coronary Artery Disease Waiver Guide Topic for more information)

III. Information Required for Waiver Submission:

The following information should be included in the aeromedical summary:

A. Evidence of diabetic counseling –includes diabetic education, consultation with a dietician, lifestyle modification for diet and exercise, modification of cardiac risk factors, monitoring of glucose levels as appropriate, attention to complications, etc.
B. Compete history: focus on dietary, familial, and risk factors
C. Complete physical exam including vitals and blood pressure: focus on evidence of diabetic complications
D. BUN/Creatinine
E. Fasting lipid panel
F. HbA1C
G. Urine: check albumin / creatinine ratio in random, spot collection (microalbuminuria). Also check for ketones, protein and sediment.
H. Ophthalmology evaluation to look for evidence of retinopathy
I. Screening ECG

Good cControl is defined as:
A. Fasting blood sugar < 126 (report quarterly data points)
B. Hgb A1C less than < 7% (report quarterly data points)
C. Lipid panel – target to NCEP ATP III guidelines (annual)
D. Weight/body fat within USAF standards
E. No diabetes related complications that interfere with safety of flight / mission completion.

IV. Waiver Considerations.

1. DM Type-1: waiver will not be considered.
2. DM Type-2:
   - FC I: no waiver recommended
   - FC II and III: a waiver will be considered if there is evidence of good control on diet alone. The waiver will reflect the limitations, if any, imposed by the MEB.
3. Impaired Glucose Tolerance: no waiver is required since it is not a disqualifying diagnosis.

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WAIVER GUIDE
Updated: Nov 03
By: Aeromedical Consultation Service (ACS) Staff

CONDITION:
Diverticular Disease of the Intestine

I. Overview.

Diverticular disease occurs more commonly in the colon than in any other portion of the gastrointestinal tract. About 95% of patients have sigmoid colon involvement. The descending, transverse, and ascending portions of the colon are involved in decreasing order of frequency. Acquired disease of the jejunum or ileum is believed to have a prevalence of about 1.3% in the general population. Diverticular disease has a 2 to 5% incidence in persons less than 40 years old but becomes more common rapidly thereafter; approximately 65% of the general population will develop disease by the age of 80 years. It is more common in developed countries and is thought to be associated with cultural factors such as the fiber content of foods.

The pathogenesis of diverticular disease requires defects in the colonic wall and increased pressure in the lumen relative to the serosal surface. Small openings in the circular muscle layer for penetration of nutrient blood vessels are often the sites of diverticula formation.

Diverticulosis is asymptomatic in 80% of individuals. Episodic pain, constipation, and diarrhea may occur in uncomplicated cases due to an associated hyper-motility disorder. Barium studies may outline the diverticula and reveal an underlying motility disorder. Diverticulosis may mimic irritable bowel syndrome. It can also mimic diverticulitis and must be differentiated from other causes of rectal bleeding such as carcinoma. Medical treatment usually 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. Surgery for uncomplicated cases is rarely advisable. 10 to 25% of patients will go on to develop diverticulitis or hemorrhage.

Diverticulitis typically consists of nausea, abdominal pain, left lower quadrant tenderness and mass, fever, leukocytosis, and characteristic radiological signs. Plain abdominal films, water-soluble contrast enema, and CT scan are most useful in establishing the diagnosis; ultrasound, colonoscopy, and/or MRI may also be required. Complications include free perforation, abscess formation, fistulization, and partial obstruction. Hospitalization may be necessary for medical or surgical treatment and/or percutaneous abscess drainage. About 25% of those hospitalized require surgical treatment. About 33% of medically treated cases recur within the first 5 years. Recurrent disease after surgical resection ranges from about 3 to 7%.

II. Aeromedical Concerns.

There is only a slight risk of in-flight physical incapacitation. Altered bowel habits, episodic pain, nausea, and flatulence could be a distraction and could also affect crew availability. 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.

III. Information Required For Waiver Submission.

A surgical evaluation is required to determine the need for elective surgery following a conservatively managed episode of diverticulitis. Likewise, a surgical evaluation is required for cases initially treated with surgery. Consultation by a gastroenterologist is required for cases of symptomatic diverticulosis. All imaging studies should be forwarded along with the waiver package.

IV. Waiver Considerations.

75% of individuals on record with ACS evaluations for diverticular disease in the last ten years have ultimately had waivers recommended. All of the remaining 25% have been medically disqualified for other diagnoses. Before ACS evaluations, individuals should have resolved symptoms and be taking no medications that are incompatible with flying. Full reports of any surgical interventions need to be forwarded to the ACS for review. The ACS evaluation will include flight medicine and internal medicine evaluations, with surgical evaluation as needed.

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WAIVER GUIDE
Updated: Nov 99
By: Dr. Corigan

CONDITION:
Dysmenorrhea

I. Overview.

Primary dysmenorrhea is defined as recurrent cramping pain in the lower abdomen occurring just before or during menstruation, in the absence of other diseases such as endometriosis. Prevalence rates are as high as 90 %. Women with primary dysmenorrhea have increased production of endometrial prostaglandin, resulting in increased uterine tone, and stronger, more frequent contractions. 90% of women will respond to nonsteroidal anti-inflammatory medication or oral contraceptives.

II. Aeromedical Concerns.

Primary dysmenorrhea causing recurrent pelvic pain can be a distraction in flight and may occasionally cause incapacitation. Aircrew should be grounded during a work-up for significant recurrent pelvic pain until the etiology is known or the condition is controlled. Significant recurrent pelvic pain is defined as that which necessitates recurrent absences of more than a few hours of routine duty.

III. Information Required for Waiver Submission.

An aeromedical summary should contain the following: date of diagnosis, history of symptoms, history of work absences, treatments used, last symptoms, side effects on medication, and any current medications or ongoing treatments. In addition, a gynecologic consultation should be obtained and included in the waiver package.

IV. Waiver Considerations.

Causes of secondary dysmenorrhea should be ruled out through history and physical exam. These include endometriosis, adhesions, ovarian cysts, PID, and benign or malignant tumors of the ovary, uterus, bowel and bladder. If the exam is normal, a trial of ibuprofen or oral contraceptives is warranted. If the symptoms resolve on medication for several cycles, and there are no significant side effects from the medication, a waiver will be considered. If the symptoms do not resolve after several medication trials, the patient should remain DNIF, and further evaluation for secondary causes of dysmenorrhea should be entertained.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Eating Disorders

I. Overview.

The hallmark of the eating disorders is a significant disturbance in eating behavior. Three eating disorder diagnoses are recognized: anorexia nervosa, bulimia nervosa and eating disorder not otherwise specified. Patients with anorexia nervosa refuse to eat enough to maintain a minimally normal body weight. The prevalence of anorexia n Nervosa is significantly higher in females than males, and the disorder is potentially fatal in severe cases. The mean age of onset is late adolescence to early adulthood. Patients with bulimia nervosa 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 1-3%, with the prevalence among males being about one-tenth that. Bulimia nervosa is often associated with alcohol abuse. Both disorders are characterized by a disturbances in perception of body weight and interpersonal relationships. The third diagnosis, eating disorder not otherwise specified, is used for those eating disorders that do not fully fit the criteria for anorexia or bulimia nervosa.

II. Aeromedical Concerns.

Eating disorders can cause life-threatening metabolic alkalosis, hypokalemia, dehydration, and hypotension which impact readiness, mission completion, and flying safety. Anxiety and depression often accompany eating disorders, and there exists an increased risk of suicide. Eating disorders are incompatible with aviation duties.

III. Information Required for Waiver Submission.

Eating disorders are disqualifying for aviation. Treatment can be difficult. Complex treatment options should be reviewed with a mental health specialist. Relapse rate is high. Forty percent of patients recover, 30% improve, and 30% are chronic. Waiver may be considered on a case-by-case basis if the patient is off medication, asymptomatic, and out of active treatment for one year. A complete mental health evaluation by a qualified mental health provider is required within three months prior to waiver package submission.

The waiver package should include: copies of psychiatric evaluation and treatment summary, medical evaluation board (MEB) reports if applicable, and an aeromedical summary outlining any social, occupational, administrative or legal problems associated with the case. Additionally input from the aviator’s commander/supervisor regarding the aviator’s current status is important. Patients with eating disorders must meet minimum aviation weight standards.

IV. Waiver Considerations.

The ACS has limited experience in evaluation of and recommendations for pilots and navigators diagnosed with an eating disorder. It is a relatively uncommon disorder in the flying population. A review of the ACS coversheet file and the USAF Waiver File (FC II) over a period of 15 years (1981-1996) revealed four aircrew with eating disorder diagnoses, of whom two (50%) received waivers for resumption of flying status.

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WAIVER GUIDE
Updated: Mar 07
By: Dr William Kruyer and Dr Karen Fox

CONDITION:
Ectopy and Pairing, Superventricular and Ventricular (PACs, PJCs, PVCs)

I. Overview.

This waiver guide discusses isolated ectopy and paired ectopy (pairs, couplets). 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.

ECG/Rhythm Strip	24-hour Holter Required[1]
PACs, PJCs < 2 PACs, PJCs ≥2	No Yes
≤35 yo with 1 PVC ≥2 PVCs >35 yo with ≥ 1 PVC	 No Yes 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.

The results of the 24-hour Holter will determine further work-up and if waiver is required. Currently, only very frequent ectopy (>10% of total beats on Holter monitor) and frequent pairs (>10 pairs total on Holter monitor) require waiver. Frequent ectopy (>1% up to 10% of total beats) and rare and occasional pairs (1-10 pairs total on Holter) require local evaluation with echocardiogram and treadmill as directed by the USAF Central ECG Library (part of the Aeromedical Consultation Service (ACS)) but do not require waiver if both tests are read as normal by ECG Library. If either test is abnormal or borderline aeromedically as determined by the ECG Library, the aviator must be placed DNIF and a waiver submitted for ACS evaluation. Rare and occasional isolated ectopy are considered normal variants.

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. Information Required for Waiver Submission.

As noted above, only very frequent ectopy and frequent pairs require waiver. Frequent ectopy (>1% up to 10% of total beats) and rare and occasional pairs (1-10 pairs total on Holter) require local evaluation with echocardiogram and treadmill as directed by the USAF Central ECG Library (part of the ACS) but do not require waiver if both tests are read as normal by the ECG Library. If either test is abnormal or borderline aeromedically as determined by the ECG Library, the aviator must be placed DNIF and a waiver submitted for those identified abnormalities for ACS evaluation. Rare and occasional isolated ectopy are considered normal variants. Note: Correspondence from the ECG Library should be placed in the aviator's medical record.

For ACS review/evaluation of initial waivers for very frequent ectopy (>10% of total beats per Holter monitor) and/or frequent pairs (>10 pairs per Holter monitor) submit:

A. Aeromedical summary to include cardiac risk factors, symptoms (including negative) and pertinent cardiac exam.
B. Report and representative tracings from the Holter monitor.
C. Reports of any local consultations, as directed by ECG Library or as clinically indicated.
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, echocardiography, treadmill, stress nuclear imaging) or as directed by the ECG Library.

IV. Waiver Considerations.

Very frequent PACs/PVCs and frequent PAC/PVC pairs are disqualifying for all classes of flying duties. FC I/IA waiver consideration is handled on a case-by-case basis. FC II/III waiver is typically unrestricted. ACS evaluation is required for FC II. ACS review/evaluation is required for FC III. Waiver is typically valid for three years.

Findings on 24-hour Holter	Additional Local Testing	Flying Class/ Waiver Required Waiver Authority	ECG Library makes final determination	ACS Review/ Evaluation
PACs/PVCs ≤1% and no pairs	None	FC I/IA No FCII/III No	Yes Yes	No No
PACs/PVCs >1%and ≤10% and/or 1-10 pairs	Echocardiogram and treadmill test[1]	FC I/IA No FC II/III No	Yes Yes	No No
PACs/PVCs >10% and/or > 10 pairs	None unless clinically indicated[2]	FC I/IA Yes AETC FC II/III Yes MAJCOM	No No	Yes Yes

[1] Studies to be submitted to the ECG library, if found aeromedically acceptable no further work-up required.
[2] Individual placed DNIF and waiver submitted for ACS evaluation.

A review of AIMWTS through mid February 2007 showed 66 cases of very frequent PVCs, PACs or pairs; three FC I/IA, 47 FC II and 16 FC III. Of the 66 cases, seven cases were disqualified (one FC I, five FC II and one FC III). Of the seven disqualified cases, five were disqualified because of additional cardiac findings (e.g. coronary artery disease, positive coronary fluoroscopy, ventricular tachycardia) and two were disqualified for other medical conditions (headaches, excessive refractive error).

V. References.

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WAIVER GUIDE
Updated: Apr 07
By: Lt Col Rawson Wood (RAM 08) and Dr Karen Fox

CONDITION:
Eczematous Dermatitis (Eczema) [Atopic & Contact Dermatitis, Nummular, Dyshidrosis]

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.[3] The more commonly encountered eczemas (dermatitis) are atopic dermatitis (AD), contact dermatitis (CD), seborrheic dermatitis, nummular, and dyshidrosis. 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%.[13] About half of the cases are diagnosed in the first year of life[13] and over 80% by age five.[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.[2] Almost 50% of patients with AD report a family history of respiratory atopy.[10]

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.[1] Allergic contact dermatitis (ACD) is an immune system reaction, delayed (type IV) hypersensitivity, that only affects those with a genetic predisposition who have

exposure to certain substances. The most common sensitizer in North America is urushiol found in poison ivy, poison oak and poison sumac.[7] It is estimated that over 70% of the US population would acquire ACD if casually exposed to these plants.[5] Other common sensitizers include nickel (jewelry), formaldehyde (permanent press clothing), fragrances, preservatives (quarternium-15), rubber, latex, and topical antibiotics (neomycin and bacitracin).[11]

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. 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.

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 eczema: Nummular dermatitis 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.

Dyshidrosis: Dyshidrotic dermatitis 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.[11]

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, therapy is mainly with topical prescription corticosteroid for nummular eczema, ICD, ACD, dyshidrosis, and AD. For severe cases systemic corticosteroids may be required. Antihistamines have been used to treat the pruritis, however the evidence supporting use is relatively weak.[10, 12] Other immuno-modifying medications such as cyclosporine, azathiprine, mycophenolate and interferon gamma have been used in severe cases of AD.[12] 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 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.[6] 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. Information Required for Waiver Submission.

The aeromedical summary should include the following:

A. A thorough history to include time of onset, location, frequency, identification and ability to avoid flare factors, and treatment.

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.

B. Copy of dermatology consultation, in moderate/severe cases.

C. Confirmation of presence or absence of history/current asthma and allergic rhinitis.

D. Optometry/ophthalmology consult if eyes involved.

E. Medical evaluation board (MEB) results if severe atopic dermatitis or chronic moderate/severe eczema with repeated exacerbations in spite of treatment.

IV. Waiver Considerations.

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. Those with severe symptoms or triggers that cannot be avoided are unlikely to obtain a waiver.

Flying Class (FC)	Condition/Treatment	Potential Waiver Waiver Authority
I/IA, initial FC II and III	Verified history of AD or eczema after age 8 Contact dermatitis caused by materials used in required protective/flying equipment	No AETC No AETC
II	Atopic dermatitis/eczema controlled on topical steroids, topical pimecrolimus, and/or oral nonsedating antihistamines (Allegra® or Claritin®) Atopic dermatitis/eczema controlled on topical tacrolimus, oral cyclosporine, oral steroids, PUVA Contact dermatitis caused by materials used in required protective equipment	Yes MAJCOM No MAJCOM No* MAJCOM
III	Atopic dermatitis/eczema controlled on topical steroids, topical pimecrolimus, and or oral antihistamines (Allegra® or Claritin®) Atopic dermatitis/eczema controlled on topical tacrolimus, oral cyclosporine, oral steroids, PUVA Contact dermatitis caused by materials used in required protective equipment	Yes MAJCOM No MAJCOM No MAJCOM

* If change in aircraft could eliminate exposure to protective equipment then categorical waiver may be possible and AFMOA is waiver authority

A review of AIMWTS through March 2007 showed 82 cases of eczema/atopic dermatitis; 18 FC I/IA, 37 FC II and 27 FC III. Of the 82 cases, 22 percent (18/82) were disqualified (four FC I/IA, three FC II and 11 FC III). Of the 18 disqualified, 12 were disqualified for eczema/atopic dermatitis (not controlled or initial FC physical). The other six were disqualified because of additional medical conditions (e.g. depression, radial keratotomy, eye disease, facial nerve problems). The vast majority of eczema, atopic dermatitis, dyshidrotic eczema was controlled on topical steroids.

Waiver Guide reviewed by the AF/SG Consultant for Dermatology, Lt Col John G LeVasseur.

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WAIVER GUIDE
Updated: Feb 07
By: Col Fred Marks (RAM 07) and Dr Karen Fox

CONDITION:
Endometriosis

I. Overview.

Endometriosis occurs when endometrial tissue proliferates outside the endometrial cavity. It affects 5-10% of reproductive aged women and occurs most commonly between the ages of 25 and 29. It is the underlying cause in significant percentage of patients presenting with pelvic pain. Symptoms of endometriosis include pelvic pain, dysmenorrhea, dyspareunia, and/or infertility. Pain can be located in the lower abdominal and/or lower back, and occur with exercise, micturition, or defecation. The etiology of endometriosis is not well understood and is probably multifactorial. 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. For the primary care provider the first line management includes the use of non-steroidal anti-inflammatory drugs (NSAIDs) and combination oral contraceptives pills (OCPs). Other medications (danazol, gonadotropin releasing hormone agonists such as Lupron® or Zoladex®, provera, and depoprovera) are available and effective in treating the symptoms of endometriosis, however, only NSAIDS, OCPs 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.

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. 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 1st need is to treat your patient to the standard of care, secondary is to treat so that your patient's condition/therapy is waiverable. If various treatments are equally effective then pick the one most likely to be waiverable.

III. Information Required for Waiver Submission.

An aeromedical summary should contain the following:

A. History of symptoms
B. Gynecological evaluation report
C. Treatments used, last symptoms, and any current medications or ongoing treatments.
D. Latest hematocrit.

IV. Waiver Considerations.

Flying Class	Medication/Treatment Required for Symptom Control of Endometriosis	Potentially Waiverable Waiver Authority
I/IA	NSAIDs, OCPs, depoprovera	No AETC
	Danazol, gonadotropin releasing hormone agonists	No AETC
	Surgery	No AETC
II	NSAIDs, OCPs, depoprovera	Yes MAJCOM
	Danazol, gonadotropin releasing hormone agonists	No AFMOA
	Surgery	Yes MAJCOM
III	NSAIDs, OCPs, depoprovera	Yes MAJCOM
	Danazol, gonadotropin releasing hormone agonists	No MAJCOM
	Surgery	Yes MAJCOM

Review of AIMWTS showed 40 endometriosis cases. Twenty-seven women with endometriosis, asymptomatic with or without medications were granted waivers. Thirteen of the 40 cases were disqualified; five had symptoms not controlled or on nonwaiverable 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.

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WAIVER GUIDE
Updated: Feb 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Endometritis

I. Overview.

Endometritis is an infection of the uterus, almost always bacterial in nature. Most cases of endometritis follow or accompany delivery of the pregnant uterus, although, it can be part of the total clinical picture of pelvic inflammatory disease (PID). PID is covered in a separate section. The organism can be normal vaginal flora, fecal contaminant, or sexually transmitted. It is usually treated and cured with appropriate IV antibiotics, however, in some instances it may develop into a more indolent chronic form. This chronic form can be associated with infertility, chronic pelvic pain, and abnormal uterine bleeding. Diagnosis is usually made either clinically in the postpartum patient or through culture of endometrial specimens when possible.

II. Aeromedical Concerns.

If the infection is acute and resolves with initial antibiotic treatment, there is little cause for concern. However, the chronic form of the disease presents several concerns. The chronic pain that can accompany chronic endometritis may affect the individual's ability to concentrate on her job and may even inhibit the completion of strenuous physical tasks often involved in aviation. Abnormal bleeding, especially if heavy, may cause fatigue and weakness, and in addition may change the patient's susceptibility to hypoxia or decompression sickness. Infertility in itself is an extremely stressful condition that may cause an undue psychological burden on an aviator.

III. Information Required for Waiver Submission.

Complete report of OB/GYN evaluation, with obstetrical history where pertinent. This should include before treatment and evidence-of-cure cultures. Documentation of disease resolution is necessary.

IV. Waiver Considerations.

No waivers for endometritis have been requested. Two waiver requests have been submitted for pelvic inflammatory disease, one of which was granted for FC III. The other was disqualified because of an additional condition.

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WAIVER GUIDE
Updated: Jan 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Excessive Height.

I. Overview.

AFI 48-123 specifies height for all flying classes of 64-77 inches. In addition, Flying Class I, IA, and initial II (Flight Surgeon) require sitting height of 34-40 inches. Height outside of these parameters is considered disqualifying.

II Aeromedical Concerns.

Excessive height is primarily an egress concern, both for ejection and emergency egress from single or multiplace airframes. Excessive height during ejection may be associated with increased neck and flail injuries because of positioning to accommodate the individual in the cockpit. Having to position oneself in a particular fashion to egress through small openings in a multiplace aircraft during an emergency might slow the progress of the tall individual and those behind. There are also issues of comfort, ability to manage all controls, and inadvertent manipulation of switches or other controls due to cramping in the cockpit or workstation due to excessive height.

III. Information Required for Waiver Submission.

Height and weight, along with anthropometric measurements to include sitting height, functional reach, buttock-knee-length, buttock-leg-length, as well as detailed description of the results of a functional check, to include ability to egress and eject safely, as well as perform all maneuvers required to maintain control of the aircraft under varying circumstances.

Anthropometric measurements should be made as follows, preferably using an anthropometer. However, this may often not be available. In this case, it is best to perform the measurements with the applicant seated on a flat unpadded bench flush with the wall. The applicant should hold his or her shoulders and buttocks against the wall, with feet flat in front of them. Sitting height - Measure from the bench surface to the crown of the head. (Burke, et al have suggested that seated eye height may be a better measure for the cockpit.) Functional reach - Measure from the wall to the tip of the fingers with the shoulder flexed at 90 degrees while kept against the wall. Buttock leg length - Measure from the wall behind the buttocks to the bottom of the foot with the hip flexed to 90 degrees and the foot also held at a 90-degree angle to the lower leg. Buttock knee length - With the feet flat on the floor, measure from the wall behind the buttocks to the front of the knee when bent at a 90 degree angle. (Note, though, the weakness associated with these measurements. Pedal excursion and flight control manipulation may not necessarily be accomplished with the tips of the fingers or the foot with the knee in full extension.)

IV. Waiver Considerations.

The ACS database does not contain information on initial Flying Class I exceptions to policy for excessive height. There are, however, 105 waivers in the database for excessive height (68),

excessive sitting height (25), and a combination of both (12). Of these, 11 were for Flying Class III and 94 for Flying Class II-IIC. One hundred percent of these waivers were granted, but are only noted because of the presence of a second condition requiring waiver consideration. Initial physicals require an exception to policy.

For initial exception to policy, it must be remembered that throughout the training process, an aviator will be required to fly various aircraft and the path may not always be predictable depending on the pipeline into which the candidate is placed. A student who may fit into a training aircraft may not fit functionally into their final aircraft and vice versa. Over time, the individual's primary aircraft may be expected to change.

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WAIVER GUIDE
Updated: Feb 07
By: Maj Kelly West, Lt Col Marc Goldhagen, Col Pat Storm, and Dr Karen Fox

CONDITION:
Gastroesophageal Reflux Disease

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 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. Nonsteroidal anti-inflammatory drugs 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 being those containing a combination of magnesium and aluminum hydroxides. Most individuals with heartburn or regurgitation not responding to conservative measures and intermittent antacids will self-medicate with OTC H2-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, gaining symptom relief, even though their clinical condition could be of aeromedical concern. According to the most recent Official Air Force Approved Aircrew Medication list, two doses of over-the-counter omeprazole or ranitidine is allowed per week as long as the symptoms do not last greater than 48 hours. If the aviator requires more medication to control their symptoms then they require a visit to the flight surgeon and a waiver.

Disease severe enough to warrant physician attention can be treated with higher dose H2-receptor antagonists, or with a proton pump inhibitor (omeprazole, rabeprazole, lansoprazole, pantoprazole, esomeprazole). Although a prokinetic agent such as metoclopramide is sometimes used clinically, its use is not waiverable. 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, 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 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 GERD may cause disqualifying side effects. Metoclopramide, a dopamine antagonist, crosses the blood-brain barrier and up to 20% of patients experience psychotropic side effects to include somnolence, lassitude, restlessness, anxiety, insomnia, and rarely extrapyradimal reactions. Cisapride, also a dopamine antagonist, is better tolerated, but is still associated with psychiatric and extrapyramidal symptoms; furthermore, QT prolongation and serious ventricular arrhythmias have been a particular problem with this drug. 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. Antacids are also safe to use in an aeromedical environment. Some H2-receptor antagonists and PPIs are well-tolerated and may be considered for waiver (See Official Air Force Approved Aircrew Medication list.)

III. Information Required for Waiver Submission.

Initial evaluation of GER should include a thorough history and physical examination. In aircrew describing recurrent retrosternal burning or regurgitation that worsens after eating, lying down, or bending but is relieved with antacids, the clinical diagnosis of GERD can be made. If symptoms are mild and can be controlled with dietary and lifestyle modifications, or by infrequent use of antacids, cockpit duties can continue uninterrupted and further evaluation is not necessary. Chronic use of antacids, H2-receptor antagonists, or PPIs requires a waiver. For aircrew with refractory symptoms, onset of symptoms over age 50, or for those with weight loss, dysphagia, or bleeding, an EGD should be performed and the results included in their aeromedical summary. For those with demonstrated esophagitis, waiver is required for the esophagitis. The decision to pursue endoscopy is made on clinical grounds, and the use of EGD to reveal/refute esophagitis is not recommended simply to support a waiver request. Barium swallow and upper GI series are of little use. While they may reveal spontaneous reflux from the stomach into the esophagus, demonstration of barium reflux during this study is not specific, and many patients with GERD may not show reflux during

the period of study. An upper GI study may be useful to rule out other GI lesions, to include tumor and peptic ulcer disease, but endoscopy is generally more accurate. Esophageal pH monitoring provides the best indication of reflux, particularly in cases of atypical chest pain, but is uncomfortable, not widely available, and not generally required for waiver purposes. It may be useful in cases where reflux symptoms persist in a patient with a normal-appearing esophagus, and response to PPIs has been poor. The acid perfusion test (Bernstein test) is a test of historical interest only. It is no longer performed and not required for waiver consideration.

Information submitted for waiver consideration should include the following:

A. History of symptoms.
B. Response to therapeutic interventions especially if medication is required.
C. Diagnostic test results and consultation findings (if indicated by poor response to empiric therapy).
D. Documentation of resolution of symptoms and observation for adverse reaction.

IV. Waiver Considerations.

Neither GERD nor therapy with antacids, sucralfate, ranitidine, or proton pump inhibitors is disqualifying for ground-based controller duty. Qualification standards and waiver requirements are the same across all flying classes: I, IA, II and III. Waiver is not required for aviators reporting intermittent use of OTC antacid preparations for minor, self-limiting dyspepsia. A waiver can be considered for routine use of antacids, sucralfate, ranitidine, omeprazole, rabeprazole, lansoprazole, pantoprazole or esomeprazole as long as the reflux symptoms are eliminated on the medication. GER without demonstrated esophagitis does not require a specific waiver, though a waiver is required for routine use of the medication to control GER symptoms. Use of omeprazole (Prilosec®), rabeprazole (Aciphex®), lansoprazole (Prevacid®), pantoprazole (Protonix®) or esomeprazole (Nexium®) for the control of GERD is currently authorized under a single waiver approved by the appropriate MAJCOM/SGPA. Under the single waiver, medication change between omeprazole, rabeprazole, lansoprazole, pantoprazole or esomeprazole requires a three-day ground observation period and the changes documented in AIMWTS at the time of waiver renewal.

In patients with demonstrated esophagitis, waiver is required for both the use of chronic medications, and for the esophagitis itself. For applicants for initial flying physicals, FC I/IA, II (flight surgeons), or III, who have esophagitis previously identified on EGD or X-ray, whether symptomatic or asymptomatic, an EGD will be required to rule out on-going inflammation or complications such as a stricture. In addition, initial FC physicals in applicants who are age 40 or older who have been on any of the above medications for more than five years, intermittently or consecutively, who have never been evaluated with an EGD will require an EGD to rule out underlying significant pathology. Furthermore, an EGD should be obtained in any person on a proton-pump inhibitor, H-2 blocker, or other anti-acid medication who demonstrates unexplained weight loss, dysphagia, significant nausea and or vomiting, and any hematemesis, or blood in the stool. Qualified aircrew members who are still symptomatic despite medical treatment should also be evaluated with an EGD prior to waiver submission.

In those aircrew who have undergone anti-reflux surgery, no waiver is required if all symptoms have resolved and the aircrew member does not require medication. If the symptoms persist and require chronic use of medication then a waiver must be requested for use of the medication.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Michaud

CONDITION:
Gastrointestinal Polyps

I. Overview.

Polyps of the gastrointestinal (GI) tract may be single or multiple, pedunculated or sessile, and sporadic or part of an inherited syndrome. They become significant because of their potential to bleed or become malignant. Rarely, polyps may present in adulthood as an intussusception with acute abdomen.

Adenomatous polyps are the most frequent tumor of the GI tract. Polyps may be found in as many as 30 % of the middle-aged or elderly population, however it is believed that less than 1% of these ever become malignant. The relative risk of malignancy correlates with the size, histology, and epithelial dysplasia of the lesion and ranges between 1% and 40%. Polyps arise as part of several hereditary syndromes. Depending on the syndrome, the patient's risk for a polyp to undergo malignant change may very from small as in the case of Peutz-Jeghers syndrome to nearly 100% as in familial adenomatous polyposis. Once a polyp has been removed, a patient's chance of developing another polyp is 30%. A polyp takes between 3 to 5 years to become clinically detectable.

Polyps may be removed surgically or by endoscopy. The entire colon should be evaluated with endoscopy or barium enema for concurrent lesions before or at the time of treatment. Post excision hemorrhage after endoscopic removal should be ruled out. Evaluation of the rest of the GI tract may be appropriate for extra-colonic GI polyps. Surveillance at 3 years post removal and every three years thereafter is recommended to monitor for recurrences.

II. Aeromedical Concerns.

Anemia that results from bleeding of a polyp represents the most likely direct complication affecting flying duties. This complication would likely be gradual and could cause problems in flight if undetected. Malignant change of a polyp would present similar risks associated with colorectal cancer. The aeromedical concerns of anemia and colorectal cancer are discussed separately in this pamphlet. The risk of intussusception is very rare. Once a patient has been diagnosed with having a polyp, routine surveillance should negate the risk of recurrence for flying duties. Resection of a polyp may lead to prolonged hemorrhage that must be identified and treated.

III. Information for Waiver Submission.

Before waiver can be considered for a history of GI polyps, the full extent of the disease must be known and the flier should be disease free and fully recovered from any treatments. The presence of colostomy or iliostomy is not compatible with military aviation. Gastroenterology opinion and AFIP confirmation of histology are mandatory for initial waiver. MEB and Tumor Board recommendations may be required. Flyers who receive waivers should have their GI tract evaluated

every three years for recurrence. Renewal waivers require the results of interval GI tract evaluations and Gastroenterology opinion.

IV. Waiver Considerations.

US Air Force Experience: Of the 18 requests for initial waivers for gastric or intestinal polyps, all have been granted. One waiver request for a resected esophageal polyp was granted. These numbers only reflect the patients who have had a waiver request submitted or have visited the consult service.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Michaud

CONDITION:
Gastrointestinal Tumors, Other

I. Overview.

Other than colorectal cancer, gastrointestinal (GI) polyps, and lymphoma, the other tumors that affect the GI tract are relatively rare, and frequently more lethal. The other tumors that afflict the GI tract include: esophageal, gastric, gall bladder, hepatic, and pancreatic carcinomas, as well as benign tumors of these organs. Once a flier is diagnosed with one of these tumors, the disease progression of that tumor usually dictates discontinuance of flying duties.

Although the incidence of many of these diseases is low, a notable exception is gastric carcinoma with a relatively high incidence of 2-6 per 100,000 population. However, this represents a significant decrease during the past 60 years from incidence rates in the range of 28 per 100,000 population.

Treatment for most of these diseases involves surgical resection with or without adjuvant therapy. In many cases, due to late diagnosis or the aggressiveness of the malignancy, therapy may represent palliation rather than an attempt to cure.

II. Aeromedical Concerns.

The initial presentation of these diseases is the primary aeromedical concern. Many of these tumors may present with sudden incapacitation. Esophageal tumors carry a risk of sudden hemorrhage or aspiration. Gastric carcinoma has the risk of incapacitating hemorrhage or metastasis to the brain. Hemorrhage is also the concern with primary hepatic carcinomas. Pancreatic carcinoma may be associated with a risk of developing diabetes mellitus, thrombophlebitis, and serious psychiatric disorders.

Once the patient has been adequately treated, the question of waiver for any of these tumors is addressed, and the survival rate of patients with the tumor becomes important. The five year survival rates for various carcinomas are as follows: esophagus 5-20%, gastric 25-30%, pancreas < 1%, hepatic < 1%, and gall bladder < 10%.

III. Information for Waiver Submission.

Patients will be considered for waiver after a period of five years symptom free after the cessation of therapy. Any treatment modality is acceptable for waiver consideration.

Waiver request should include appropriate opinions from oncology, internal medicine, gastroenterology, and/or surgery. Studies required include CXR, CT/MRI of the mediastinum and abdomen, and endoscopy where indicated. Medical evaluation board (MEB) and tumor board recommendations, as well as AFIP confirmation of histology are essential.

IV. Waiver Considerations.

US Air Force Experience: The numbers are too small to be useful and each case is addressed on a case by case basis. Of these conditions only one flier diagnosed with pancreatic cancer requested a waiver. He was disqualified, but survived for twenty years after diagnosis.

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WAIVER GUIDE
Updated: Mar 07
By: Maj Petran Beard (RAM 08) and Dr Karen Fox

CONDITION:
Guillain-Barré Syndrome (Acute Inflammatory Demyelinating Polyradiculoneuropathy)

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[4, 7] 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, 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. It also can be seen after immunizations, surgery, trauma, bone-marrow transplantation, and systemic diseases such as Hodgkin's disease, systemic lupus erythematosus, and sarcoidosis. GBS 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 young adults, as well as in the elderly and pregnant or postpartum women.[4, 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 hypo 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 incidental 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.[4] 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 at onset because of the large variety of symptoms incurred. The huge differential diagnosis includes disorders of the spinal cord, muscles, neuromuscular junction, brainstem, and other acute polyneuropathies. In addition, electrolyte imbalances, viruses, bacterial 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) and/or plasmapheresis have been successful in shortening the severity and duration of the illness up to 40% to 50%.[8] 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.[8] 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.[3] 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.[3] 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 being immunized against.

III. Information Required for Waiver Submission.

The following are required to be documented in the aeromedical summary:

A. Summary of presentation, course and treatment of disease
B. Results of lumbar puncture
C. Results of EMG, neurophysiologic studies
D. Neurology consult that includes complete exam once disease has resolved

E. Pulmonary function test upon resolution of disease
F. Optometry/ophthalmology consult to include all test listed in AFI 48-123 V3 A4.12.1. (stereopsis, ocular motility and alignment testing), if vision involved
G. 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)

IV. Waiver Consideration.

Guillain-Barré syndrome is disqualifying for all flying classes. If full neurological recovery occurs then waiver is likely. An Aeromedical Consultation Service (ACS) review/evaluation is required to determine eligibility for a return to flying status (RTFS) if residual deficits remain after recovery and are minor and not felt to interfere with aircrew duties.

Eight cases requesting waivers for GBS were found in AIMWTS through January 2007. Seven were approved (one FC I/IA, three FC II, one initial FC II, and two FC III). The one waiver was disapproved due to residual motor deficits. For waiver consideration of GBS, there should only have been a single disease episode and there should be no residual signs or symptoms which would affect normal functioning in any way. The unpredictable nature of disease outcome requires that waivers for GBS be considered and granted on an individual basis.

Reviewed by Dr Stephen McGuire, Aeromedical Consultation Service neurologist.

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WAIVER GUIDE
Updated: May 00
By: Col Towle

CONDITION:
Head Injury

I. Overview.

Head injury is epidemic in the United States with an estimated incidence of 200/100,000 persons per year. This is 40 times the incidence of spinal cord injury and 10 times the incidence of AIDS. About 80% of these are mild injuries, with brief loss of consciousness and no sequelae. 10% are moderate, and commonly are associated with residual motor or neuropsychological deficits, or personality changes. Severe head injuries are found in 10% and are accompanied by prolonged loss of consciousness and frequently severe physical and cognitive impairments. The most common cause of head injury in the U.S. is motor vehicle accidents (50%), followed by falls (30%) and assaults (5-15%). Males are affected twice as often as females and the predominant age group is 15-24 years. Predisposing factors include alcohol use, history of alcohol abuse, and lower socioeconomic status.

AFI 48-123 separates head injury into four categories:

1. **minimal** head injury without loss of consciousness, post-traumatic amnesia (PTA), or abnormality on examination

2. **mild** head injury where unconsciousness has been less than 30 minutes and PTA less than one hour, and no other findings consistent with a worse category are present

3. **moderate** head injury where unconsciousness and/or PTA are longer than for mild but less than 24 hours and no abnormalities consistent with severe head injury are present. This category includes: unconsciousness of more than 30 minutes but less than 24 hours, amnesia of more than one hour but less than 24 hours, or a small epidural collection of blood found only on CT scan or MRI, without any evidence of parenchymal injury and followed to resolution without surgery.

4. **severe** head injury where one or more of the following are present: unconsciousness or PTA exceeding 24 hours duration, radiological evidence of retained metallic or bony fragments, leptomeningeal cyst, aerocele or arteriovenous fistula, depressed skull fracture with or without dural penetration, traumatic or surgical laceration or contusion of the dura mater or the brain or a history of penetrating brain injury, focal neurological signs, epidural, subdural, subarachnoid or intracerebral hematoma, CNS infection such as meningitis or abscess within six months of head injury, or CSF rhinorrhea or otorrhea lasting more than 7 days

Acute management for head injury is in accordance with published ATLS protocol.

II. Aeromedical Concerns.

The decision to return an aviator to the cockpit must be based on the probability of developing serious sequelae, namely motor or neuropsychological deficits, or post-traumatic seizures (PTS). It

has been demonstrated that even minor head injury can result in lasting, often subtle deficits, which can lead to failure in the cockpit. Mild intellectual deficits may be missed on a detailed neurological exam, and a good neuropsychological assessment combined with reports from perceptive relatives or friends may be the best tools for detection. For this reason, all rated aviators experiencing even mild head injuries must have cognitive testing prior to return to flying. Screening data obtained prior to UPT is often helpful in this regard in providing a baseline to which this testing may be compared.

Risk of seizure is much more difficult to quantify, but is of critical importance due to the implications for sudden incapacitation. The overall risk of PTS after closed head injury is 1-5%. If a seizure occurs within the first week post injury, the risk of further seizures is 25%. When seizures do occur, 27% occur within the first 3 months, 56% within the first year, and 70% within 2 years. The risk of PTS is substantially reduced if 2 years have elapsed after the head injury but in 30% PTS develops several years after the injury.

It is desirable to know what factors involved in the head injury are associated with increased PTA risk. However, studies that have attempted to identify risk factors are limited and difficult to extrapolate to the flying population. In the general population, several risk factors seem to be associated with greater risk. Intracranial hemorrhage, particularly subdural hematoma combined with cortical contusion, is the worst prognostic indicator, with the combination carrying a 31% risk of PTS. A duration of unconsciousness of >24 hours or depressed skull fracture also increase the risk, but not greatly unless associated with other abnormalities.

III. Information Required for Waiver Submission.

Head injury associated with any of the following is *not* waiverable:

1. Post-traumatic seizures (exception: seizures at the time of injury)

2. Persistent neurological deficits indicative of significant parenchymal CNS injury, such as hemiparesis or hemianopsia

3. Evidence of impairment of higher intellectual functions or alterations of personality as a result of injury

4. Cerebrospinal fluid shunts

5. **Persistent post-traumatic sequelae**, as manifested by headache, vomiting, disorientation, spatial disequilibrium, personality changes, impaired memory, poor mental concentration, shortened attention span, dizziness, altered sleep patterns, or any findings consistent with organic brain syndrome are **disqualifying**, but **may be considered for waiver** when full recovery has been confirmed by complete neurological and neuropsychological evaluation

Minimum observation periods and evaluation requirements are listed in Table 16.1 of AFI 48-123. Waiver criteria vary depending on the category of head injury under consideration and the classification of the aviator:

Minimal: No waiver is required. A complete neurological examination by a flight surgeon will suffice.

Mild: FC II requires complete neurological examination by a flight surgeon and administration of neuropsychological testing as directed by ACS Neuropsychology as soon as possible. If the neuropsychological testing is normal, the aviator may obtain a waiver for FCII duties. If neuropsychological testing is abnormal, additional more extensive neuropsychological testing will be required and an ACS evaluation may be necessary. A history of seizure within 5 minutes of the injury (without recurrence) may be considered for waiver. FC I and III only require a neurological exam by a flight surgeon.

Moderate: FC II requires complete neurological evaluation by a neurologist, CT scan (preferably obtained within 48 hours of the injury), MRI, EEG (with sleep samples), and neuropsychological testing as directed by ACS Neuropsychology. Examinees may be considered for a FC II waiver after 6 months if the only abnormality placing the injury in the moderate category is duration of LOC/PTA and a CT of the head obtained within 48 hours of the injury is normal. Therefore, it is important to get a CT at the time of injury to permit this exception. Otherwise, the observation period is usually 2 years. ACS evaluation is necessary at 6 months post-injury regardless of whether a waiver is likely to be granted at that time. FC I, IA, III require complete neurological evaluation by a neurologist or internist, CT scan, and neuropsychological evaluation consisting of the following tests, as a minimum: MMPI, Halstead Reitan, and WAIS-R.

Severe: FC II requires complete neurological evaluation by a neurologist, a CT (preferably obtained within 48 hours of the injury), MRI, EEG (with sleep samples), and neuropsychological testing (tests as in category 3). An ACS evaluation is required at 6 months with reevaluations at 2 and 5 years as necessary. Examinees may be considered for waiver after 2 years if the only abnormality that placed the injury in the severe category is duration of LOC/PTA or a small epidural hemorrhage not associated with focal neurological findings. FC III requires complete neurological evaluation by a Neurologist, CT Scan, and neuropsychological evaluation consisting of, as a minimum: MMPI, Halstead-Reitan, and WAIS-R. Severe head injury is generally not waiverable for FC I, but may be considered after 10 years.

IV. Waiver Considerations.

There are 407 rated aviators in the USAF waiver files with the diagnosis of head injury. Of these, 44 were disqualified from flying duties. The majority of those disqualified were in the moderate and severe categories.

V. References.

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WAIVER GUIDE
Updated: *Mar 06*
By: LtCol Donald Christensen, Col William Nelson, Lt Col Michael Thornsberry, Col Christopher Williams, Lt Col Dana Windhorst and Lt Col Michael Jaffee

CONDITION:
Headache

I. Overview.
Headaches are extremely common, with most adults being affected at some point during their lives. Most headaches are not serious. However, many experience headaches severe enough to prevent one's ability to function at a normal level.
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). 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 cephalalgias, 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. This is the approach of the aeromedical disposition guidelines of this Waiver Guide.

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.

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. 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. Newer treatment options include botox to the muscles of head and neck or occipital nerve injections. 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.

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. 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.

Migraines

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. Migraine affects approximately 6% of men and 18% of women. Most have a family history of migraine. 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. 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 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).

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). Intranasal lidocaine has also been used but is reported to have only transient effect. 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. None of the abortive pharmacologic therapies are waiverable for flying.

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 be incapacitating 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 medications are not waiverable. Use of over-the-counter (OTC) analgesics such as acetaminophen, ibuprofen and caffeine are acceptable for occasional use for headaches that are not otherwise disqualifying.

III. Information Required for Waiver Submission.

Required before any disqualifying headache can be considered for <u>initial</u> waiver:

-- A complete medical evaluation.

-- Neurology consultation with original supporting documents such as radiographs, electroencephalograms (EEGs) and laboratory studies.

-- Aeromedical summary (AMS) with emphasis on accuracy of documentation of frequency, intensity and associated neurologic findings.

IV. Waiver Consideration.

A disqualifying headache for Flying Classes I, IA, II and III, ground-based controller duty, space and missile operations, and air vehicle operators is defined as any history of a *primary* headache with any of the following characteristics present:

-- Impairment in social, vocational or academic activities caused by the headache and/or its associated symptoms.

-- Medication other than OTCs is required for abortive control of the headache.

-- A prescription for prophylactic medication is required for the headache.

-- There is associated neurologic dysfunction or deficit including aura, with or without (i.e., acephalgic migraine) associated headache.

A *secondary* headache meeting any of the above criteria is disqualifying unless the secondary headache and its underlying cause(s) have resolved. Whether a history of the underlying cause is separately disqualifying must be considered.

The waiver authority will review cases of any aviation and special operational duty applicants with a history of headache to determine if the headaches are disqualifying. The waiver authority may consider for remote and isolated history of disqualifying headache in applicants.

There is no longer any minimum observation period before waiver application.

The MAJCOM may consider a waiver if there are:

-- *Three or fewer* disqualifying headaches per year, and

-- *No* associated neurologic dysfunction, deficit or aura, and

-- *No or mild* (i.e., did not cause any social or occupational impairment) nausea, photophobia, or phonophobia, and

-- *No* prophylactic medication is required.

For all other cases, the waiver authority is AFMOA.

IV. References.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Bachmann

CONDITION:
Hematuria

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 13% in community population-based studies. Hematuria itself is not necessarily aeromedically significant. Discovering the underlying process, if any, causing the hematuria is the key to a proper aeromedical disposition. Hematuria may be essentially a normal variant, or it may be a sign of life-threatening disease. In 6 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[4]. Most sources recommend evaluation of microscopic hematuria of greater than 3-5 RBC/hpf. In one study of 161 aviators with asymptomatic microscopic hematuria, no evident pathology developed over a mean follow-up period of 7.6 years[5].

The differential diagnosis of asymptomatic hematuria without proteinuria or casts includes neoplasm, calculi, infection, trauma (including exercise), analgesic 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.

The differential diagnosis of hematuria with proteinuria or casts is extensive, and includes nephron damage and many forms of glomerulonephritis.

II. Aeromedical Concerns.

Hematuria by itself is unlikely to be aeromedically significant. However, this sign must be evaluated fully. Calculi can cause extreme pain, lead to urinary tract infection and obstruction. 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. Information Required for Waiver Submission.

The initial evaluation of persistent hematuria should include examination of external urethra and prostate, repeat urinalysis after discontinuing exercise, and urine cultures. BUN, creatinine CBC, and 24-hour urine for creatinine and protein should be obtained. If no etiology is determined on this initial workup, consultation with a urologist should be obtained to rule out collecting system disease. If no structural etiology is found, consultation with a nephrologist should also be obtained. Tests which may be requested by these consultants include:

IVP
renal ultrasound
cystoscopy
coagulation studies, urine cytology
CT
renal arteriography
renal biopsy

The amount of information required for waiver submission depends on the individual case. For instance, if exam, urine cultural, renal function, and blood count were normal, and the microscopic hematuria disappeared while the aviator refrained from exercise, no further workup would be required.

IV. Waiver Considerations.

Waiver criteria include documentation of complete evaluation by urology and nephrology (if indicated), 24-hour urine creatinine clearance and protein, and demonstrating the absence of significant renal disease, calculi or neoplasm.

There are 223 aviators in the USAF waiver file with the diagnosis of hematuria. Of these, 119 were waivered and 4 were disqualified. The disqualifications were all for worsening of renal function (increasing proteinuria) or renal biopsy results consistent with significant renal disease.

There are 35 aviators in the Aeromedical Consultation Service database who were diagnosed with hematuria while on active duty (including ANG and AFR) since August 1991. This was the cause for grounding in 11. Of these, 10 were recommended for waiver and one was treated and returned to flying duties without waiver.

V. References.

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2. Coe FL. Alterations in urinary function. *Harrison's Principles of Internal Medicine,* 12th Ed, Wilson JD, et al (eds). New York, McGraw-Hill, 1991, p 271-8.

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WAIVER GUIDE
Updated: Mar 99
By: Major Paston

CONDITION:
Hepatic Cirrhosis

I. Overview.

There are several causes of hepatic cirrhosis. Hemochromatosis (Wilson's disease) or chronic active hepatitis usually becomes symptomatic in the teens and 20s. Other etiologies, of cirrhosis, usually become symptomatic in the 40s. Only 10 to 15 percent of alcoholics develop cirrhosis. Women appear to be more susceptible to alcoholic liver cirrhosis. Symptoms of alcoholic cirrhosis are insidious in onset. Patients who continue to drink after having had a major complication have a 5-year survival of less than 50 percent. This contrasts to a 90 percent rate for patients who stop drinking. In decreasing order of presenting symptoms: 1) malaise (30-80%), 2) abdominal pain (30%), 3) gastrointestinal hemorrhage (25%), and 4) neurological features (less than 10%). In primary biliary cirrhosis, pruritis occurs as the first symptom in 80 percent of the cases and jaundice is usually found in the remainder of the cases. Collagen disease in association with primary biliary cirrhosis and joint involvement is seen in over 40 percent of the cases. Bacteruria is found in 35 percent of cases but may be asymptomatic. For primary biliary cirrhosis the average survival is 11.9 years but may be less than 2 years when serum bilirubin starts to rise quickly.

II. Aeromedical Concerns.

The aeromedical concerns include: 1) gastrointestinal hemorrhage, 2) malaise, 3) lethargy, 4) ascites, 5) encephalopathy, 6) peripheral neuropathy, 7) abdominal pain, and 8) Dupuytren's contractures. Osteomalacia arising in cases of primary biliary cirrhosis could be detrimental on ejection. Ascites arising from cirrhosis will interfere with the proper functioning of the anti-gravitational suit. Furthermore, there may be other aeromedical concerns if the etiology of the cirrhosis is alcohol (Laennac's cirrhosis).

III. Information Required for Waiver Submission.

Internal medicine consultation is necessary. Liver biopsy may be required. Likewise, ultrasound of the abdomen may be required.

IV. Waiver Consideration.

The Aeromedical Consultation Service (ACS) has evaluated four individuals with the diagnosis of hepatic cirrhosis. Evaluee One was disqualified with the diagnosis of Laennec's cirrhosis. Evaluee Two was granted a waiver, class II, with the diagnosis of, "possible cirrhosis." Evaluee Three was disqualified with the diagnosis of viral cirrhosis. Lastly, Evaluee Four had the diagnosis of Laennec's cirrhosis, however the disposition granted was unknown. He was evaluated in May 1970. The waiver is likely to be considered only in asymptomatic and non-progressing (stable) cases who do not require treatment and do not exhibit any evidence of esophageal varices. Additional requirements for waiver of alcoholic cirrhosis are found in the section on alcohol abuse.

V. References.

1. Bergin JD. *Medicine Recall*. Baltimore: Williams and Wilkns, 1997.

2. Braunwald E.,et al. *Harrison's Principles of Internal Medicine*, 11th Ed. New York: McGraw-Hill Book Company, 1987.

WAIVER GUIDE
Updated: Dec 03
By: Wg Cdr Hutchinson

CONDITION:
Hepatitis

I. Overview.

Acute hepatitis can result from infection (including viral hepatitis A-E, infectious mononucleosis, cytomegalovirus, Herpes simplex, Coxsackie virus, toxoplasmosis, leptospirosis, Candida, Brucella, mycobacteria and Pneumocystis), autoimmune disease or drug/toxin/alcohol ingestion. Symptoms during the acute phase are variable but include anorexia, nausea, vomiting, fatigue, malaise, arthralgias, myalgias, headache, photophobia, pharyngitis, cough, coryza and a low-grade fever. Symptom expression is variable, however; as an example, 70-80% of those with acute hepatitis C virus (HCV) infection may be asymptomatic.

Full functional recovery from acute infection is the norm, although a small number of individuals may progress directly to hepatic failure. Recovery may be assumed when the individual is asymptomatic, the liver transaminases (AST and ALT) have returned to within normal limits and viral markers are appropriate for a resolved acute infection. With hepatitis B virus (HBV), chronic infection is likely if HbsAg is still detectable after 6 months - usually absent by 3 months - and in HCV infection if there is persistent detectable viral load. Approximately 1% of immunocompetent adults become chronically infected following hepatitis B virus (HBV) infection and 70-90% of HCV infections become chronic. Such chronic infections may be non-, or only slowly, progressive, but can be severe with cirrhosis, end-stage hepatic failure and risk of hepatocellular carcinoma. In chronic HBV infection antigen-antibody immune complexes can cause arthralgias, arthritis, glomerulonephritis and polyarteritis nodosa.

In HCV, chronic hepatitis tends to be very slowly and insidiously progressive, if at all, but in 25% will eventually progress to end-stage cirrhosis. Due to the high risk of chronicity, HCV-infected aviators should be under the clinical care of a hepatologist. A liver biopsy can give valuable prognostic information but this procedure should probably not be performed routinely in these circumstances for non-clinical indications. Pharmaceutical therapy is available for chronic B and C virus hepatitis but these drugs have significant side effects, including fatigue and neuropsychiatric complaints. For both infections, treatment is typically reserved until there is evidence of chronic liver disease (as demonstrated by a recurrence of abnormal transaminases) rather than treating virological carrier status.

The following sections in AFI 48-123 relate specifically to hepatitis:
A. Minimum evaluation requirements for cases submitted to certification and waiver authorities: 16.8. Hepatitis, History Of Hepatitis B and C antigen/antibody testing, ALT, and GGPT (in cases of confirmed Hepatitis A, no additional testing is required).
B. Requirement for an MEB: A2.9.6. Hepatitis. Chronic, when symptoms persist after a reasonable time following the acute stage and there is objective evidence of impairment of liver function.

C. Appointment, enlistment, and induction: A3.16.5.1. Hepatitis within the preceding 6 months; or persistence of symptoms after 6 months, with objective evidence of impairment of liver function and chronic hepatitis, including hepatitis B carriers.
D. Flying duties: A7.19.1.5. History of viral hepatitis, with carrier status, persistent transaminase elevation or evidence of chronic active or persistent hepatitis.

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. Information Required for Waiver Submission.

The following are required for waiver consideration:
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. Results of physical examination, focusing on signs of acute and chronic liver disease.
C. Gastroenterology/hepatology evaluation.
D. Current LFTs, serum albumin, prothrombin and CBC with platelet count.
E. MEB report (if required under A2.9.6).
F. 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.

IV. Waiver Considerations.

Waiver consideration will hinge upon the severity of hepatic inflammation, functional hepatic capacity and absence of significant neuropsychiatric symptoms. Individuals granted a waiver should have annual evaluation locally, including as a minimum a blood panel (LFTs, serum albumin, prothrombin and platelets) and review of possible neuropsychiatric symptoms. The minimum information required for waiver renewal would be a current history (including updates/changes since last waiver) and a blood panel.

FC I/IA: should meet the standards within AFI 48-123; waiver not recommended for chronic hepatitis/carrier status due to unpredictable medium-term prognosis.
.
The Aeromedical Consultation Service (ACS) has noted many cases with a coincidental remote history of hepatitis but since 1990 it has evaluated 6 aviators because of this diagnosis. Four had

chronic HCV infection and waivers were recommended in all cases. One had mild chronic persistent hepatitis of uncertain etiology and was also recommended for a waiver but one individual with HBV and evidence of cirrhosis was not recommended.

V. References.

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WAIVER GUIDE
Updated: Mar 04
By: LtCol Doan and Maj James

CONDITION:
Herniated Nucleus Pulposus (HNP) and Spinal Fusion

I. Overview.

The following sections in AFI 48-123 address specifically HNP and spinal fusion for flying classes (FC) I/IA, II, III as disqualifying conditions:

> V3 A4.27.1.7. History of frank herniated nucleus pulposus or history of surgery or chemonucleolysis for that condition.
> V3 A4.27.1.13. Any surgical fusion.

<u>Herniated Nucleus Pulposus</u>

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. 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.

The majority of HNPs occur in the lumbar region (80%), followed by the cervical region (20%), and the thoracic region (<1%). 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.

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.

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. 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 it may take 6 months for complete postoperative fusion of bone mass. Other 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.

II. Aeromedical Concerns.

Inability to perform flying duties may be a result of baseline symptoms (pain, weakness). Sudden incapacitation and permanent disability are significant concerns, particularly in a high-G environment or during ejection. And finally, 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 and requires more time for healing or possibly additional surgery. It is essential to establish successful complete fusion prior to returning to fly, particularly in high-performance aircraft given the mechanical stresses occurring during G-exposure and ejection. One common guideline for fusions with or without retained hardware is based upon i) once fusion occurs the load is taken up by the bone and the hardware is thought to no longer be under significant stress, ii) an identical policy for both options leads the surgeon to choose the approach which is medically optimal for the patient.

III. Information Required for Waiver Submission.

An <u>initial waiver</u> can be considered following the successful treatment of HNP (conservative or surgical) and for other conditions treated with spinal fusion with or without hardware. Initial evaluation should include history and physical examination to ensure that the examinee is asymptomatic and able to perform duties without limitations. If history or physical elicits findings, further studies (such as nerve conduction study and electromyelogram) may be needed for further evaluation. For surgical procedures, details of the surgical procedure (copy of the operative report), with the date, recovery process (physical therapy, progressive weight bearing, etc.) and a consultation from an orthopedic surgeon, neurosurgeon, or a neurologist clearing the aviator for flying duties and delineate prognosis are required. Finally, MRI may be useful, and although not necessary for all evaluations, it is required for initial FC II waiver requests for cervical HNP treated with conservative therapy or microdiscectomy. Results of all studies performed should be included with the waiver request. (See Tables 1, 2, and 3 for a listing of requirements for initial waiver request broken down by specific FC, HNP location and treatment.) For those cases reviewed at the Aeromedical Consultation Service (ACS), additional information and/or studies may be required on a case-by-case basis.

Information required for <u>waiver renewal</u> would include an interval history and physical exam by a flight surgeon documenting a normal neurologic exam. In addition, results from any studies obtained in the interval period should be included. 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.

IV. Waiver Considerations.

Aviation personnel need to fulfill all of the following applicable qualifying criteria for initial waiver request:

General criteria:

- Need to be asymptomatic
- Need to have adequate waiting period after treatment
- A normal examination by a flight surgeon, and in addition, for surgical procedures (spinal fusion, discectomy with or without laminectomy, microdiscectomy), have a normal neurologic exam and be cleared for all activities by a neurologist, neurosurgeon or orthopedic surgeon.
- Need applicable studies to be submitted with the waiver along with copies of operative reports and specialty consultations.

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 AFMOA	3 months	Cervical MRI*
Cervical	FC IIB	Yes AFMOA	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

*MRI shows 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 field strength magnet minimally 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.

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 AFMOA (ACS evaluation required)	6 months	Dynamic X-rays* (Further tests may be required by ACS)
Thoracic	FC II (single or multiple level fusion)	Yes AFMOA (ACS evaluation required)	6 months	Dynamic X-rays (Further tests may be required by ACS)
Lumbar	FC II (single or multiple level fusion)	Yes MAJCOM	6 months	Dynamic X-rays
Cervical/lumbar	FC IIB (single or multiple level fusion)	Yes AFMOA	4 months	Dynamic X-rays
Thoracic	FC IIB (single or multiple level fusion)	Yes AFMOA (ACS evaluation required)	4 months	Dynamic X-rays (Further tests may be required by ACS)
Cervical/lumbar	FC III**	Yes MAJCOM	4 months	Dynamic X-rays
Thoracic	FC III**	Yes MAJCOM (ACS evaluation required)	4 months	Dynamic X-rays (Further tests may be required by ACS)

*Dynamic plain x-ray films of region to include flexion, extension, and A/P views establish successful and complete bone fusion. (CT with thin cuts of region of interest may also be performed if necessary, though not required.)
** 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.

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 on-fused levels. Thoracic HNP is much less common than cervical and lumbar HNP and thoracic HNP requiring surgical intervention is even more rare. 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 (Treatment other than Conservative,
Discectomy, Microdiscectomy or Spinal Fusion, e.g. Prosthetic nucleus implant) *

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	AFMOA ACS evaluation	As requested by ACS	As requested by ACS
Cervical/thoracic/lumbar	FC III	MAJCOM ACS evaluation	As requested by ACS	As requested by ACS

* Waiver requests for HNP treated with surgical procedures other than spinal fusion, discectomy (with/without laminectomy) or microdiscectomy will be considered on a case-by-case basis and will require ACS consultation.

ACS experience with HNP (ICD 722.XX) reveals 430 finalized cases with 381 received a waiver recommendation (89%).

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WAIVER GUIDE
Updated: Apr 00
By: Maj Mavity

CONDITION:
Hodgkin's Disease

I. Overview.

Hodgkin's disease (HD) is a neoplasm of lymphoid tissue that is defined histopathologically by the presence of the malignant Reed-Sternberg cell with an appropriate cellular background. Four histologic types (lymphocyte predominance, nodular sclerosis, mixed cellularity, and lymphocyte depletion) are distinguished on the basis of the appearance and relative proportions of Reed-Sternberg cells, lymphocytes, and fibrosis. 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 HD.

The incidence of HD in the US has been stable over the past decade. About 7,900 cases were diagnosed in 1993, an incidence of 3.2 per 100,000 population. 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, HD 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 HD. An increased risk for HD among siblings and close relatives supports a genetic basis for increased susceptibility.

The extent of HD is classified using the four-stage Ann Arbor classification. Stage I is involvement of a single lymph node region or extralymphatic site. Stage II is involvement of two or more lymph node regions or extralymphatic sites on the same side of the diaphragm. Stage III is involvement of lymph node regions on both sides of the diaphragm with or without splenic involvement. Stage IV is diffuse or disseminated involvement of one or more extralymphatic organs or tissues. 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 to be denoted in all cases by the suffix letters A or B, respectively.

Treatment for HD may involve radiotherapy, chemotherapy, or both. Radiotherapy is usually delivered in the mantle region (cervical, supraclavicular, infraclavicular, axillary, mediastinal, and hilar nodes), the paraaortic/splenic region, and the pelvic region. Chemotherapy regimes consist of MOPP (nitrogen mustard, vincristine, procarbazine, and prednisone) or ABVD (adriamycin, bleomycin, vinblastine, and dacarbazine). Recently, bone marrow transplantation has been used as therapy for refractory HD with limited success.

Prognosis varies depending primarily on stage of disease and histologic subtype. For limited-stage disease (stages I or II), the cure rate after treatment is 85% to 90%. For advanced disease (III or IV)

the cure rate ranges from 65% to 85%. 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 40 years, B systemic symptoms, and extensive tumor burden are other factors that have been repeatedly documented as poor prognostic factors. Relapse after successful treatment occurs in 25% to 40% and greater than 90% of the relapses occur within 2 to 4 years.

II. Aeromedical Concerns.

As with most malignancies aeromedical health concerns are raised based on the disease and the treatment. With HD, the risk for sudden incapacitation is minimal as disease involvement of the CNS or heart is rare. Although the most common presentation of HD is a superficial nontender mass, initial manifestations 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 HD and/or treatment protocol is aggressive. Damage to the cardiopulmonary, neurologic, endocrine, and reticuloendothelial systems may occur as a result of disease progression and radiotherapy/chemotherapy.

III. Information Required for Waiver Submission.

Initially, after the diagnosis of HD is made, histology must be confirmed by AFIP and the case must be reviewed by a tumor board and medical evaluation board (MEB) for appropriate disposition. Unrestricted waiver can only be considered in an aviator whose HD is in remission for 2 to 3 years and in whom no adverse effects from treatment are evident (2 years for Stages I and IIA and 3 years for more advanced stages). **Initial presentation, to Aeromedical Consultation Service (ACS) for case review as a minimum, should include CBC, CXR, ECG, PFT, and hematology/oncology consultation. Additional testing should be based on radio-/chemotherapeutic courses given.**

IV. Waiver Considerations.

The USAF aircrew waiver file lists eleven members with HD in remission and nine received waivers (8 of the 9 received FC II waiver). Although these numbers are small, the possibility of returning to flying status after effective treatment of HD is good.

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WAIVER GUIDE
Updated: Apr 07
By: Maj Alexies Ramirez and Dr Karen Fox

CONDITION:
Human Immunodeficiency Virus (HIV) Infection

I. Overview.

Human immunodeficiency virus (HIV) infection causes the host to progress from an asymptomatic latency period to clinical manifestations with the gradual degradation of immunological function. During the early subclinical phase, affected individuals are often asymptomatic with preserved CD4 counts. Acquired immunodeficiency syndrome (AIDS) is diagnosed once the CD4 count decreases below 200/µl or with the occurrence of AIDS-defining illnesses or opportunistic infections.

Seropositive HIV rated aviators, non-rated aircrew, and special operations personnel are permanently disqualified from flying duties and are not waiver eligible. The presence of AIDS in an aviator is a condition for which little to no debate exists regarding the incompatibility with continued flying duties. This waiver guide does not consider the clinical or aeromedical implications of HIV in the aviator, once they have developed AIDS. On the other hand, debate exists about whether the asymptomatic aviator with subclinical HIV infection is fit for continued participation in flying duties. The objective herein is to provide insight into the considerations that necessitate a conservative policy for these individuals.

HIV positive (+) individuals are susceptible to depression, delirium (an acute confusional state) and HIV-associated dementia (HAD),[11] the most severe form of neuropsychological impairment. In the pre-highly active antiretroviral therapy (HAART) era, once AIDS was diagnosed, dementia occurred at a rate of 7% per year with a prevalence of 20 to 30%.[7] HAD incidence has decreased and prevalence increased in the HAART era and this appears to be due to the longer survival of HIV patients.[7] These conditions are obviously not compatible with flying duties.

Also, HIV+ individuals may have subtle manifestations that may be occupationally detrimental during the clinical latency period of infection. Of greatest concern within the aerospace environment is that of neurological involvement. The neurocognitive effects of HIV occur as a result of central nervous system (CNS) supporting cell infection. Cytotoxicity also seems to occur as a result of CNS exposure to cytokines, macrophage metabolites and viral gene products.[13, 19] Though dementia is rare prior to the presence of immunosuppression, other more subtle forms of impairment may develop insidiously. For example, minor cognitive-motor disorder (MCMD) occurs earlier in HIV disease, symptoms are subtle and may result in impairment in the following domains: verbal/language, attention, memory, abstraction and motor skills. An additional impairment among some HIV+ individuals is that of prospective memory (intention memory) which may be limiting especially during times of high retrieval demands.[11]

Studies done at Walter Reed Army Medical Center (WRAMC) showed significant deficits among HIV+ subjects in areas of information processing, attention, spatial integration, spatial memory, verbal learning, verbal memory, and reaction times. Re-evaluations at 6, 12, and 18 months showed further progression and was not related to constitutional symptoms, mood state, or immunological status (CD4 or CD4/CD8 ratio).[15] Other studies have documented deficits with problem solving,

visual processing tasks, conceptual skills, set shifting, design fluency, concentration, sequencing, and mental flexibility.[11] Visual attention deficits have been observed to be associated with a higher risk of involvement in automobile driving accidents.[17] Studies of the incidence of HIV neurological disease show up to 40% of seropositive HIV cases have HIV encephalopathy, and of those, in 25% the encephalopathic symptoms were the initial presentation of the disease.[14] Ninety-four percent of those with encephalopathy showed areas of cortical and subcortical hypoperfusion on SPECT scans. Major EEG abnormalities were present in 19.2% of those with asymptomatic HIV infection.[14] Although the presence and significance of the above findings are not universally accepted, the findings do have aeromedical importance. Neurobehavioral and cognitive deficits are frequently subtle and cover the range of neurocognitive skills necessary to successfully aviate. No randomized studies exist to date however, using neurobehavioral and cognitive test batteries normed for aviation populations (COGSCREEN). No reliable screening methods exist with sufficient sensitivity to forecast those at risk for developing neurobehavioral or cognitive deficits; one can merely identify those deficits which already exist.

HAART has shown remarkable efficacy and success rates in terms of immune reconstitution and preservation. However, one study showed no significant differences on neurocognitive testing between subjects with CDC stage 4C2 disease using didanosine (DDI) and zidovudine (AZT) and controls not on medication.[8] Those on medication scored higher on the oral fluency test, but the sample sizes were small, and the neurocognitive tests were not normed for aviator populations. Another study looked at the prevalence and pattern of neuropsychological impairment in cohorts of HIV-infected individuals across pre- and post-HAART eras.[7] The prevalence of impairment was not significantly different across the two eras. However, the pattern of neuropsychological impairment was different pre-HAART and HAART eras, with an improvement in attention, verbal fluency, visuoconstruction deficits, but deterioration in learning efficiency and complex attentions. Regardless, the toxicity and side effects of HAART make it incompatible with flying duties.

Of note, the CD4/CD8 ratio is commonly used as a measure of immune system function. The Infectious Diseases Society of America recommends monitoring CD4 counts and RNA viral loads every 3-4 months.[1] This is suggested as a way of assessing immune and viral replication status. Some patients with well-preserved CD4 cell counts develop symptoms. Therefore, routine monitoring of CD4 counts and viral loads can be misleading when they are relied upon to precisely predict the onset of disease manifestations. In a prospective case control group, it was suggested that a combination of clinical examination, magnetic resonance imaging for atrophy and neurocognitive testing was clinically useful in identifying HIV-related CNS changes.[12] This strategy has been proposed as a way of monitoring response to therapeutic interventions and as surrogate end points in clinical investigations. However, these tests do not herald or predict HIV-related CNS changes.

II. Aeromedical Concerns.

Qualification for worldwide military duty must be considered prior to considering an aeromedical disposition in seropositive HIV individuals. In fact, issues of worldwide deployment to areas of limited medical resources, use of attenuated live virus vaccines, and the military as its own walking blood bank, were all reasons cited for mandatory HIV testing of all military personnel beginning in 1985. Since that time, additional research has shown a significant percentage of HIV patients develop subtle neurobehavioral and cognitive deficits, an issue of direct concern and relevance to aviation safety.[3] In those with more abrupt onset of neurocognitive signs, nearly 50% showed

additional deficits under conditions of hypoxia.[6] There is also a risk of depression and suicide (relative rate 20 as compared to USAF controls) during the adjustment reaction phase.[4] The first manifestation of active disease can be seizures or sudden violent or disturbed behavior.

There is insufficient evidence as generated through randomized controlled trials, to determine whether screening strategies to identify HIV-related CNS changes would indeed reduce HIV-related CNS morbidity or how well it can be expected to provide a means to quantify and monitor aviation performance and safety. Aeromedically validated neurocognitive testing can only be done at six month intervals which may miss some interim neurocognitive changes and therefore pose a potential threat to self, crew-safety, or mission completion.

III. Information Required for Waiver Submission.

Active duty Air Force members and Air Reserve Component (ARC) members on extended duty are referred to Wilford Hall Medical Center (WHMC) 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.

The aeromedical summary should include:

A. History to indicate current clinical status and history of past opportunistic infections.
B. Laboratory results to include total lymphocyte count, total T-lymphocyte cell count, absolute CD4 and CD8 level, and absolute and percent positive CD3 positive and CD4 positive T cells and CD56 and/or CD56/16 natural killer cells, and B-lymphocyte markers, HIV ELISA and confirmation test and viral load.
C. MEB results

IV. Waiver Considerations.

FC I/IA, II and III and special operations personnel are permanently disqualified from flying duties and are not waiver eligible if seropositive for HIV.

Review of AIMWTS through March 2007 showed 13 cases of HIV positive flyers; four FC II and nine FC III. All were disqualified.

Further long-term data is essential to better understand the natural history of HIV and related neurocognitive effects by way of prospective cohort studies and ideally randomized controlled trials. In this manner, careful consideration may be given in the future to the possibility of providing limited waivers if it is justified by favorable outcomes.

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WAIVER GUIDE
Updated: Nov 05
By: Lt Col Sarady Tan, Capt Joseph Sky, Maj Shawn Zarr, and Col Jeb Pickard

CONDITION:
Hypertension

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 I.

Table I. Blood Pressure Classification.[1]

Condition	SBP (mmHg)	DBP (mmHg)
Normal BP	<120	and <80
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 141 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 II, 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 II. 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

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.

III. Treatment.

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.

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 may be granted unrestricted waiver. 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-blocker (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.)

IV. Information Required for Waiver Submission.

Initial and renewal evaluations of HTN should include a thorough aeromedical summary and documentation of review of the chart for past blood pressure readings. Table III outlines concerns that should be considered and, where applicable, addressed in the waiver submission.

Table III. History and physical guidelines for hypertension waiver submission.

Initial Waiver	Renewal Waiver
History: • Diet, especially, alcohol and sodium intake • Botanicals/supplements • Cigarette smoking/tobacco use • Physical inactivity • Dyslipidemia • Diabetes mellitus • Sleep apnea (snoring, observed apneas) • Family history of premature cardiovascular disease • Symptoms: flushing, headaches, nocturia, chest pain, claudication. **Physical examination**: • Weight (BMI) • Hypertensive retinal changes • Thyroid • 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 & pulses • Neurological assessment **Basic laboratory studies**: • Hematocrit/hemoglobin • Fasting glucose • Lipid profile • Serum electrolytes • Serum calcium • Blood urea nitrogen • Serum creatinine • Urinalysis • Resting electrocardiogram (ECG) • Thyroid stimulating hormone (TSH)	**History**: • Symptoms related to coronary artery disease or medications • Diet (e.g., alcohol and sodium intake) and supplements • Cigarette smoking/tobacco use • Physical inactivity • Other medical conditions since last waiver granted **Physical examination**: • 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 & pulses • Neurological assessment **Basic laboratory studies**: • Serum electrolytes (if on HCTZ)

V. Waiver Considerations.

Of those aircrew submitted for waiver for HTN, almost 90% have received waivers**.** 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 continued lifestyle modifications. The rated or non-rated aviator with a history of isolated HTN who remains normotensive using lifestyle modifications does not require a waiver.

Failure to achieve blood pressure control with lifestyle modifications, or initial blood pressure average exceeding 160 mmHg systolic or 100 mmHg diastolic, requires initiation of pharmacotherapy. After clinical control of hypertension with stable medication(s) dosing (requiring a minimum of 7 days after the last dosage adjustment, to allow cerebral autoregulation to stabilize, and to document control), submit documentation for waiver consideration. Refer to Table IV for specific FC and their waiver authorities.

Table IV. Anti-hypertensive medications and the waiver authority for specific flying classes.

Flying Class	**Medications**	**Waiver Authority**	**Duration**
I, IA	HTN not waiverable, regardless if controlled on medications	AETC	N/A
II	HCTZ[1]	MAJCOM[3]	Up to 3 years
II	Lisinopril, ramipril[2] or losartan	MAJCOM[3]	Up to 3 years
IIA	HCTZ combined with lisinopril, ramipril[2] or losartan	AFMSA	Up to 3 years
IIA	Atenolol[4] alone or in combination	AFMSA	Up to 3 years
III	HCTZ and/or lisinopril, ramipril[2], losartan, or atenolol[4]	MAJCOM[3]	Up to 3 years

[1] With or without triamterene, or potassium replacement.
[2] Ramipril restricted to dosages of 5 mg to 20 mg.
[3] After initial waiver MAJCOM may delegate to local authority.
[4] Third line drug, used after all others failed or were not tolerable. For aviators not required to fly in high-G aircraft.

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WAIVER GUIDE
Updated: Feb 07
By: Lt Col J. Michael Curry (RAM 08) and Dr Karen Fox

CONDITION:
Hyperthyroidism

I. Overview.

Graves' disease (known as von Basedow's disease in Europe), the most common cause of hyperthyroidism, is an autoimmune disorder affecting the thyroid gland. It is characterized by an increase in thyroid hormone synthesis and release with a symmetric goiter. Graves' disease typically occurs between the ages of 20-40 with an 8:1 female to male preponderance, has a familial tendency, and may be associated with other systemic autoimmune disorders such as pernicious anemia, myasthenia gravis, and diabetes. Presenting symptoms often include sweating, heat intolerance, loose stools, anxiety, fatigue, weakness, tremor, irritability, tachycardia, tachyarrhythmias (most often atrial fibrillation, occurring in about 8% of patients), menstrual irregularities, goiter, psychiatric disorders, and ophthalmopathy. Asian or Native American men presenting with sudden symmetric flaccid paralysis, hypokalemia, and hypophosphatemia must always be suspected of having thyrotoxicosis, especially since classic signs of thyrotoxicosis may be lacking (an endocrinologic emergency known as thyrotoxic periodic paralysis, and must be treated immediately). An estimated 25-50% of patients with Graves' hyperthyroidism will develop some degree of ophthalmopathy, but rarely will ophthalmopathy occur with other causes of thyrotoxicosis (excess thyroid hormone from any cause).

Toxic multinodular goiter is hyperthyroidism that arises from a nontoxic multinodular goiter, usually of long standing duration. The structural and functional heterogeneity and functional autonomy evolve over time; the increase in the autonomous function causes the disease to move from the nontoxic to the toxic phase. The over production of thyroid hormone is usually less than in Graves' disease. It usually occurs after the age of 50 in patients who have had nontoxic multinodular goiter for many years. Toxic adenoma (Plummer's disease), a less common form of hyperthyroidism is caused by autonomous adenoma(s), usually one, of the thyroid gland. Toxic adenoma occurs in the 3rd and 4th decade with a history of long-standing, slowly growing lump in the neck. Adenomas usually don't start producing thyrotoxicosis until 2.5 to 3 cm in size.

Transient hyperthyroidism can be seen in subacute thyroiditis, which is thought caused by a viral infection of the thyroid gland and often follows after an upper respiratory infection. The peak is in patients in their 40s and 50s, women more often, and the gland is painful. Treatment is usually limited to controlling pain symptoms, nonsteroidal anti-inflammatory. Thyrotoxicosis can also occur in subacute thyroiditis without pain. The thyrotoxicosis is usually mild with spontaneous resolution (1-2 months duration); passing through a transient phase then hypothyroid phase (2-9 months) before a long-term return to euthyroidism and a tendency for the syndrome to recur. Treatment is symptomatic for thyrotoxic phase, β-blocker or sedatives, and prolonged hypothyroid phase with levothyroxine.

With the improved sensitivity of TSH assays it has resulted in the identification of patients with low TSH concentrations (<0.5 μU/mL) but normal free T_4 and T_3, a constellation of findings defined as subclinical hyperthyroidism. These patients have few or no symptoms of hyperthyroidism;

however, they do have increased risk for atrial fibrillation and low bone density. If subclinical hyperthyroidism diagnosis is uncertain, a 24-hour radioiodine uptake and scan of the thyroid may be helpful. Central hypothyroidism, nonthyroidal illness and recovery from hyperthyroidism can also have low TSH with normal free T_4 and T_3.

Other causes of thyrotoxicosis include Jod-Basedow reaction (iodine induced), thyrotoxicosis factitia (ingesting excessive exogenous thyroid hormone), and medication induced (e.g. amiodarone, which can also cause hypothyroidism). Less common causes include struma ovarii (associated with dermoid tumors and teratomas), TSH secreting pituitary tumors (rare), Hashimoto's thyroiditis (early in the disease, then later hypothyroid), pregnancy and trophoblastic tumors.

Diagnosis: A reliable sensitive TSH assay is the best screening test for thyrotoxicosis; it is suppressed except in the very rare cases of pituitary inappropriate secretion of thyrotropin. If the serum TSH is low, then free T_4 and T_3 should be obtained; if both are high then the diagnosis if hyperthyroidism is confirmed. Other laboratory abnormalities may include hypercalcemia, increased alkaline phosphatase, anemia, and decreased granulocytes. Prior to sensitive TSH, the free thyroxine index (FTI) was frequently used, but is rarely utilized today. Thyroid stimulating immunoglobulin (TSI) is elevated in approximately 80% of Graves' cases, and can be helpful in diagnosis. Antithyroglobulin or antithyroperoxidase antibodies are usually elevated in Graves' disease but are nonspecific. A high radioactive iodine uptake is seen in Graves' disease (diffuse uptake) and toxic multinodular goiter (focal or patchy uptake), but can be seen in other conditions as well. A low radioactive iodine uptake is most commonly seen in thyroiditis or thyrotoxicosis factitia. A thyroglobulin concentration may help differentiate between the two conditions.

Treatment: Propranolol is generally used for symptomatic relief until the hyperthyroidism is resolved, as it alleviates symptoms by blocking the β-adrenergic receptors and by impeding the conversion of T_4 to T_3. It effectively relieves the tachycardia, tremor, diaphoresis, anxiety, and even the periodic paralysis that can occur with hyperthyroidism due to any cause. It is the initial treatment of choice for thyroid storm. Thioureas (methimazole or propylthiouracil (PTU)) are used in primarily two ways: as the primary treatment for hyperthyroidism or as a preparative therapy before radio therapy or surgery. Thioureas are frequently used in Europe, but in the US the usual treatment of choice for Graves' disease is with radioactive iodine (RAI), ^{131}Iodine. At one time the thioureas were thought to preserve the thyroid so that hypothyroidism did not ensue, but it now appears eventual hypothyroidism is the typical outcome of Graves' disease. Additionally, treatment of Graves' disease with the thioureas has up to a 60 to 80% recurrence of the disease when the medication is discontinued, and those patients will typically then undergo RAI treatment. RAI is also the usual treatment of adenomas and toxic multi-nodular goiter, because spontaneous remission rarely occurs with thioureas. A less common treatment option for hyperthyroidism is surgical resection of the gland. Thioureas are the preferred primary treatment in pregnant patients. Thyroiditis, which is usually self-limiting and transient in nature, is typically treated with beta-blockade +/- thioureas, and supportive care.

The administration of RAI is an excellent method of destroying overactive thyroid tissue, and in a 36-year retrospective study patients treated with RAI as adults or teenagers have not been shown to have any increase risk of malignancy. Likewise, children born to parents previously treated with RAI do not have an increased rate of congenital abnormalities. Most individuals will eventually become hypothyroid, which is easily treated with synthetic T_4. RAI has been shown in controlled

trials to accentuate ophthalmic Graves' disease. However, this worsening is typically mild and transient and can be ameliorated with corticosteroid treatment.

Graves' exophthalmos: Exophthalmos secondary to Graves' disease is the most common cause of exophthalmos, accounting for more than 50% of cases. The prevalence is estimated to be about 0.4% in the US and 1.1% to 1.6% in the UK, with a female predominance (female to male ratio is between 3:1 and 10:1). Although more common in women, Graves' disease is typically more severe in men and in those older than 50, and the onset of orbitopathy occurs on average 2.5 years later (and will usually stabilize 8-36 months after onset). The course of the ophthalmopathy in Graves' disease may be independent of the hyperthyroidism, sometimes occurring in euthyroid patients or not occurring at all in clinically hyperthyroid individuals. Environmental factors may increase the risk of developing Graves' ophthalmopathy (as well as increasing its severity), such as stress, smoking, and some infections (particularly with Gram-negative organisms, such as Yersinia enterocolitica). The odds ratio for ophthalmopathy in Graves' disease is increased almost 7-fold in smokers as compared to non-smokers, and smoking exhibits a dose-response relationship (e.g. the more you smoke, the greater the risk of ophthalmopathy).

The initial symptoms of Graves' ophthalmopathy may be complaints of foreign-body sensation, tearing, photophobia, lid retraction (lid retraction is common, often leading to a more pronounced appearance of the eyes as opposed to actual proptosis), lid lag, lagophthalmos, decreased vision in one or both eyes, lid edema, and diplopia (which may be noticed only on awakening). Dry eye is common secondary to disturbances of tear quantity and tear film constitution, as well as inability to fully close the lids. The optic nerve may be compressed in the orbital apex by enlarging extraocular muscles. Evaluation by an ophthalmologist/optometrist should be accomplished to screen for exposure keratopathy, optic nerve compression, presence or absence of diplopia, intraocular pressure, and proptosis (measured with a Hertel exophthalmometer). Because complaints or evidence of decreased visual acuity, color loss, afferent pupillary defect, or visual field loss may be due to optic neuropathy, they require urgent evaluation and possible emergent management by an ophthalmologist. The optic nerve can appear normal, swollen, or atrophic. If optic nerve compression is suspected orbital imaging is indicated. If optic nerve compression is confirmed then treatment consists of steroids, radiation and/or surgery.

II. Aeromedical Concerns.

The obvious concerns of untreated hyperthyroidism in flyers includes the symptoms of heat intolerance, loose stools, anxiety, fatigue, weakness, tremor, irritability, tachycardia, psychiatric disorders, and ophthalmopathy, all of which could be safety hazards as well as detract from performance. Post treatment, the major concern is the insidious onset of hypothyroidism, which can lead to apathy, slowed mentation, hypersomnolence, and performance degradation.

The thioureas are aeromedically cumbersome, since they are utilized for 6-18 months, discontinued and then occasionally restarted (and it takes a few months for the patient to stabilize on a particular dosage). There is a high treatment failure rate so that RAI is eventually used. Waiver for hyperthyroidism temporarily controlled with these medications is unlikely. There are no aeromedical concerns of treatment with RAI and waiver is likely once stable on thyroid replacement therapy.

III. Information Required for Waiver Submission.

The following information is required for initial waiver for hyperthyroidism:

A. Complete history of symptoms, pertinent negative symptoms (eye, heart, psychiatric) lab and radiographic studies, treatment, and current symptoms.

B. Endocrinology evaluation and confirmation of euthyroid status (TSH and free T_4) off any medication other than thyroid replacement (e.g. Synthroid) for initial waiver.

C. Ophthalmology consult with orbital imaging if any symptoms or signs of optic neuropathy or orbitopathy are present.

D. If atrial fibrillation occurred then echocardiogram, Holter and treadmill should be accomplished. If FC II, then all tests and tape must be sent to the Aeromedical Consultation Service (ACS) (ECG Library) prior to waiver. See atrial fibrillation waiver guide.

E. If smoker, documentation of steps taken to assist flyer to stop smoking due to the increased risk and exacerbation of orbitopathy with smoking.

The following information is required for renewal waivers:

A. Brief history of hyperthyroidism episode, treatment and current symptoms.

B. Annual TSH values if now hypothyroid on T_4 replacement (see hypothyroidism waiver guide.)

C. Annual TSH, free T_4, CBC, and ALT if on chronic thioureas.

D. Individuals with Graves' disease treated with thioureas and euthyroid need annual TSH values for rest of life (still at risk for hyperthyroidism returning.)

E. Annual optometry evaluations for individuals with continuing eye symptoms.

IV. Waiver Considerations.

The table below summarizes flying class versus treatment and the resulting waiver potential.

Flying Class	**Treatment**	**Waiver Potential Waive Authority**
I/IA	RAI, thyroidectomy, thioureas treatment completed[1] Thioureas	Yes AETC No AETC
II	RAI, thyroidectomy, thioureas treatment completed[2] Thioureas	Yes MAJCOM No AFMOA
III	RAI, thyroidectomy, thioureas treatment completed[2] Thioureas	Yes MAJCOM No MAJCOM

[1] Thioureas treatment completed over 3 years prior.
[2] Thioureas treatment completed and individual euthyroid for 6 months.

A review of the AIMWTS database through mid-November 2006 of ICD9 code 240.0 through 246.00, thyroid disorders (hypothyroidism, hyperthyroidism, thyroiditis, thyroid cancer, etc.) revealed over 390 cases for FC I/IA, II and III flyers. All (136) aeromedical summaries for all FC I (12), disqualified (21) and 106 randomly selected cases were reviewed.

Fifty-six (41%) of these cases (136) had the diagnosis of hyperthyroidism. Ninety-five percent (53/56) were granted waivers. Of the three disqualified, two were disqualified for other medical conditions and one was a FC I who was diagnosed with hyperthyroidism at the time of exam, untreated. The other two (2/3) FC I with history of hyperthyroid were granted waivers (one treated by thyroidectomy and now hypothyroid on replacement and the other treated with thiourea and now euthyroid). Concerning treatment, forty-seven (85%) were treated with RAI; 45 became hypothyroidism and two were euthyroid. Seven were treated with the thioureas; four were hypothyroid and three were euthyroid. One hyperthyroid was treated with thyroidectomy and became hypothyroid.

Waiver Guide reviewed by the AF/SG Consultant for Endocrinology, Lt Col Tom Sauerwein.

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WAIVER GUIDE
Updated: Dec 06
By: Maj David Cockrum (RAM 06) and Dr Karen Fox

CONDITION:
Hypothyroidism

I. Overview.

The incidence of hypothyroidism in the United States (US) occurs in 0.8 to 1.0% of the population.[1] Hypothyroidism is much more common in women than men. Autoimmune (Hashimoto's) thyroiditis is the most common cause of hypothyroidism in US adults.[1] In autoimmune-based hypothyroidism, antibodies are directed against thyroperoxidase, thyroglobulin and the thyroid-stimulating hormone (TSH) receptor and sodium/iodide symporter (NIS). Antithyroglobulin and antiperoxidase antibodies probably serve as markers of autoimmunity, but anti-TSH antibodies cause disease. Thyroid ablative therapy is another common cause of hypothyroidism, additional causes include neck irradiation, medications, post-partum thyroiditis and hypothalamic or pituitary deficiency. Primary thyroid disease accounts for over 95% of cases of hypothyroidism.[1, 4] Central hypothyroidism is due to thyrotropin (TSH) deficiency caused by either acquired or congenital hypothalamic or pituitary gland disorders. 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. 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. Subclinical hypothyroidism is defined as asymptomatic mild elevations in TSH with a normal serum free thyroxine (T_4). The implications of mildly elevated TSH levels are not entirely clear but in some cases this represents early primary hypothyroidism. In spite of this, screening for hypothyroidism is not routinely recommended. Testing for hypothyroidism should be conducted whenever a patient complains of any of the typical symptoms of hypothyroidism. Testing should also be considered in patients with diabetes or hyperlipidemia due to a known association between these disease entities.

Laboratory evaluation includes TSH and free T_4 levels. An elevated TSH indicates the presence of primary hypothyroidism. A low T_4 confirms overt hypothyroidism, while 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.

Ultrasonography is reserved for evaluations of goiter and nodules. Ultrasonography can distinguish solid form cystic lesions and determine changes in the size of the nodules over time and if fine needle aspiration (based on the size) is needed, or assist with aspiration of those nodules that are not palpable. A radioactive iodine uptake (RAIU) and thyroid scan are used for evaluating hyperthyroid patients only, and give a graphic representation of the distribution of radioactive iodine in the gland; identifying increased (hot) or decreased (cold) nodule uptake.

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. 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 a potential threat to flying safety. With hypothyroidism the symptoms may become dramatic to 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 euthyroid and stable.

III. Information Required for Waiver Submission.

Initial waiver requires consultation by an endocrinologist or internist. Information sought from the endocrinologist includes the cause of the hypothyroidism and treatment recommendations. For primary hypothyroidism ongoing specialty care is not typically required. When thyroid replacement is started very close monitoring is required to ensure the patient remains euthyroid; this typically requires monitoring the TSH every three months for at least the first year. 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 10mU/L can be used as a guide to when thyroid replacement should be initiated if the diagnosis is primary hypothyroidism. Treatment for elevations of TSH below 10mU/L may be appropriate for symptomatic patients. Waiver renewal requires confirmation of euthyroid status on a regular basis throughout the waiver period (e.g. every 6 months). If the cause of the hypothyroidism is other than primary hypothyroidism the primary disease process should be addressed appropriately and waiver for this disease should also be requested in accordance with the applicable section of the waiver guide.

The initial aeromedical summary should include the following:

A. History of symptoms
B. Physical exam to include thyroid gland and lateral and submandibular lymph nodes.
C. TSH, T_4 (before and with treatment)
D. Ultrasonography, radioactive iodine scan, and/or fine-needle aspiration, if indicated
E. Endocrinology or internal medicine consult

IV. Waiver Considerations.

Table 1. Criteria for Hypothyroidism Waiver Request

Flying Class	Waiver Potential	Waiver Authority	Additional Information Required
I/IA	Yes	AETC	Endocrine/internal medicine consult; TSH, T_4 level
Initial II/III II/III first waiver	Yes Yes	AETC/MAJCOM MAJCOM/local	Endocrine/internal medicine consult, TSH, T_4 level
II renewal	Yes	MAJCOM/local	TSH*
III renewal	Yes	MAJCOM/local	TSH*

* also free T_4 if central hypothyroidism.

A review of the AIMWTS database through mid-Nov 06 of ICD9 code 240.0 through 246.00, thyroid disorders (hypothyroidism, hyperthyroidism, thyroiditis, thyroid cancer, etc.) revealed over 390 cases for FC I/IA, II and III flyers. Aeromedical summaries (136) for all FC I (12), all disqualified (21) and 106 randomly selected cases were reviewed. Eighty-two percent (111/136) had primary hypothyroidism (no cases of central hypothyroidism); 50 were due to thyroid ablative therapy for hyperthyroidism, 50 cases were hypothyroid (presumptive autoimmune), seven (six were thyroid cancer) were due to thyroidectomy, two were hypothyroid due to radiation treatment for Hodgkin's and squamous cell cancer and two were thyroid ablative for thyroiditis. Of the eight FC I with hypothyroidism (5 presumptive autoimmune, one thyroidectomy, two radioactive ablative (one for goiter and one for hyperthyroid)), only two were disqualified (both due to other disqualifying diagnoses). Of the 111 primary hypothyroidism cases, 18 (16%) were disqualified. Of the 18 disqualified cases, only four were disqualified due to thyroid disease (one with hypothyroidism not controlled (refused medications), one with thyroid cancer metastases, one with hypoparathyroidism also, and one with hypothyroidism).

Waiver Guide reviewed by the AF/SG Consultant for Endocrinology, Lt Col Tom Sauerwein.

V. References.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Impulse-Control Disorders

I. Overview.

Impulse disorders (termed "impulse-control disorders not elsewhere classified" in the DSM-IV) involve the inability to resist an impulse or psychological drive to act in a way harmful to oneself or others. The urge causes anxiety, tension or arousal; its completion gives relief or gratification; regret or guilt may follow.

Differential diagnosis of impulse control problems includes (among others) antisocial personality disorder, conduct disorder, and mood disorders, as well as neurological conditions such as temporal lobe epilepsy. Whether the impulse disorders come from the same underlying etiology, or are simply a "residual group," remains unsettled. The six listed in DSM-IV (1994) are:
- **Intermittent explosive disorder—**an inability to resist aggressive impulses that result in serious physical assaults or destruction of property
- **Kleptomania—**an inability to resist recurrent impulses to steal objects not needed for personal use or monetary gain
- **Pyromania**—a pattern of firesetting for pleasure, gratification, or the relief of tension
- **Pathological gambling**—recurrent, persistent and maladaptive gambling behavior
- **Trichotillomania**—noticeable hair loss due to recurrent hair pulling that gives pleasure, gratification or the relief of tension
- **Impulse-control disorder not otherwise specified—**impulse control disorders not included above or elsewhere in the DSM-IV

Epidemiological studies suggest that such afflicted individuals (and their relatives) are at high risk for alcohol and other substance abuse, obsessive-compulsive disorder, anxiety disorders, mood disorders, and other diagnoses. However, few rigorously controlled studies have been done using strict diagnostic criteria and methodologies. A standard textbook of psychiatry (Kaplan & Sadock, Eds., 1995) indicates that the impulse disorders range in incidence from the common (possibly 4% for trichotillomania and 3% for pathological gambling) to the very rare (pyromania, intermittent explosive disorder). Except for trichotillomania and kleptomania, these six diagnoses are more common in men.

These are chronic and episodic disorders, and rates of spontaneous remission are unknown. Patients tend to be refractory to treatment, in part because of poor insight and cooperation. Treatment approaches include both medications and psychotherapy. Serotonin reuptake inhibitors may be useful in alleviating acute urges, but are, of course, incompatible with flying duties. Long-term insight-oriented psychotherapy is generally recommended in impulse disorders, since a supportive therapeutic alliance provides help in avoiding repetition of any dangerous or noxious behavior. Gamblers Anonymous may aid pathological gamblers, and is helpful for somewhat the same reasons as other 12-step addiction programs.

II. Aeromedical Concerns.

These disorders occur very infrequently among military aviators. Clearly, these disorders, when present, include features that are incompatible with mission readiness and flying safety. Their presence may also arouse specific perceptions and concerns in other aircrew about officership, reliability, trustworthiness, etc. Inability to control aggressive impulses is a particular concern, as is any impulsive, undisciplined or unconsidered behavior, regardless of the cause. Stereotyped or compulsive behavior may be distracting to self or others, or interfere with safe flying practices, or lead to increased anxiety if thwarted or delayed (eg, hairpulling impulses on the flight deck, or while wearing a flight helmet).

Persons with intermittent explosive disorder may have a significant history of unstable interpersonal relationships, illegal behavior, and substance abuse, and so would be unlikely to complete a rigorous pilot training program. A troublesome pattern might include isolated outbursts of extreme temper with long periods of reasonably normal functioning, which differs from the more diffuse and continuous impulsivity of a personality disorder.

The features of the other impulse disorders may not bear as directly upon cockpit safety. However, such behaviors as compulsive gambling, thievery or firesetting may disrupt sleep, consume time and mental energy, and cause anxiety or stress-related distractions. Any of these factors can affect primary flying duties. Thus, administrative or legal action may be required even if the primary problem is not medically disqualifying. Also, keep in mind the possibility of a reverse effect: the increased stresses of an aviation career (or, indeed, any increased life stressors) may precipitate increased manifestations of any underlying problem with impulse control.

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III. Information Required for Waiver Submission.

An aviator with a possible diagnosis of impulse disorder should be evaluated against DSM-IV criteria by a mental health professional. A confirmed diagnosis is disqualifying. Waiver may be considered after successful treatment, followed by a validated symptom-free period and second-opinion confirmation. The long-term therapy needed for such conditions makes it unlikely that waiver will be practical, and any need for ongoing medication is disqualifying. The waiver package should include:

A. Copies of initial and final mental health evaluation summaries, including second opinions, and a treatment summary

B. An aeromedical summary detailing 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

C. Letters from the flier's aviation supervisor or commander, and from the treating psychiatrist and/or psychologist, supporting a return to flying status

IV. Waiver Consideration.

The ACS has little experience in evaluation of and recommendations for impulse disorders in pilots and navigators. A 15 year (1981-1996) review of the USAF Waiver File and ACS Cover Sheet File yielded no impulse disorder diagnoses. Such paucity of data indicates this is likely a rare diagnosis in the aviator population.

V. References.

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WAIVER GUIDE
Updated: Nov 03
By: Aeromedical Consultation Service (ACS) Staff

CONDITION:
Irritable Bowel Syndrome

I. Overview.

Irritable bowel syndrome (IBS) is a chronic, episodic functional disorder of the digestive tract, accounting for up to 50% of referrals made to gastroenterologists. Common symptom criteria used to make a diagnosis of IBS are the Manning criteria and the Rome II criteria. Under the Manning criteria IBS involves abdominal pain, plus at least two of the following six: abdominal distention, sensation of incomplete evacuation, mucus in stools, pain relieved by defecation, pain associated with looser stools, or pain associated with more frequent stools. Rome II criteria (revised in 1998) require abdominal discomfort or pain for at least 12 weeks during the past 12 months (need not be consecutive), plus two of the following: discomfort relieved with defecation, onset of pain/discomfort associated with changes in stool frequency, or onset associated with changes in stool form or appearance. Despite extensive research, the etiology and pathogenesis of IBS remain elusive and all indications are that IBS, and the various sub-classes of IBS defined by some researchers, result from the interplay of multiple biopsychosocial factors. Two primary contributing factors are increased colonic motility (especially contractions stimulated by recent meals, emotional stress, and certain drugs) and an increased sensitivity to discomfort caused by pressure in the sigmoid colon or by normal levels of intestinal gas. Many believe these result from dysregulation at the intestinal motor or sensory levels, and/or within the central nervous system. It's estimated that 14-24% of women and 5-15% of men in western countries are affected by IBS, resulting in enormous economic and social impacts in addition to the effects on the individuals involved. As expected, psychosocial factors have an important role in modulating the illness experience and its clinical outcome. Since no specific treatment has been found to "cure" IBS, efforts are typically directed toward symptom relief and ideally involve an integrated pharmacological and behavioral approach. Standard therapy includes stress reduction, psychotherapy, and/or hypnosis to reduce anxiety and other psychological factors. Many patients benefit from a high fiber diet and from avoiding foods that they have found to aggravate their individual symptoms. Medical treatment includes antispasmodics (antimuscarinic agents and calcium channel blockers) for acute episodes. Loperamide has been effective in treating diarrhea symptoms. Newer medications, such as Tegaserod (an aminoguanidine indol compound) are being developed and tested for potential treatment of GI disorders. Also, tranquilizers and antidepressants may be useful in selected patients for the short-term management of situational anxiety and depression.

II. Aeromedical Concerns.

Urgency and frequency of defecation, as well as abdominal pain or discomfort, can be quite 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 would at best present inconveniences during long flights, extended trips, or austere living conditions, and symptoms may likely worsen as a result of theses types of stressors. Further, between 40-60% of IBS patients have some form of anxiety, depression, or panic disorder (even if psychological comorbidities do not predate the IBS in certain patients, anxiety, frustration, and dysthymia might be expected to *result*

from the symptoms experienced). Many medications used for treatment of IBS symptoms cause cognitive impairment and are therefore not compatible with flying duties.

III. Information Required For Waiver Submission.

Internal Medicine evaluation is needed to exclude other bowel pathology (e.g. Crohn's disease, lactose intolerance, and cancer). Mental health evaluation is needed to rule out anxiety, depression, or other psychiatric problem, and to ensure optimal treatment.

IV. Waiver Considerations.

Only 50 active duty flyers with IBS (as either a primary, secondary, or incidental diagnosis) were evaluated by the ACS between 1956 and 2002. Nearly all of these patients had other disqualifying conditions when seen. Looking specifically at ACS experience over the past 10 years (CY 1993-2002), four of nine patients who carried IBS as a diagnosis when evaluated were recommended for waivers, and four of the five not recommended had non-waiverable cardiac, neurological, or other co-existing problems. Only one individual, representing 11% of patients with known IBS seen at the ACS during the past decade, was non-recommended for a waiver based solely on GI and associated mental health symptoms. For ACS evaluation, individuals should have resolved symptoms and be taking no medications that are incompatible with flying. The ACS evaluation will include aerospace medicine, internal medicine, and neuropsychiatric evaluations.

V. References.

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3. Manning AP, Thompson WG, Heaton KW, Morris AF. Towards positive diagnosis of the irritable bowel. British Medical Journal. 1978, 2: 653-654.

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WAIVER GUIDE
Updated: Feb 99
By: Lt Col Kapp

CONDITION:
Joint Replacement

I. Overview.

The cemented total hip replacement provides a good to excellent clinical result in up to 85% of patients for at least 15 to 20 years. The failure rates continue to average around 1 percent per year on follow-up. However, the older cement techniques were associated with higher revision and loosening rates that have improved with the second and now third generation cementing techniques (though there is limited data with these) using hybrid fixations and uncemented acetabular components. Cementless hip replacement has not been used for as many years but there is a low revision rate and high durability for at least 12 years and they are currently recommended for younger, more active patients. Previous experience with cementless hips replacement patients experiencing unexplained thigh pain or limp has been largely overcome though, if present, it may improve over time. Some movements predispose to dislocation of an artificial hip and although dislocation is variously reported in 1-10% of patients, 40-70% occur in the first month postoperatively. Posterior dislocations are the most common (60-90%) and typically occur with adduction, flexion and internal rotation of the hip. Anterior dislocation typically occur in the exact opposite position, i.e., extension, abduction and external rotation, and is more associated with the anterior and lateral surgical approaches. Recurrence of the dislocation is lower if the dislocation occurs within the first month postoperatively than 3 months later.

Cemented knee prostheses have shown excellent long term survivorship at 10 to 15 years and currently either a cemented arthroplasty is still recommended over the hybrid models with the femoral cementless component. Obesity is felt to contribute to the perioperative and postoperative complication rate but not greatly so. Overall, the little data available on younger patients notes good results for at least the first 5 to 10 years.

Despite the optimistic outlook for survivability, a recent review of the literature and a survey of orthopedists suggests that after hip or knee arthroplasty, participation in no-impact or low-impact sports may be encouraged depending on the patient and the prosthesis but participation in high-impact sports should be prohibited. Those prohibited would include running, football, basketball, hockey, handball, karate, soccer, racquetball and waterskiing.

II. Aeromedical Concerns.

The major concerns following joint replacement relate to stability of the artificial joint over its lifespan of use and during ejection, emergency ground egress, or escape and evasion. In addition, flailing of the limbs following ejection may result in dislocation. Moreover, the replacement joint is often much heavier than the original and may affect flotation. A Class IIB waiver is recommended to allow flying in non-ejection seat aircraft, particularly in those who are younger and heavier, and in those with cementless hip prostheses.

III. Information Required for Waiver Submission.

Full orthopedic evaluation is required. A cockpit assessment by a flight surgeon and the squadron training officer may be necessary to ensure no limitations or problems in ingress, egress, equipment, or escape and evasion exist.

IV. Waiver Considerations.

US Air Force experience shows very few cases are on record but most have received categorical waivers. Hip, knee, and finger joint prostheses have been waived.

V. References.

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WAIVER GUIDE
Updated: Apr 06
By: Col Ivan

CONDITION:
Keratoconus

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, it commonly is expressed asymmetrically and, rarely, 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, corneal topography (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 <u>of any degree</u> is disqualifying for accession from any source and for all flying classes IAW AFI 48-123. 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 at any time. Rarely, it may remain subclinical. Frequent changes in contact lenses or spectacles are usually necessary to maintain 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 difficult and complicated, often requiring special hard contact lenses. Abnormal corneal topography can be diagnostic and usually precedes all other signs or symptoms. Slit lamp findings of keratoconus, such as Rizzuti's sign, Fleisher's ring, Vogt's striae, corneal thinning, and Munson's sign, are all late clinical signs. Early signs include scissoring reflex on retinoscopy and distortion of corneal keratometry (mires).

Aircrew who develop keratoconus, or abnormal CT, require a full Aeromedical Consultation Service (ACS) evaluation. Trained aircrew who develop keratoconus are entered into a clinical management group. With the introduction of computerized CT analysis, corneal patterns were identified that appeared similar to those seen in keratoconus, but without other clinical signs consistent with keratoconus. Such a pattern became known as "topographical pattern suggestive of keratoconus" or "TPSK," a term, however, coined only by the USAF. The term does not appear in the literature. Aeromedically, concerns arose that CT might be too sensitive because such keratoconic patterns were being identified in nearly 6% of the general population versus 0.5%. Although such a pattern remains a recognized contraindication to corneal refractive surgery because of the potential for underlying keratoconus, there was little data available on suspicious CT patterns in the literature to determine keratoconic progression and progression rates. Consequently, the USAF decided in 1997 to open a TPSK management group to determine if these early CT patterns were keratoconus or not. Therefore, USAF aircrew applicants who had TPSK on CT, but without

any other clinical signs of keratoconus, were waivered for TPSK, entered into this new prospective management group, and followed by the ACS. However, continued analysis of that management group revealed that TPSK definitely progressed to keratoconus, thus far in over 32% 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 has been closed. 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, will no longer be 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.

III. Information Required for Waiver Submission:

Initial waiver for keratoconus in trained aircrew requires an ACS evaluation. Prior to ACS evaluation, however, a variety of obvious ocular and systemic diseases associated with keratoconus, such as Marfan's syndrome, retinitis pigmentosa, and vernal keratoconjunctivitis, should be ruled out by appropriate medical and ophthalmic evaluations. The work-up should also include locally obtained CTs. Following initial waiver, trained aircrew with keratoconus will be followed at the ACS every 1-3 years depending on clinical and optical stability.

IV. Waiver Considerations.

Keratoconus is a disqualifying condition for flying class (FC) I, IA, II and III. Keratoconus is not waiverable for FC I, IA, initial II, and initial 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 safely and achieve functional wearing times. Aircrew with keratoconus require continuous management to ensure that they are adequately corrected to mitigate the optical side-effects of keratoconus. 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 ensure maintenance of adequate stereopsis with both contact lenses and spectacles. An acute loss of stereopsis associated with keratoconus is problematic. Hard and soft contact lenses for keratoconus are fitted and dispensed only by the ACS. Recent review of over 75 trained aircrew subjects in the ACS database revealed an 80% overall waiver rate in trained aircrew with keratoconus.

V. References.

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WAIVER GUIDE
Updated: Oct 98
By: Aeromedical Consultation Service (ACS)

CONDITION:
Kidney Tumors

I. Overview.

Aviators with a diagnosis of carcinoma of the kidney are to be placed DNIF. Renal cell cancer is an uncommon malignancy representing approximately 2% of all new cancer cases with a 1.5 M:F ratio. Peak incidence occurs between the ages of 50 and 70. Renal cell carcinoma (RCC) accounts for 90 to 95% of malignant neoplasm arising from the kidney. Twenty to 30% of RCC may be related to cigarette smoking and many familial as well as sporadic cases appear to be associated with a von Hipple-Lindau type genetic mutation. Presenting signs and symptoms include hematuria (40%), abdominal/flank pain (40%), and flank/abdominal mass (25%). Less than 20% will have all three. Paraneoplastic syndromes of erythrocytosis, hypercalcemia, nonmetastatic hepatic dysfunction and acquired dysfibrinogenemia will occur. Anemia is even more common. Diagnosis and staging is made by contrast visualization of the entire urinary system, ultrasonography, pelvic/abdominal/retroperitoneal CT or MRI, chest radiograph (CXR), urinalysis and urine cytology. Chest CT should be done if CXR is suspicious. Stage I tumors are confined to the kidney and have a 66% 5-year survival while Stage II tumors extend beyond the renal capsule but are confined by Gerota's fascia and have a similar 5-year survival (64%). Stage IIIa disease involves extension into the renal vein or vena cava but has a similar survival as Stage I and II disease. Stage IIIb disease extends to the hilar lymph nodes with a 5-year survival of only 20%. Stage IV disease is locally invasive into adjacent tissues or has distant metastases. Only 11% survive 5 years. The standard management of stage I, II, and IIIa RCC is radical nephrectomy. There is no proven role for adjuvant chemotherapy, immunotherapy, or radiotherapy post-nephrectomy. Metastatic RCC may be treated with interferon-alpha or interleukin-2. Both therapies are associated with significant morbidity. Selected solitary metastases to lung and brain may be excised with some increase in survival time. Upper tract transitional cell carcinoma is staged and treated much like bladder CA. A renal mass may be an oncocytoma or angiomyolipoma. The treatment for both is surgical excision.

II. Aeromedical Concerns.

Impairment may result from complications of surgical intervention. Metastatic disease to lung and brain is associated with impairment related to both tumor and its treatment. Brain metastases can result in significant unrecognized cognitive impairment and have presented initially with seizure or hemiplegia and invariably will lead to incapacitation. Loss of a paired organ requires more vigilance on protection of function of the remaining kidney. Ongoing therapy is generally incompatible with flying duties due to toxicity affecting physical performance. Consider for waiver after at least two years disease-free off all medications.

III. Information Required For Waiver Submission.

Aeromedical summary should include (1) initial presentation, (2) all surgical reports, (3) AFIP confirmation of histology, (4) chronology of therapy and results, (5) remarks that patient is in

remission without complications of surgical procedures, off all medications, and free of physical limitations, (6) statement that the remaining kidney is functioning normally accompanied by normal serial serum creatinines and urinalysis including microscopic, (7) remarks concerning future follow-up including tumor board and oncology or nephrology recommendations. In addition, upgrading of flying category requires full flying physical, CXR, contrast studies of entire urinary tract, and CT or MRI of the abdomen/pelvis/retroperitoneum, and brain. Medical evaluation board (MEB) results should be included in initial package.

IV. Waiver Considerations.

Review of waiver files and ACS data reveals limited requests for waivers have been favorably acted upon in the case of Stage I and II disease essentially cured with radical nephrectomy. History of nephrectomy (as in treatment of Wilm's Tumor in childhood) is generally disqualifying for FC I or IA.

V. References.

1. Kavolius JP, Mastorakos DP, Pavlovich C, Russo P, Burt ME, Brady MS. Resection of metastatic renal cell carcinoma. J Clin Oncol. Jun 1998; 16(6): 2261-6.

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WAIVER GUIDE
Updated: Feb 97
By: Aeromedical Consultation Service (ACS)

CONDITION:
Laryngeal Cancer

I. Overview.

Laryngeal cancer most commonly affects middle-aged or older men who have smoked tobacco and/or drank alcohol. The male to female ratio of 4.5:1 has decreased over the last 30 years due to the increase in women smokers. Etiologic factors that have been implicated in laryngeal cancer include; voice abuse and chronic laryngitis, certain dietary factors, chronic gastric reflux, and exposure to wood dust, nitrogen mustard, asbestos, and ionizing radiation. The vast majority of cases, however, are associated with smoking, whether by pipe, cigarette, or cigar. A synergistic effect has been seen when alcohol is combined with smoking, although some studies have failed to show an interdependent effect of alcohol alone.

Glottic or true vocal cord carcinoma is the commonest of all laryngeal cancers in the U.S. followed by supraglottic and subglottic, respectively. Most larynx cancers are squamous cell carcinomas, are surface lesions, and are usually visible with routine laryngeal inspection. Cervical metastasis in supraglottic disease may occur at an early stage unlike glottic cancer. Survival rates for early-stage carcinoma of the vocal cords treated with radiation therapy are 80-98%. For more progressive lesions treated with surgery and radiation the survival rate ranges from 57-83%.

Radiation therapy is the mainstay of treatment although early/in situ lesions may be treated with microexcision or laser vaporization. More advanced lesions usually require partial or total laryngectomy along with radiation. Recurrence is usually local and can be controlled with radiation if caught early.

II. Aeromedical Concerns.

The primary aeromedical concern is the ability to preserve comprehensible speech of a sufficient loudness. The risk of airway compromise following surgical treatment is also of significant concern. Treatment of early lesions with microexcision and/or radiation therapy usually preserves full voice and function of the larynx. Laryngectomy is not compatible with flying duties. Residual effects of radiation therapy and any surgical procedure must also be examined carefully for aeromedical concerns.

III. Information Required for Waiver Submission.

Medical evaluation board (MEB), tumor board recommendations and AFIP confirmation of histology are essential. The individual should be disease free and fully recovered from all treatments. Speech must be clear and any residual effects of therapy should be identified and their impact on the flying environment assessed.

IV. Waiver Considerations.

The USAF has limited experience with laryngeal cancer in aviators. Only two cases of squamous cell carcinoma of the true vocal cords were in the waiver file, and they were given a FC II and FC III waiver.

Individuals who are disease-free and fully recovered will be considered on a case by case basis.

V. References.

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WAIVER GUIDE
Updated: Feb 06
By: Dr. Andrew Downes

CONDITION:
Lattice Degeneration

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% of the general population. 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).

Lattice degeneration is characterized by multiple pathological features, including peripheral retinal thinning and atrophic hole formation. Clinical features include the following: localized round, oval or linear retinal thinning; pigmentation; whitish-yellow surface flecks; round, oval, or linear white patches; round, oval, or linear red craters; small atrophic round holes; branching white lines; yellow atrophic spots (depigmentation of pigment epithelium); and, traction tears at the ends or posterior margins of the lesions. The size and area of lattice degeneration lesions vary tremendously. Both eyes are affected in about half of cases.

Retinal holes are often associated with LD. The incidence of retinal holes in LD ranges from 18-42%. 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 LD. 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 RD, but the peripheral type of hole/break constitutes the more significant risk for progression to RD. All holes, therefore, need careful examination to identify the type of holes 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 a retinal specialist.

Although LD remains stable in most cases (97%), it can cause, or be associated with retinal detachment (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 -3.00D or greater. The risk of RD in association <u>with any amount</u> 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.

There is no specific treatment for lattice degeneration, but high risk atrophic holes or breaks can be treated by cryothermy, laser photocoagulation, or diathermy.

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.

III. Information Required for Waiver Submission.

Aeromedical summary (AMS) for an initial waiver for FC I//IA is to include:

a) Retinal specialist exam.
b) Symptoms, degree of lattice degeneration, degree of myopia (pre-refractive surgery, if applicable), presence and location of retinal holes.

Aeromedical summary (AMS) for an initial waiver for FC II/III is to include:

c) Ophthalmology exam, with retinal specialist referral as needed.
d) Symptoms, degree of lattice degeneration, degree of myopia (pre-refractive surgery, if applicable), presence and location of retinal holes.

	Condition	Waiver/Authority	ACS Evaluation/Review
FC I/IA*	LD, ≤-5.50 diopters, no untreated atrophic holes outside areas of lattice	Yes/AETC	Yes (initial)
FC I/IA	LD, >-5.50 diopters, or untreated high risk retinal holes	No/AETC	No
FC II/III	LD with/without retinal holes	Yes/MAJCOM	MAJCOM discretion

* LD may be waived for FC I/IA 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.

Annual local ophthalmology follow-up is recommended to monitor disease status, and required at time of waiver renewal.

IV. Waiver Consideration.

A recent database review showed 182 people with lattice degeneration. More than 90% were recommended for a waiver, and 18 of these were FCI. Most of those not recommended for waiver had other non-waiverable diagnoses.

V. References.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Learning Disabilities/Attention-Deficit Hyperactivity Disorder (ADHD)

I. Overview.

The label, "learning disability," once associated with reading problems, is now 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*, 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 degrading events in military aviation.

Until the past couple of decades, little thought was given to adult manifestations of learning disabilities (LD) or attention-deficit hyperactivity disorder (ADHD). Clinicians now realize these disorders, once felt to "burn themselves out" in adolescence, can persist into adulthood (Spencer et al., 1998; Barkley, Hill & Schoener, 1997). 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 clinical, historical, and, often, psychometric indicators 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. ADHD is thought to affect an estimated 3% to 9% 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. Most current estimates put the prevalence of ADHD in adults at 1% to 3%. 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 DSM IV criteria state that adult ADHD cannot exist in the absence of childhood ADHD. 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.

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.

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. 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.

Typically, significant problems will become manifest 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 aptitude or poor performance on other screening tests (such as AFOQT). Thus, there are specific AF Instructions and AETC procedures for applicants with LD or ADHD (AFI 48-123, A7.24.2.4 and .5). Additionally, it is unlikely that a person with a severe learning disability will be able to successfully complete rigorous aviation training. 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. Complaints may come to the attention of the flight surgeon through the reports of spouses, supervisors, colleagues or other aircrew. A confirmed diagnosis of LD or ADHD is disqualifying for flying class (FC) II duties. A history of a learning disorder or ADHD is not necessarily disqualifying. 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. Stimulant medication such as methylphenidate (Ritalin), dextroamphetamine (Dexedrine), and pemoline (Cylert), is incompatible with aviation duty.

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

IV. Waiver Considerations.

A 15-year (1981-1996) review of the ACS Cover Sheet File revealed that three pilots (FC II) were diagnosed with learning disabilities; one was recommended for disqualification from flying duties. One of the non-disqualified fliers (a previously competent flier) was evaluated at the ACS because of inability to upgrade into higher performance aircraft. In this case, a recommendation was made to limit flying duties to the lower performance aircraft based on prior adequate performance and on the assumption that this aircraft required a lower speed of information processing. Further, a 15-year (1981-1996) review of the Aircrew Waiver File included the disqualification of four aircrew

members (not FC II) with adult ADHD that were currently being treated with stimulant medication. Over the past three years (as of Oct 1999) AETC has evaluated three FC I/IA packages with a diagnosis of ADHD; all three were given a waiver for training. Waiver may be considered for aircrew with a history of LD or ADHD, providing they are symptom free, have not manifested a degradation of their performance of aircrew duties, and have not taken medication for the disorder for the past 12 months.

V. References.

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WAIVER GUIDE
Updated: Sep 06
By: Dr William Kruyer

CONDITION:
Left Bundle Branch Block

I. Overview.

Left bundle branch block (LBBB) has been reported in 0.01%-0.1% of healthy military aviators and in 0.2%-0.7% of various civilian populations. It is rare in military aviators under age 35 and almost nonexistent under age 25. Prevalence increases with advancing age, as does the prevalence of coronary artery disease (CAD), hypertension and other disease states. In an older report of 125 military aviators with LBBB, evaluation revealed no underlying disease in 89%, CAD in 9%, hypertension in 7% and one case of idiopathic dilated cardiomyopathy. Nine years of follow-up was available for 114/125. Total mortality was 8%, 5% developed CAD, 6% developed hypertension, two developed idiopathic dilated cardiomyopathy and one developed complete heart block associated with an acute myocardial infarction.

In a more recent report, 10% of military aviators with LBBB had significant CAD by coronary angiography, 2.0% had dilated cardiomyopathy and one aviator required permanent pacemaker. During mean follow-up of 16 years, an additional 8.5% developed significant CAD, 5% developed dilated cardiomyopathy and none required permanent pacing.

II. Aeromedical Concerns.

There are two aeromedical concerns for LBBB. One, is LBBB an increased risk for progressive conduction system disease? And two, is LBBB predictive of current or future underlying cardiac disease? In the Aeromedical Consultation Service (ACS) database reviews noted above, the risk of progressive conduction system disease was not increased. In the more recent report, the aviator who required permanent pacemaker during initial evaluation actually had alternating left and right bundle branch block. However, the risk of underlying cardiac disease, CAD and dilated cardiomyopathy, is a concern. In the USAF male aviator population aged 35-55 years, estimated background prevalence of significant CAD is about 5%. LBBB thus has a two-fold risk of underlying significant CAD. The presence and especially the later development of dilated cardiomyopathy are also significant.

III. Information Required for Waiver Submission.

All aviators/aircrew with LBBB require ACS evaluation prior to waiver consideration. For ACS evaluation of initial waivers submit:

A. Aeromedical summary.
B. Original copy of the 12-lead ECG or other ECG tracing documenting the LBBB.
C. Reports of any local consultations.
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, stress nuclear imaging).

IV. Waiver Considerations.

LBBB is disqualifying for all classes of flying duties. It may be waiver eligible for any class of unrestricted flying duties after ACS evaluation. Because of the increased likelihood of significant CAD and the unreliability of most noninvasive tests in the setting of LBBB, coronary angiography is required for initial waiver consideration for aircrew older than 35 years. Angiography is preferably done during the ACS evaluation. Angiography may be recommended for aircrew younger than 35 years with increased CAD risk profile. If coronary angiography is normal, waiver is usually recommended for unrestricted flying duties. If angiography is not normal, 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 possible development of dilated cardiomyopathy.

V. References.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Robins

CONDITION:
Leukemia

I. Overview.

The leukemias are included with diseases of the blood, blood-forming tissues and immune system. Overall, the requirement for frequent assessment may interfere with military mobility. Adult acute lymphocytic leukemia (ALL) has a high relapse rate and long term survival is uncommon; central nervous system (CNS) relapse occurs in 50% of cases although this figure is reduced to 5% with chemical or radiation prophylaxis. Although 60-80% of cases of acute myelogenous leukemia (AML) go into remission, it is short lived (15 months on average). There is a high relapse rate, particularly to the CNS; long term survival without bone marrow transplant is rare but the addition of this technique to the therapeutic armamentarium has increased long term survival of AML to 50%. Chronic myelogenous leukemia (CML) usually requires cytotoxic therapy during the chronic phase; the development of a blast crisis is unpredictable and may be sudden. Chronic granulocytic leukemia (CGL) is rare; 10% of patients exhibit an accelerated progression with death occurring in weeks. Bone marrow transplant can produce long term survivors. Patients with chronic lymphocytic leukemia (CLL) may progress unpredictably from one stage to another; cytotoxic therapy is often needed and the risk of incapacitation from cytopenia is serious. Up to 20% of patients with CLL have another, coexisting malignancy. Hairy cell leukemia, on the other hand, may be clinically benign; patients may live for many years without impairment although the results of chemotherapy can range from disappointing with some drugs to a relapse rate of <1% in 5 years with pentostatin; splenectomy can increase long term survival. Relapse in hairy cell leukemia can usually be identified by regular CBC.

II. Aeromedical Concerns.

Most of the leukemias present with symptoms of fatigue, lethargy and malaise associated with infections, anemia and/or hemorrhage. Disseminated intravascular coagulation is a common complication of ALL. It can cause sudden, fatal hemorrhage or disabling bone pain. Relapse of ALL can present with mild to severe CNS symptoms. Prophylactic CNS radiation in cases of ALL can produce leukoencephalopathy with ataxia and confusion. Chemotherapeutic regimens for virtually all types of leukemia can have side effects that degrade performance. Ongoing therapy is not compatible with waiver. Patients who have had bone marrow transplant are not likely candidates for waiver.

III. Information Required for Waiver Submission.

Tumor board recommendations and medical evaluation board (MEB) are required. AFIP confirmation of the diagnosis is also mandatory. In patients who have had prophylactic CNS radiation, psychology review is necessary. All waiver renewal requests should be accompanied by full oncology review.

IV. Waiver Consideration.

The US Air Force experience is limited. Severe presentations have probably never been submitted for waiver. Since 1940 up to the time of this printing, nine flyers have been submitted for waiver, five of which received temporary waivers while in remission for CML, CLL, ALL, and hairy cell leukemia.

V. References.

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WAIVER GUIDE
Updated: Dec 03
By: Col Pat Storms

CONDITION:
Liver Function Testing (Transaminases)

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 sections in AFI 48-123 relate specifically to liver disease:
A7.19.1.5: History of viral hepatitis, with carrier state, persistent transaminase elevation or evidence of chronic active or persistent hepatitis
A7.19.1.18: Any chronic liver disease whether congenital or acquired. Marked enlargement of the liver from any cause. Hepatic cysts. Congenital hyperbilirubinemias, e.g. Gilbert's disease, do not require waiver if asymptomatic.
A 7.31.1.21: Miscellaneous conditions such as porphyria, hemochromatosis, amyloidosis.
A7.31.1.25: Sarcoidosis

Some background related to liver function blood tests may add clarity to the testing sequence, and offer insight into the evaluation and waiver consideration for affected aviators.

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 (Pratt, 2000). Environmental/toxic agents include arsenic, vinyl chloride, carbon tetrachloride, and beryllium, among others (Farrell, 2002). 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.

Transaminases (AST/ALT) are sensitive indicators of hepatocellular injury. 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, 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 (Cohen, 1979).

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. It may also be useful in confirming the hepatic origin of an elevated alkaline phosphatase level.

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.

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.

A recent report of sprue as the cause for chronically elevated transaminases in 13 of 140 asymptomatic patients (Bardella, 1999) suggests that screening for sprue with antigliadin antibodies could be valuable if more common causes of transaminase elevations have been excluded. 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.

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 (Pratt, 2000). 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. 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.

Recommended test battery for patients with abnormal transaminases and no specific diagnosis implicated by history or physical examination:
- AST/ALT (repeat)
- Gamma Glutamyltransferase 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
- Ceruloplasmin
- Serum Protein Electrophoresis
- Hepatic sonogram (to look for ductal abnormalities or fatty infiltration)
- Prothrombin time
- CBC with platelet count
- Serum albumin

II. Aeromedical Concerns.

As mentioned in section I, 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.

III. Information Required for Waiver Submission.

Results of diagnostic testing should be submitted with the waiver package. Documentation of successful treatment with diet (for steatosis), cessation of the implicated medication (for med-related hepatitis), or abstinence (for alcohol-induced liver disease) should also be included.

IV. Waiver Considerations.

Waiver consideration will hinge on the specific diagnosis and the functional hepatic capacity, as described above. The specific disqualifying diagnoses in AFI 48-123 are described in section I, and 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.

FCI/IA: no special considerations.

Aeromedical Consultation Service (ACS) experience with abnormal liver enzyme studies without specific diagnosis reveals 550 cases, 319 of which received a waiver recommendation (58%).

V. References.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Fisher

CONDITION:
Lung Cancer

I. Overview.

Lung cancer affects 99,000 males and 78,000 females in the US each year, and of those 86% will die within five years. The risk of lung cancer increases with age, first becoming a significant diagnostic consideration in the 35-54 year old age group. Fewer than 1% occur in those less than age 35. At the time of diagnosis, fewer than 15% will have localized disease, and more than 55% will have distant metastasis. Smoking is the major risk factor, and the increased risk persists even after years of cessation. A male who smoked less than one pack per day and quit 10 years ago, remains at 9 times the risk of an otherwise risk matched male who never smoked.

Lung cancers are broadly divided into two major categories, small cell (SCLC) and non-small cell lung carcinomas (NSCLC). The latter category includes squamous (epidermoid) carcinoma, adenocarcinoma, and large cell undifferentiated carcinoma, the last representing squamous or adenocarcinoma which is too primitive to categorize on light microscopy. Staging, prognosis and treatment differ between SCLC and NSCLC cancers.

NSCLC account for 75- 80% of newly diagnosed lung cancers. Overall, NSCLC cancers are generally amenable to surgical therapy, somewhat sensitive to (but rarely curable by) radiotherapy, and resistant to chemotherapy. The tumors are staged according to the TNM Staging System. Stage I disease is T1-T2 N0 M0 disease after an exhaustive and well regimented search for spread. 5 year survival for Stage I disease is 60-80%. All stages above stage I carry a less than 50% five year survival prognosis. At autopsy adenocarcinomas and large cell carcinomas will have distant metastasis 50-86% of the time and squamous cell carcinoma will have metastasized to a distant site up to 54% of the time. Major sites of metastasis for adenocarcinomas include the pleura / lung (60%), liver (41%), CNS (36%), bone (36%) and heart / pericardium (36%).

SCLC are categorized into limited stage (disease limited to one hemithorax and nodes) or extensive stage disease. SCLC is usually a systemic disease at the time of diagnosis, with distant metastasis at the time of diagnosis in about 70% of cases and over 95% at the time of death. Treatment of SCLC is typically with chemo and radiation therapy, but even with therapy survival is typically only 40-70 weeks. Treated patients with limited disease have a 5 year survival expectancy of about 30%.

II. Aeromedical Considerations.

Lung cancers of all types present a very high risk of distant metastasis. Of those, many occur in the CNS and pose a risk of seizure, neurologic deficit, or sudden neurological compromise due to bleeding. Another subset will develop cardiac involvement with dysrhythmias or conduction disturbances, or will develop bony metastasis with pain and structural compromise. Small cell tumors, like some “benign” tumors such as carcinoids, are frequently associated with endocrinopathies and neuropathies capable of incapacitating the aviator.

Treatment of NSCLC with wedge resection or lobectomy should not compromise pulmonary function significantly in the person without emphysema, and may be acceptable for flying duty. Pneumonectomy, however, carries a high risk of pulmonary compromise and is not compatible with flying duties.

III. Information Required for Waiver Submission.

Waiver for return to flying must be considered on an individual case basis only after the cancer can safely be assumed to be cured. Thus after a 5 year disease free interval, without adjunctive therapy, an evaluation to rule out metastatic or recurrent disease may be considered. The following evaluations should be considered at a minimum:

A. Report of the medical evaluation board (MEB)
B. Report of the tumor board
C. AFIP confirmation of histologic type and grade
D. Oncology consultation and opinion
E. MRI of brain
F. CXR/CT chest
G. Bone scan
H. Complete physical examination to include EKG and PFTs
I. Further enzymatic and radiological tests as required to rule out the presence of recurrence or distant metastasis
J. This waiver package should be submitted through the major command to the Aeromedical Consultation Service (ACS) for further consideration.

IV. Waiver Considerations.

Patients who have undergone curative surgical therapy, who have no compromise of pulmonary function, and who have no evidence of sequelae, metastasis or recurrence after the customary 5 year period of observation may be considered for waiver. Six Air Force aviators (all with NSCLC) have been evaluated and four returned to flying duties. Aside from epidemiological examinations for lung cancer frequency among pilots (not elevated) there is no relevant literature, including DTIC and NTIS sources, regarding lung cancer in the aeromedical environment.

V. References.

1. Kern JA, Clamon G. Lung Cancer. In: *Textbook of Internal Medicine,* 3rd Ed. Kelley WN ed. Lippincott-Raven Publ. Phila. 1997.

2. Minna JD. Neoplasms of the Lung. In: *Harrisons Principles of Internal Medicine,* 14th Ed. Fauci AS, et al eds. McGraw-Hill. 1998.

3. Rectenwald RW. Case for the Aerospace Medicine Resident's Teaching File #34. An Aviator with a Solitary Pulmonary Nodule. Aviat Space Environ. Med. 1989; 60(12): 1222-4.

4. Skarin AT. Lung Cancer in Scientific American Medicine Rubenstein et al eds. Scientific American. 1997.

WAIVER GUIDE
Updated: Mar 99
By: Dr.Hiatt

CONDITION:
Lyme Disease

I. Overview.

Lyme disease is a tick borne, spirochetal, zoonotic disease caused by infection with a species of *Borrelia burgdorferi*. In the United States, endemic foci exist along the Atlantic coast (especially Massachusetts to Maryland), along the West Coast (California and Oregon) and in the Midwest (Minnesota, and Wisconsin), although sporadic cases have been noted throughout the lower 48 States. The primary reservoir of the disease is in certain ixodid ticks. Deer are the primary maintenance mammal host for the vector-tick species. The mode of transmission is through a tick bite, and experimentally it has been shown that the tick must remain attached for at least 24 hours to ensure transmission of the spirochete. All humans appear to be susceptible and reinfection has occurred in those already treated for the disease. The incubation period for the illness is from 3 to 32 days with the early stages being asymptomatic in some cases. The initial manifestations are intermittent and changing. The illness typically begins in the summer and the first manifestation in up to 60% of patients appears as a red macule or papule that expands slowly in an annular fashion. This lesion is referred to as "erythema migrans" (EM). It is a primary diagnostic marker for infection providing it attains a diameter of 5 or greater centimeters. With or without EM, other early systemic manifestations may include a number of nonspecific "Flu-like " symptoms to include lymphadenopathy, migratory arthralgias and myalgias, malaise, headache and cervical pain. The onset and duration of these symptoms is variable. Within weeks to months after the onset of the illness, early neurologic abnormalities may occur (aseptic meningitis, cranial neuritis, cerebellar ataxia, encephalitis, myelitis, and motor and sensory neuritis). Cardiac abnormalities (atrioventricular block, cardiomegaly, and myopericarditis) may occur in some individuals within weeks after infection. Finally within weeks to years after infection chronic arthritis may occur in some individuals in large joints, especially the knees. The gold standard for the diagnosis of Lyme disease is currently based on clinical findings supported by serologic data by IFS, ELISA and immunoblot assay. The specific treatment for adults in the early course of the disease is doxycycline (100 mg BID for 2 to 4 weeks). Lyme arthritis also responds to this regimen. However in cases of neurologic and cardiologic manifestations, the treatment of choice is IV Ceftriaxone (2 grams QD for 4 weeks) or IV penicillin (20 million units in 6 divided doses for 4 weeks). In the case of allergies to tetracyclines or penicillins, erythromycin type drugs have also been effective. Regardless of the treatment regimen, there is a 10% chance of failure due to resistance which necessitates a change in drug therapy.

II. Aeromedical Concerns.

The primary aeromedical concerns of this disease are its debilitating side-effects in regards to the neurologic, cardiovascular, and arthritides that may result. If an aircrew member had one or more of these manifestations that did not resolve with treatment, he would be permanently removed from flight status, unless functional enough to be cleared by ACS. However, as with all infectious diseases, if treated early with full resolution of symptoms, then the patient should be returned to flight status.

III. Information Required for Waiver Submission.

A clinical and serologic confirmation of the disease is required. The Aeromedical Summary should include all specialist consultations (dependent on clinical manifestations) and there findings. ACS evaluation is called for in all disseminated cases or cases with residua.

IV. Waiver Considerations.

Patients should be DNIF while under treatment. In cases of full resolution of acute Lyme disease, the patient may be returned to flight status. Waiver may be required for later stage Lyme disease, depending on the success of the therapy. In patients with residual symptoms, a full ACS evaluation is required as is any case of disseminated disease. The experience of the entire DOD is scant, numbering less than 10 aircrew member cases.

V. References.

1. Asch ES, et al. Lyme disease: an infectious and postinfectious syndrome. Journal of Rheumatology. Mar 1994; 21(3): 454-61.

2. Benenson AS. *Control of Communicable Diseases Manual*, Sixteenth Edition, 275-279.

3. Massaroti EM, et al. Treatment of early lyme disease. The American Journal of Medicine, Apr 1992: 396-403.

WAIVER GUIDE
Updated: Oct 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Malignant Melanoma

I. Overview.

Epidemiology: The incidence of malignant melanoma in the U.S. was approximately 12.5 per 100,000 persons in 1996, and is increasing at a faster rate than any other cancer. Diagnosis: An excisional biopsy should be performed on suspicious lesions, after dermatology consultation, and submitted to pathology. Clinical Risk: Predominant factors associated with a poorer prognosis include: greater tumor thickness, tumor ulceration, primary tumor located axially or on palms/soles, higher stage of disease, and nodal or distant metastasis. Treatment: Patients must be DNIF while undergoing therapy. Wide and deep excision remains the definitive treatment for malignant melanoma.

II. Aeromedical Concerns.

The ultimate concern is the risk of an in-flight incapacitating event. Recurrence rates within two years after surgical treatment of American Joint Committee on Cancer (AJCC) stage I and II melanoma can be as low as 2% for minimal stage I disease, and up to 70% or more for thicker stage II tumors. Of those with recurrent disease, approximately 20% will present with metastasis to the brain. Approximately 57% of brain mets from melanoma have led to a seizure, or other incapacitating neurological event, as the presenting symptom. For AJCC stage III melanoma, the five-year mortality rate after therapeutic nodal excision is reported to be approximately 60% for all stage III patients combined, with five year recurrence rates reported to be 5-10% higher. Overall, after five years of disease-free survival, the risk of recurrence for stage III disease decreases to approximately one percent per year. Therefore, five years after treatment of stage III disease, slightly more than one-tenth of one percent of those who appear to be free of recurrence would present with an incapacitating symptom in any year. For stage IV melanoma, the five-year mortality rates are 90% or greater. In view of the very poor survival statistics for this group and the highly aggressive nature of the disease at this stage, waivers for stage IV malignant melanoma cannot be recommended. The waiver decision table and guidelines listed below take these percentages into account, along with the latest statistical data from the largest melanoma study group to date. The calculations used to design these guidelines are based on a one-percent annual risk of sudden incapacitation as a limiting rate. Local recurrences must be considered carefully. Although local recurrence may occasionally represent the first manifestation of hematogenous metastasis, true local recurrences develop from residual tumor that was not removed by the initial surgical excision. These local recurrences are contiguous with the surgical scar and usually include a significant intraepidermal tumor component. True local recurrences are expected to have relatively good prognosis, depending on the histologic and clinical features of the original tumor. After wide local excision, waiver recommendations should follow the guidelines in the table below for the primary lesion. A cutaneous recurrence that is not contiguous with the surgical scar, or lacks an intraepidermal component, should not be categorized as a local recurrence, and must be restaged. 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 equipment. Typical

down days during treatment and waiver decision process for melanoma range from several months to permanently, depending on stage of disease, lesion size, location, extent of surgery, and recovery.

III. Waiver Decision Guidelines

AJCC stage I and II (Clinically Localized Melanoma: pT1-4, N0, M0)			
Breslow Thickness (mm)	**Tumor Ulceration**	**Lesion Location**	**Aeromedical Disposition**
0.76	Yes or No	Any site	UW*
0.76 – 1.49	No	Any site	UW*
	Yes	Extremity (except palms and soles)	DQ (min 2 yrs)†
	Yes	Axial or palms or soles	DQ (min 5 yrs)‡
1.50 – 2.49	No	Extremity (except palms and soles)	UW*
	No	Axial or palms or soles	DQ (min 2 yrs†)
	Yes	Extremity (except palms and soles)	DQ (min 2 yrs) †
	Yes	Axial or palms or soles	DQ (min 5 yrs) ‡
2.50 – 3.99	No	Extremity (except palms and soles)	DQ (min 2 yrs) †
	No	Axial or palms or soles	DQ (min 2 yrs) †
	Yes	Extremity (except palms and soles)	DQ (min 2 yrs) †
	Yes	Axial or palms or soles	DQ (min 5 yrs) ‡
> or = 4.00	Yes or No	Any site	DQ (min 5 yrs) ‡
AJCC stage III Melanoma (any pT, N1/N2, M0)			
Any stage III disease = DQ (min 5 yrs) ‡			
AJCC stage IV Melanoma (any pT, any N, M1)			
Waiver is not recommended for any stage IV disease.			

*** UW = Unrestricted Waiver. All waivered cases require close follow-up for life, at intervals recommended by the evaluating dermatologist/oncologist.**

† DQ (Min 2 yrs) = Disqualified for **two** years, beginning after treatment is completed. If disease-free and fully mission capable after this period, as determined by a flight surgeon evaluation and a mandatory dermatology evaluation (and oncology evaluation if indicated), then recommend unrestricted waiver. All waivered cases require close follow-up for life, at intervals recommended by the evaluating dermatologist or oncologist.

‡ DQ (Min 5 yrs) = Disqualified for **five** years, beginning after treatment is completed. If disease-free and fully mission capable after this period, as determined by a flight surgeon evaluation and a mandatory dermatology evaluation (and oncology evaluation if indicated), then recommend unrestricted waiver. All waivered cases require close follow-up for life, at intervals recommended by the evaluating dermatologist or oncologist.

IV. Information Required In Package for Waiver Submission.

A. A complete aeromedical summary—to include comments addressing interference with use of aviation equipment;

B. Copy of full dermatological consultation (and oncology/surgery consultation if indicated), with specific comments regarding work-up to rule-out metastatic disease;

C. A copy of the pathology report, specifically indicating histologic diagnosis of melanoma, presence or absence of tumor ulceration, and Breslow depth;

D. Confirmation of histology, ulceration, and Breslow depth by AFIP, with a copy of report attached;

E. Copies of all laboratory studies, radiological studies, and any other studies;

F. Copies of tumor board and medical evaluation board (MEB) reports (mandatory to include with waiver package submission).

V. Waiver Considerations.

USAF Experience. In the history of the Aeromedical Consultation Service (ACS), 40 aviators with malignant melanoma have been evaluated. Of these, 36 received a waiver, and 4 aviators (10%) were permanently disqualified. Two of the disqualified aviators had regional metastases to lymph nodes, and two had choroidal melanoma. One aviator received a FC IIC waiver for a stage IB (1.47mm--1.95mm) forehead melanoma, with a restriction from single seat aircraft due to risk of seizure. The USAF waiver file database showed a total of 184 aviators diagnosed with melanoma that were not referred to the ACS. Of these, 7 aviators (3.8%) were permanently disqualified, while the rest received waivers. Complete histories were not available for aviators in this database, however; at least one of the disqualifications was due to regional metastasis. No data is available on aviators with melanoma who were not submitted for waiver.

Evaluation/Reevaluation at the Aeromedical Consultation Service, Brooks City-Base: Not required. Initial evaluations may be performed by a local dermatologist (and oncologist/surgeon when indicated). Waiver package will be submitted to MAJCOM. The aviator will require life-long local follow-up.

VI. References.

1. Balch CM, et al. An Analysis of Prognostic Factors in 8500 Patients with Cutaneous Melanoma. In Balch CM, et al, eds. *Cutaneous Melanoma*, 2nd Ed. New York: J.B. Lippincott Company; 1992: 165-87.

2. Balch CM, et al. Cutaneous Melanoma. In: DeVita VT, et al, eds. *Cancer, Principles and Practice of Oncology*, 4th ed. Philadelphia: J.B. Lippincott Company; 1993: 1612-61.

3. Rigel DS, Rogers GS, Friedman RJ. Prognosis of Malignant Melanoma. Derm Clin. 1985; 3: 309-14.

4. Sampson JH, et al. Demographics, prognosis, and therapy in 702 patients with brain metastases from malignant melanoma. J Neurosurg. 1998; 88: 11-20.

5. Soong S-J, et al. Predicting Survival and Recurrence in Localized Melanoma: A Multivariate Approach. World J Surg. 1992; 16: 191-5.

WAIVER GUIDE
Updated: Mar 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Medullary Sponge Kidney

I. Overview.

Medullary sponge kidney is a disease of adults which is usually an incidental finding during imaging of the abdomen, usually by IVP. It occurs in about one in 5,000 individuals and has nearly a two to one male predominance. It does not appear to follow any classical type of inheritance pattern. The cause of medullary sponge kidney is unknown. Occasionally, medullary sponge kidney is identified as a result of conducting a workup for complications of the disease which include stone formation, hematuria and infection. Renal function is usually normal. The disease is characterized by dilation of the papillary ducts of the renal medulla. Small cysts may be present. The cysts are lined with cuboidal or transitional epithelium.

II. Aeromedical Concerns.

Medullary sponge kidney is important aeromedically due to the side effects of the disease. Aviators with this disease are more likely to form stones. Pyelonephritis is also more common and may cause cortical scarring which can compromise renal function.

III. Information Required For Waiver Submission.

Local evaluation should include a thorough history and physical to establish whether or not renal function is compromised. In addition, imaging studies such as IVP, renal scan, CT or NMRI which clearly show the presence of medullary sponge kidney should be included. All evaluations should include serum creatinine, urinalysis, urine creatinine, 24-hour creatinine clearance, complete blood count, blood urea nitrogen, and 24-hour urine protein.

ACS referral is required. In cases associated with abnormal renal function a nephrology consultation must be obtained.

IV. Waiver Considerations.

Of three active duty aviators referred to the ACS from 1985 to 1995 with medullary sponge kidney, two were referred for problems actually related to that diagnosis and both received waivers despite the fact that one had a retained stone which was felt to be unlikely to pass or cause symptoms. The third aviator was disqualified because of the presence of SCAD.

Before applying for a waiver, the aviator should be asymptomatic and stable. Waiver criteria also include a low probability of recurrent problems and adequate renal function.

V. References.

1. DeHart RL. *Fundamentals of Aerospace Medicine*. Lea & Febiger, Philadelphia, PA, 1985, Chaps. 13, 18, 20, 21 & 22.

2. Ernsting J & King P, eds. *Aviation Medicine*. Butterworths, Boston, MA, 2nd Ed., 1988, Chaps. 35 & 46.

3. Ravel R. *Clinical Laboratory Medicine*. Mosby, St. Louis, IL, 1995, Chaps. 13 & 37.

4. Robbins SL & Cotran RS, eds. *Pathologic Basis of Disease.* W.B. Saunders Co., Philadelphia, PA, 1979, Chaps. 23 & 24.

5. Sabiston DC, ed. *Textbook of Surgery*. W.B. Saunders Co., Philadelphia, PA, 1986, Chaps. 18 & 19.

6. Wyngaarden JB, Smith LH & Bennett JC. *Cecil Textbook of Medicine.* W.B. Saunders Co., 19th ed., Philadelphia, PA, 1992, Chaps. 72, 76, 77, 79, 81, 84, 89 & 90.

WAIVER GUIDE
Updated: Nov 03
By: Aeromedical Consultation Service (ACS) Staff

CONDITION:
Meningitis

I. Overview.

Meningitis is an acute or chronic process involving the tissues surrounding the central nervous system. Most commonly meningitis is an infectious process, but can be a result of trauma, chemicals, or metastatic neoplasms. The most common form of meningitis is infectious, generally due to bacteria or viruses. Pathogenesis of bacterial meningitis depends on a defect in the blood-brain barrier, bacterial virulence factors, and host defense factors. The hallmark of meningitis is inflammation of the meninges, causing an increase in intrathecal pressure. Bacteria in the subarachnoid space can cause release of active cytokines that increase vascular permeability and result in a corresponding rise in intracranial pressure. The increased pressure causes cerebral ischemia, altered mental status, and cellular damage that can give rise to long-term complications. Patients with viral or aseptic meningitis tend to have a milder course, but will still develop some degree of elevated CNS pressure leading to long-term sequelae.

II. Aeromedical Concerns.

There are many transient or chronic complications of meningitis that may affect the flyer that had had meningitis. Up to 20% of meningitis patients will develop late complications. Complications can include visual or hearing disturbances due to cranial nerve palsies, epilepsy, and renal failure. Subtle changes in mental performance are a possible adverse outcome of meningitis. Some patients, particularly those who had meningitis due to *S. pneumoniae*, develop intracerebral cysts due to resolving brain abscesses.

III. Information Required for Waiver Submission.

A. Neurological consultation
B. Neuropsychological testing
C. Sleep-deprived EEG
D. MRI scan of the head
E. Audiologic evaluation

IV. Waiver Considerations.

The diagnosis of central nervous system infection is disqualifying from military flying. Over the past ten years 85% of the persons with meningitis referred to the ACS have received waivers. Those not receiving waiver included individuals who have had seizures, certain persistent cranial nerve palsies, or parenchymal defects. Waiver criteria include the flyer to be symptom-free for six months, normal EEG and MRI, and cleared by neurology.

V. References.

1. Roos KL. Acute bacterial meningitis. *Semin Neurol*. 2000; 20(3): 293-306

2. Sigurdardotttir B, Bjornsson OM, Jonsdottir KE, Erlendsdottir H, Gudmundsson S. Acute bacterial meningitis in adults. *Arch Intern Med.* 1997 Feb 24; 157 (4): 425-430

3. Spach DH, Jackson LA. Bacterial meningitis. *Neurol Clin.* 1999 Nov; 17 (4): 711-735

WAIVER GUIDE
Updated: Jun 99
By: Lt Col Castillo

CONDITION:
Mitral Regurgitation

I. Overview.

In the aircrew population, clinically significant mitral regurgitation (MR) is most commonly associated with mitral valve prolapse. Other causes include rheumatic heart disease, infective endocarditis, coronary heart disease, connective tissue diseases such as Marfan's syndrome, and dilated cardiomyopathy. MR is graded as trace, mild, moderate and severe.

Clinically mild cases of MR are asymptomatic. Moderate to severe MR can eventually lead to dyspnea, fatigue, and reduced exercise tolerance. Atrial fibrillation can occur in advanced cases. They may have increased left atrial and pulmonary pressures thus being prone to attacks of acute pulmonary edema. Individuals with MR are at an increased risk to develop both left and right sided heart failure.

In the aircrew population, MR would typically be diagnosed from an echocardiogram done for a systolic murmur heard on physical examination or for atrial enlargement on ECG.

Auscultation demonstrates a soft S1. The murmur is a blowing pansystolic murmur which is best heard at the apex which is transmitted to the axilla. Signs that indicate a more severe MR include a third heart sound, wide splitting S2, and an increase in the pulmonic component of S2.

II. Aeromedical Concerns.

The aeromedical concerns include: 1) symptoms of dyspnea, fatigue and reduced exercise tolerance, 2) the progression of MR to a more severe form, and 3) left and right-sided heart failure. Thromboembolic events and dysrhythmias are less common concerns. Static exercises are also likely to worsen the MR and thus have deleterious effects.

III. Information Required for Waiver Submission.

An echocardiogram easily diagnoses and grades the severity of MR. The Aeromedical Consulation Service (ACS) reviews all echocardiograms done locally to confirm all abnormal findings. The ACS considers trace and mild MR by echocardiogram without an accompanying murmur as normal variants and therefore do not require disqualification or waiver considerations. Mild MR by echo with an accompanying murmur, moderate MR, and severe MR can be considered for waiver provided that the individual is: 1) asymptomatic with a normal exercise tolerance, 2) disease free in the other valves, 3) has no dilatation of the left ventricle or atrium, 4) has no left ventricular dysfunction, and 5) has no significant dysrhythmias. All flying class II waiver considerations will need to be evaluated at the ACS. Local evaluation prior to the ACS evaluation would include history and physical examination, ECG and the echocardiogram. Flying class III waiver considerations do not require an ACS evaluation but require a local evaluation and waiver request to the appropriate waiver authority.

IV. Waiver Considerations.

Twenty-three individuals have been evaluated at the ACS for moderate and severe mitral regurgitation from 1990 through early 1996. Thirteen have been granted a waiver. These numbers represent individuals who were evaluated at the ACS who did not have mitral valve prolapse or other significant cardiac abnormalities. The ACS evaluation will include history and physical by an internist or cardiologist, routine labs, ECG, chest x-ray, echocardiogram, PFTs, 24-hour Holter, treadmill, and, for evaluees over the age of 35, thallium imaging and coronary artery fluoroscopy.

V. References.

1. Cheitlin MD, Douglas PS, Parmley WW. Task force 2: acquired valvular heart disease. JACC. Oct 1994; 24(4): 874-6.

2. Kruyer WB, Schwartz RS. Valvular and congenital heart disease in the aviator.

WAIVER GUIDE
Updated: Jun 99
By: Lt Col Castillo

CONDITION:
Mitral Stenosis

I. Overview.

Mitral stenosis is almost always a result of rheumatic fever. In rare cases, mitral stenosis can occur congenitally, from a carcinoid syndrome, systemic lupus erythematosus, rheumatoid arthritis, or mucopolysaccharidosis. Mitral stenosis has been declining in incidence in this country for most of this century. However, the incidence of rheumatic heart disease has been increasing more recently due to the increase in the number of immigrants from countries prevalent with rheumatic heart disease. Since mitral stenosis typically progresses in severity or is associated with significant cardiac complications, the current ACS recommendation for mitral stenosis is disqualification without consideration for waiver for all categories.

Clinically the concern is for the potential for dysrhythmias, thromboembolic events, pulmonary hypertension, and the propensity for left atrial and right ventricular enlargement. Over 50% of individuals with mitral stenosis will develop chronic atrial fibrillation and over 80% will develop paroxysmal atrial fibrillation. Cases typically present with dyspnea, fatigue, and decreased exercise and activity tolerance. In the aircrew population, mitral stenosis would typically be diagnosed from an echocardiogram done for a left atrial enlargement on ECG or for a murmur or opening snap heard on physical exam.

Physical findings include prominent “a” waves of the jugular venous pulse, a palpable right ventricle heave, and sometimes a flushed facial appearance. Auscultation demonstrates a loud S1 (if the leaflets are still pliable), a narrowly split S2 with an opening snap after S2. The classical murmur is a low pitched blowing diastolic rumbling murmur which is best heard with the bell of the stethoscope at the apex.

II. Aeromedical Concerns.

The aeromedical concerns include dysrhythmias, thromboembolic events and pulmonary hypertension. The latter can be aggravated by the exposure to the potentially hypoxic aerospace environment inducing pulmonary vasoconstriction.

III. Information Required for Waiver Submission.

An echocardiogram easily diagnoses mitral stenosis. The ACS reviews all echocardiograms done locally to confirm all abnormal findings. As this condition is disqualifying without waiver, no ACS evaluation is necessary.

IV. Waiver Considerations.

Five individuals have been evaluated at the ACS for mitral stenosis in the past 20 years. None have been granted a waiver on their most current evaluation. One individual did receive a waiver on his

evaluations in 1975, 1976 and 1977 but was disqualified on his most recent evaluation in 1979. Almost all individuals with mitral stenosis will be disqualified at the MAJCOM level and would not undergo an ACS evaluation although ACS review of cases with mild mitral stenosis would be reasonable.

V. References.

1. Caroll JD, Feldman T. Percutaneous mitral balloon valvotomy and the new demographics of mitral stenosis. JAMA. 13 Oct 1993; 270(14): 1731-6.

2. Cheitlin MD, Douglas PS, Parmley WW. Task force 2: acquired valvular heart disease. JACC. Oct 1994; 24(4): 874-6.

3. Feldman T. Rheumatic mitral stenosis. Postgrad-Med. 1 May 1993; 93(6): 93-4,99-104.

4. Kruyer WB, Schwartz RS. Valvular and congenital heart disease in the aviator.

WAIVER GUIDE
Updated: Jun 05
By: Dr William Kruyer, USAFSAM/FECI

CONDITION:
Mitral Valve Prolapse

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. 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 initial 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 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.

II. Aeromedical Concerns.

Two categories of aeromedical events may be considered with MVP. Events which might occur abruptly and impact flying performance include sudden cardiac death, cerebral ischemic events, synope/presyncope and sustained supraventricular and ventricular tachydysrhythmias. Other aeromedical concerns include infective endocarditis risk, 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.

Reduced +Gz tolerance and +Gz induced dysrhythmias are a consideration and centrifuge assessment was previously required for return to high performance aircraft. In the ACS database, 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 several cohorts of apparently healthy centrifuge subjects or trainees. A slight reduction in +Gz tolerance has previously been reported for MVP but

was operationally nonsignificant. Monitored centrifuge assessment is thus no longer required for MVP.

III. Information Required for Waiver Submission.

Submit the following to the ACS:

A. Aeromedical summary.

B. Copy of the local echo report and a videotape or CD copy of the echo (required for ACS confirmation of the diagnosis and grading of any associated MR).

C. Additional local cardiac testing is not routinely required but may be requested in individual cases.

D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. electrocardiogram, treadmill, Holter monitor).

IV. Waiver Considerations.

MVP is disqualifying for all classes of flying duties. 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. In summary:

Table 1. Summary of Associated Clinical Conditions and ACS Requirements

MVP and/or Associated Levels of Mitral Regurgitation (MR) Documented by Echocardiogram	**Flying Class**	**Waiver Potential** **Waiver Authority**	**Required ACS Review and/or ACS Evaluation**
MVP and ≤ mild MR	FC I and IA	Yes AETC	ACS evaluation
MVP and ≤ moderate MR	FC II and FC III	Yes MAJCOM	FC II: ACS evaluation FC III: ACS review if ≤ mild MR otherwise ACS evaluation
MVP and severe MR	All Flying Classes	No	N/A
MVP: clinical only without a positive echo	FC II and FC III	Yes MAJCOM	After 3 serial evaluations without a positive echo: indefinite waiver is recommended

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.

V. References.

1. Kruyer WB. Cardiology. In: Rayman RB, ed. *Clinical Aviation Medicine*, 3rd ed. New York: Graduate Medical Publishing, LLC, 2000; 189-192 and 200-201.

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; 352-354.

3. 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.

4. 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.

5. Whinnery JE. Acceleration Tolerance of Asymptomatic Aircrew with Mitral Valve Prolapse. Aviat Space Environ Med. 1986; 57: 986-92.

6. 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.

7. Whinnery JE. Acceleration-Induced Ventricular Tachycardia in Asymptomatic Men: Relation to Mitral Valve Prolapse. Aviat Space Environ Med. 1983; 54(1): 58-64.

8. Whinnery JE. Dysrhythmia comparison in apparently healthy males during and after treadmill and acceleration stress testing. Am Heart J. 1983; 105: 732-737.

9. McKenzie I, Gillingham KK. Incidence of Cardiac Dysrhythmias Occurring During Centrifuge Training. Aviat Space Environ Med. 1993; 64: 687-91.

WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Mood Disorders (Mania and Depression)

I. Overview.

These disorders are characterized by a disturbance in mood as the predominant psychological feature. The mood disorders are divided into four major categories: bipolar disorders, depressive disorders, mood disorder due to a general medical condition and substance-induced mood disorder. The bipolar disorders (bipolar I disorder, bipolar II disorder, cyclothymic disorder, bipolar disorder not otherwise specified) are distinguished from the depressive disorders by a history of a manic, hypomanic, or mixed episode, none of which occurs in the depressive disorders. Major depressive episodes, however, are seen in bipolar disorders. Fifty to sixty percent of patients in the general population with a major depressive disorder (single episode) will have a recurrence (second episode) in their lifetime. Acute major depression is treatable in 80% of patients. Twenty to thirty percent of dysthymic patients develop subsequent depression or mania. The risk of concurrent substance abuse is high.

II. Aeromedical Concerns.

Mood disorders can be associated with a variety of emotional and behavioral anomalies including depressed mood, impaired judgment, inflated self-esteem or grandiosity, disorders of 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 untoward consequences (spending sprees, promiscuity, etc.). These emotional and behavioral anomalies are incompatible with aviation safety and flying duties.

III. Information Required for Waiver Submission.

Any aviator with bipolar disorder is permanently disqualified due to the risk of recurrence, and the presenting symptoms of loss of insight, tenuous reality-testing, and the unlikelihood of self-referral; in such cases a medical evaluation board (MEB) should be held to determine fitness for general duty and retention. If the diagnostic criteria for major depressive disorder, dysthymic disorder or depressive disorder not otherwise specified are met, the aviator is disqualified. If the aviator completes treatment successfully and remains asymptomatic off medications for six months, a waiver may be requested. Recurrent episodes of the depressive disorders are generally not waiverable because of the likely emerging repetitive pattern.

The waiver package should include: copies of psychiatric evaluation and treatment summary, MEB reports if applicable, an aeromedical summary outlining any social, occupational, administrative or legal problems associated with the case, and letters from the aviator's supervisor and treating psychiatrist or psychologist supporting a return to flying status.

IV. Waiver Considerations.

The ACS has accumulated considerable experience in the evaluation and recommendations for mood disorders in pilots and navigators. Based on a 15 year (1981-1996) review of the USAF Waiver file and ACS Cover Sheet File 77 FC II aviators were diagnosed with depressive disorders; 50 (65%) were waived to return to fly. One bipolar case was found and did not receive a waiver.

V. References.

1. American Psychiatric Association. 296.xx Major Depressive Disorder, 300.4 Dysthymic Disorder, 311 Depressive Disorder NOS, 296.xx Bipolar disorder, 301.13 Cyclothymic Disorder, 296.80 Bipolar Disorder NOS, 293.83 Mood Disorder Due to…*[Indicate the General Medical Condition]*, 29x.xx Substance-Induced Mood Disorder, 296.90 Mood Disorder NOS. *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition. Washington, DC, 1994.

WAIVER GUIDE
Updated: Feb 04
By: Maj Files and Maj Borchardt

CONDITION:
Multiple Sclerosis

I. Overview.

Multiple sclerosis is a chronic demyelinating disease of the central nervous system. The cause remains unknown but probably involves a combination of genetic and environmental factors. It is a disorder of young adults in temperate climates. The average age of onset is between 20 and 40 years of age, with a 2:3 male to female ratio. The diagnosis of multiple sclerosis depends on dissemination of CNS lesions in time and space. Accepted modalities for determining the diagnosis include clinical signs, MRI findings, evoked potentials (positive in 50-90% of cases), and CSF studies (positive in 60-90% of cases). Upon presentation with only one symptom (e.g. optic neuritis), the diagnosis of multiple sclerosis cannot be made if the patient lacks dissemination of lesions in time and space. However, the risk of recurrence can be determined by results of studies such as serum anti-myelin antibodies, which are slowly becoming available for clinical use. In cases presenting with a single symptom, a diagnosis of monophasic syndrome is often made and a neurologist determines whether or not immunomodulating treatment is indicated.

II. Aeromedical Concerns.

The unpredictable nature and potentially rapid onset of CNS symptoms is generally considered incompatible with a safe flying environment. Multiple sclerosis may present with visual disturbances, bladder dysfunction, ataxia, vertigo, weakness, spasticity, paresthesias, or fatigue. Symptoms can present over a period as short as a few hours. Full neuropsychological testing may be needed to confirm normal higher cerebral function in aircrew. One study has demonstrated mild cognitive deficits (e.g. verbal impairment and decreased attention span) in 53% of patients with a diagnosis of possible MS. The treatment of monophasic syndrome now often involves immunomodulating agents. Beta-interferon is incompatible with flight due to a 50-75% chance of flu-like symptoms and a 2-4% chance of psychosis. Glatiramer is also used for immunomodulation and is nearly as efficacious as interferon and may prove to be compatible for flying with monophasic syndrome. However, this is still in the consideration phase.

III. Information Required for Waiver Submission.

A. Neurology consultation
B. Ophthalmology consultation
C. Evoked potentials
D. CSF IgG synthesis index
E. Oligoclonal bands
F. MRI scan of the head
G. Serum anti-myelin antibodies (anti-MOG and anti-MBP) may be ordered by the consulting ACS neurologist in cases of monophasic syndrome.

**A favorable medical evaluation board (MEB) disposition returning an aviator to military duty must be accomplished prior to waiver consideration.

IV. Waiver Considerations.

Multiple sclerosis is disqualifying from military flying. No Air Force waivers have been granted. Nonetheless, aviators with a single, monophasic episode of neurologic dysfunction (e.g. optic neuritis) with a full and complete recovery who remain asymptomatic for a period of 1 year and in which extensive studies fail to reveal other evidence of demyelination may be considered for a waiver after an ACS evaluation.

V. References.

1. Achiron A, Barak Y. Cognitive impairment in probable multiple sclerosis. Journal of Neurology, Neurosurgery and Psychiatry. 2003. 74: 443-446.

2. Antel JP, Bar-Or A. Do myelin-directed antibodies predict MS? NEJM. 10 Jan 2003. 349; 2: 107-109.

3. Berger T, et al. Anti-myelin antibodies as a predictor of clinically definite multiple sclerosis after a first demyelinating event. NEJM. 10 Jul 2003. 349; 2: 139-145.

4. Brex PA, et al. A longitudinal study of abnormalities on MRI and disability from multiple sclerosis. NEJM. 17 Jan 2002. 346;3: 158-164.

5. McDonald WI ,et al. Recommended diagnostic criteria for multiple sclerosis: Guidelines from the international panel on the diagnosis of multiple sclerosis. Annals of Neurology. July 2001. 50;1: 121-127.

6. Noseworthy JH, et al. Multiple sclerosis. NEJM. 28 Sep 2000. 343; 13: 938-952.

7. Olek MJ. Treatment of multiple sclerosis. UpToDate. 29 Apr 2003. http://www.utdol.com/application/topoc/topictext.asp?file=demyelin/2880

WAIVER GUIDE
Updated: Mar 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Neurological Tumors

I. Overview.

Primary tumors arising from within the meninges or the parenchyma of the brain and spinal cord are common at all ages of life. Thirteen thousand new primary brain tumors were reported in 1993 in the United States along with approximately 80,000 metastatic brain neoplasms. Spinal tumors are only 25% as common as intracranial tumors. The most frequent location for all types of spinal neoplasms is in the thoracic cord. In patients with brain tumors, headache is the initial symptom in 50% of patients and seizure is the initial symptom in 20% of patients.

II. Aeromedical Concerns.

Aeromedical concerns include: 1) seizures, 2) neurological impairment, 3) neuropsychological impairment, and 4) risk of sudden neurological dysfunction (particularly in tumors of the spinal cord).

III. Information Required for Waiver Submission.

Medical evaluation board (MEB) and tumor board recommendations, AFIP confirmation of the histology and recent neurology consultation with supporting laboratory findings are required.

IV. Waiver Consideration.

Aircrew with tumors of the spinal cord may be granted a waiver provided there is no recurrence and neurological sequelae are acceptable 5 years after therapy. Waiver may be granted for tumors of the peripheral nervous system if there is no appreciable impairment of function. All tumors involving the brain or meninges are disqualifying. The ACS has evaluated three individuals with tumors of the peripheral nervous system. Two evaluees were diagnosed with Schwannomas of the lumbar cord nerve roots and were granted waivers. The third evaluee was diagnosed with a neurilemmoma of the left C6 cranial nerve root with a residual Horner's syndrome status post excision and was granted a waiver. The ACS has evaluated four individuals with tumors of the central nervous system other than acoustic neuromas. There were no waivers granted.

V. References.

1. Braunwld E., et al. *Harrison's Principals of Internal Medicine*, 12th Ed. New York: McGraw-Hill Book Company, 1991.

2. Engleberg AL, Doege TC (eds). Review of Part 67 of the Federal Air Regulations and the medical certification of civilian Airmen. American Medical Association. Chicago, IL. 1986, IV 67.

WAIVER GUIDE
Updated: Mar 99
By: Lt Col Wyman

CONDITION:
Non-Hodgkin's Lymphoma (NHL)

I. Overview.

Non-Hodgkin's lymphomas (NHL) are a heterogeneous group of malignancies of B or T cell that usually originate in lymph nodes but may originate in any organ of the body.

In 1993, new cases of NHL in the US were estimated to be 43,000, an incidence of 17.4 per 100,000 population. This represents 4% of cancer incidence. While there is a preadolescent peak in incidence, there is generally a logarithmic increase with age. Several exposure agents (phenytoin, benzene and herbicides) as well as viral agents (Epstein-Barr virus and HTLV-I) have been documented to increase NHL incidence.

Because there is such histologic diversity among NHL, multiple classification schemes have been advanced. Recently, the Working Formulation was developed to provide a morphologic classification scheme with prognostic relevance. In this system, NHLs are divided into low-, intermediate-, and high-grade status.

The extent of NHL is staged using the four-stage Ann Arbor classification. Stage I is involvement of a single lymph node region or extralymphatic site. Stage II is involvement of two or more lymph node regions or extralymphatic sites on the same side of the diaphragm. Stage III is involvement of lymph node regions on both sides of the diaphragm with or without splenic involvement. Stage IV is diffuse or disseminated involvement of one or more extralymphatic organs or tissues. 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 to be denoted in all cases by the suffix letters A or B, respectively. However, since lymphomas spread hematogenously rather than by contiguity from lymph node areas, such as occurs in HD, most lymphomas present in advanced stages (III or IV).

Many adverse prognostic factors have been documented. These include intermediate- or high-grade histologic subtype, advanced stage of disease (III or IV), extranodal disease (particularly CNS involvement), systemic B symptoms, tumor mass $\geq$ 10 cm, elevated LDH, T-cell phenotype, nonrandom chromosomal abnormalities, and a high proliferative index (Ki-67 antigen).

Because of the wide variety of histologic subtypes of T and B cells, a number of cytotoxic agents have been used in the treatment of NHL in addition to radiotherapy and immunotherapy. Predominantly combination regimes such as CHOP, CVP, and COP-BLAM have produced cure rates (5 year survival rates) ranging from 20% to 85%. These cure rates are highly variable and dependent on the previously mentioned prognostic factors (particularly grade and stage at time of treatment). Relapse rates up to 50% are common. Recently bone marrow transplantation has been used in refractory cases with limited success.

II. Aeromedical Concerns.

As with most malignancies, aeromedical health concerns are raised based on the disease and the treatment. If there is involvement of the CNS, then a risk for sudden incapacitation by seizure is present. However, the greatest concern arises from the potentially rapid (weeks to months) degradation in mental and physical status when the lymphoma and/or the treatment protocol is aggressive. Extranodal involvement of the lungs, liver, spleen, marrow, and heart are frequently seen with progression of disease. Additionally, damage to the cardiopulmonary, neurologic, and reticuloendothelial systems may occur as a result of chemotherapy and radiotherapy.

III. Information Required for Waiver Submission.

Initially, after the diagnosis of NHL is made, histology must be confirmed by AFIP and the case must be reviewed by a tumor board and medical evaluation board (MEB) for appropriate disposition. Because of low cure rates and high relapse rates, unrestricted waiver can only be considered in an aviator whose NHL is in remission for 5 years and in whom no adverse effects from treatment are evident. Initial presentation, as a minimum, should include CBC, CXR, ECG, PFT, and hematology/oncology consultation. Additional testing should be based on radio-/chemotherapeutic courses given.

IV. Waiver Considerations

The USAF aircrew waiver file lists four members with NHL in remission and all received waivers (3 of the 4 received FC II waiver). Although these numbers are small, the possibility of returning to flying status after effective treatment of NHL is good.

V. References.

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2. Greer JP, Malon WR, List AF, McCurley TL. Non-Hodgkin's lymphomas. Lee GR, Bithell, TC, Foerster J, Athens JW, Lukens JN (eds). *Wintrobe's Clinical Hematology*. 1993; 9: 2054-2081.

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4. Horning AJ. Hodgkin disease. Beutler E, Lichtman MA, Coller BS, Kipps TJ (eds). *Williams Hematology*. 1995; 5: 1057-1075.

WAIVER GUIDE
Updated: Jun 99
By: Lt Col Funke

CONDITION:
Ocular Histoplasmosis (Presumed Ocular Histoplamosis Syndrome)

I. Overview.

Ocular histoplasmosis syndrome refers to a choroidopathy believed to be induced by the fungus Histoplasma capsulatum. Three types of ocular involvement have been described: histoplasmic endophthalmitis, solitary chorioretinal granulomas, and presumed ocular histoplasmosis syndrome.

In the United States, presumed ocular histoplasmosis syndrome (POHS) is an important cause of loss of central acuity. An epidemiologic relationship exists between clinical disease and sensitivity patterns of the histoplasmin antigen skin test. The highest prevalence of the disease is found along the Ohio and Mississippi River valleys, but small endemic foci are also found in South America, Africa and Asia.

The diagnosis of POHS is made by clinical examination. Typical lesions appear as small atrophic, "punched-out" chorioretinal scars in the mid-periphery and posterior pole, with or without macular neovascularization. Vision loss is due to the sequelae of subretinal neovascular membrane formation in the macula. It is the macular lesions which generally bring patients to an ophthalmologist with the complaint of metamorphopsia. Over 99% of histoplasmic infections are benign, and up to 2% of adults in the Midwest have histoplasmosis spots disseminated in the fundus. These spots are more frequent in left than right eyes, but they are bilateral in 67% of patients. Up to 60% of patients with macular involvement become legally blind. Eyes with POHS and neovascular membranes beyond 200 microns of the fovea have approximately 34% risk of symptomatic vision loss within two years. This risk is significantly reduced by laser photocoagulation of the lesions. Macular histoplasmosis involvement should be followed daily by the individual aircrew member using an Amsler grid. Peripheral manifestations of POHS are usually asymptomatic and clinically irrelevant.

II. Aeromedical Concerns.

Optimal visual acuity is a requirement for piloting aircraft in both military and civilian settings. The maculopathy that occurs in ocular histoplasmosis syndrome can lead to significantly decreased central acuity and even legal blindness. Other aeromedical visual effects from histoplasmosis include central visual field loss, loss of stereopsis, color vision deficits, and contrast sensitivity degradation. Theoretically, the Valsalva maneuver can cause increased leakage or hemorrhage into the subretinal macular lesions; however this has not been proven.

III. Information Required for Waiver Submission.

Ophthalmology consultation at the Aeromedical Consultation Service (ACS) is required for all waiver requests. A thorough ocular history should be obtained. Examination should include dilated fundus examination, color vision testing, Amsler grid testing, visual fields, and fluorescein angiography. Early consultation with ACS is recommended prior to any laser procedures.

IV. Waiver Considerations.

Waiver consideration is possible depending on to what level visual acuity, central visual field, stereopsis, and color vision are minimally affected. A review of the USAF waiver repository indicates 19 flying class (FC) II and 5 FC III individuals enrolled for ocular histoplasmosis. Of these, 17 individuals (89%) were granted waivers for FC II and five individuals (100%) were granted waivers for FC III.

V. References.

1. Duane TD, Jaeger EA. *Clinical Ophthalmology*. Philadelphia: Harper and Row, 1993; 4(48): 1-8.

WAIVER GUIDE
Updated: Aug 06
By: Lt Col Jeffery Lawson and Lt Col John Gooch

CONDITION:
Ocular Hypertension, Glaucoma and Enlarged Optic Nerve Cupping

I. Overview.

Aeromedically, ocular hypertension (OHT) is defined as: (1) intraocular pressure (IOP) by applanation greater than 22 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, color vision defects and relative afferent pupillary defect. 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. Historically, the term glaucoma has been used in aircrew with pressures of 30 mmHg or greater even in the absence of objective 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 currently exists.

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.

In the general population, 1 of every 10 individuals will develop glaucomatous damage within 5 years of diagnosis of OHT. 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. Information Required for Waiver Submission.

For <u>initial waiver</u> request for OHT and glaucoma, the following information is required:

1. 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.

2. 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.

IV. Waiver Considerations.

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.

OHT is a disqualifying condition for FC I, IA, II or III. OHT is not waiverable for FC I, IA, initial II, and initial III. OHT waiver criteria for trained aircrew include: acceptable visual performance on ophthalmologic examination, stabilized intraocular pressures and no evidence of optic nerve damage (as defined above).

Glaucoma is disqualifying for all flying classes. Glaucoma is not waiverable for FC I, IA, initial II, and initial III. 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. 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.

V. USAF Experience.

The Ophthalmology Branch at the ACS has followed over 550 aviators with the diagnosis of either OHT or glaucoma. Aeromedical experience reveals that approximately 90% of trained aviators are granted initial waiver for these conditions.

VI. References

1. Freidman DS, et al. Assessment of risk factors for the progression of ocular hypertension and glaucoma. American Journal of Ophthalmology (supplement). Sept 2004; Vol 138: S19-S31.

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WAIVER GUIDE
Updated: Jun 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Primary Idiopathic Optic Neuritis (PION)

I. Overview.

Primary idiopathic optic neuritis (PION) is an acute loss of vision in one or both eyes due to inflammation or demyelination of the optic nerve. Symptoms usually progress for 1-7 days, reach a nadir, and then resolve to varying degrees. Continued worsening of symptoms beyond 7 days is a strong clinical indication that another etiology is involved. Symptoms may include painful eye movements, headaches and visual changes that affect central and peripheral visual function, to include color perception. The degree of the acute visual acuity loss does not correlate with the final visual acuity after recovery. The vast majority of patients affected are between the ages of 15 and 40. Clinically, if optic neuritis develops outside these ages, other etiologies other than idiopathic must be considered. The average age in the Aeromedical Consultation Service (ACS) Study Group was approximately 30. In the ACS PION study group, over 90% of patients had the condition in only one eye. Approximately 17% of the patients had a recurrence. Greater than 90% eventually recovered to a visual acuity of 20/40, with 87% achieving 20/20. However, over 30% of patients eventually progressed to multiple sclerosis (MS). While this percentage is much less than some reports, it is worth noting that the females are 3 times as likely as males to develop MS following an episode of primary optic neuritis.

II. Aeromedical Concerns.

Optic neuritis causes a decrease in visual acuity, which may progress rapidly over 1-7 days causing a detriment to flight safety. Residual visual performance deficits after the PION may also be aeromedically relevant. Patients with symptoms lasting longer than 7 days should be evaluated for other diseases. PION symptoms may be worsened on exercise or exposure to high temperatures (Uhthoff's phenomenon). There is a strong association between PION and MS, particularly in females.

III. Information Required for Waiver Submission.

Waiver may be considered provided MS has been excluded and the patient is clinically stable with normal visual acuity, stereopsis and color vision. Full ophthalmological examination and neurology consult are required. ACS evaluation is mandatory. The February 1998 journal of *Aviation, Space, and Environmental Medicine* contains the ACS developed decision grid for determination of flying status.

IV. Waiver Considerations.

The ACS maintains an actual aircrew Management Group on PION. Forty-two members are currently listed in the ACS database with diagnoses of optic neuritis, retrobulbar neuritis or neuroretinitis. Eleven have received permanent disqualification. Fifty eight percent of patients initially received a waiver, with 51% receiving unrestricted flying waivers. Thirty-nine percent of

the cases studied progressed to multiple sclerosis (MS), with half of these presenting within three years of the diagnosis.

V. References.

1. Ivan D, Tredici T, Burroughs J, Pasquale A, Hickman J, Cuervo H, Gooch J. Primary Idiopathic Optic Neuritis in U.S. Air Force Aviators. Aviation, Space, and Environmental Medicine. Feb 1998; 69: 154.

2. Lessell S. Optic Neuritis. Ophthalmology Annual. 1987: 69.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Hasselquist

CONDITION:
Oral Cancers

I. Overview.

Oral cancers make up a large spectrum of disease but the most common cancer by far in this area is squamous cell carcinoma. In the United States, 5% of the cancers in men and 2% of the cancers in women are oral cancers, and they account for approximately 30,000 new cases of cancer per year. The male:female ratio for all oral cancers is 2:1. A clear dose-response relationship exists with tobacco exposure and alcohol has been identified as a coagent. Additional risk factors include; vitamin A deficiency, chronic oral irritants such as poor dental hygiene, and syphilis. Approximately one third of patients with oral squamous cell cancer are at a high risk for developing another primary lesion in the oral cavity, throat, or lungs.

Carcinoma of the lip is the most frequent oral cancer followed by the tongue and then the floor of the mouth. Lip carcinoma usually occurs on the lower lip, 95% occur in males, and the principle etiologic factors include sun exposure followed by tobacco use. The incidence of tongue cancer is three times higher in males. Although the median age is 60, there has been a recent increased incidence in young adult men. Cancers of the floor of the mouth make up 10-15% of oral cancers, occur three times more frequently in men, and squamous cell carcinoma is the most common type of lesion.

Treatment usually consists of radiation and/or surgery and the choice should depend on the anticipated functional result, the patient's performance status, and the need for treatment of disease in the neck. Radiation therapy and surgery are associated with survival rates for early disease of 80-90% and 50-80% respectively. Five year survival rates for advanced disease are between 30-40%. Recurrence is primarily local but up to 15% will metastasize while the local lesion is controlled. Up to 86% of those who have recurrence will have it in the first 12 months from diagnosis. Thirty-five percent of patients with tongue cancer present with positive nodes and patients with ipsilateral lymph node involvement have a 30% risk of metastases to the nodes on the opposite side of the neck.

II. Aeromedical Concerns.

Primary aeromedical concerns include difficulty with speech and with the wearing of oxygen equipment. Treatment of early lesions with surgery or radiation usually preserves full voice and cause minimal deformity of the oral anatomy. Side effects from radiation therapy must be examined closely such as xerostomia, difficulty swallowing and radiation-induced hypothyroidism. Recurrence is the highest over the first year and frequent exams must be accomplished. Avoiding tobacco products and alcohol must be highly encouraged to help prevent future disease.

III. Information Required for Waiver Submission.

Before waiver can be considered for a history of oral cancer, the full extent of the disease must be known and the probability for recurrence quantified. Medical evaluation board (MEB), tumor board recommendations and AFIP confirmation of histology are essential. The individual should be disease free and fully recovered from all treatments. Speech must be clear, there must be no difficulty wearing an oxygen mask, and if residual effects from treatment exist, their impact on the flying environment must be assessed.

IV. Waiver Considerations.

The USAF experience with oral cancers has shown that the most common waiverable cancer to be squamous cell carcinoma of the lip with complete excision (18 cases). Two out of four cases of tongue cancer were waived as was a case of epidermoid carcinoma of the hard palate. Waivers were all FC II.

Individuals who are disease-free and fully recovered will be considered on a case by case basis.

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WAIVER GUIDE
Updated: Feb 07
By: Capt Glenn Donnelly (RAM 07), Dr Jeb Pickard and Dr Karen Fox

CONDITION:
Osteoporosis/Osteopenia

I. Overview.

Osteoporosis is the most prevalent disease of bone, affecting an estimated 10 million Americans.[12, 20] 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."[8] Osteoporosis is caused by a combination of increased bone resorption and inadequate bone formation which result in deterioration of trabeculae.[19] Although it may be of clinical significance in men,[6] osteoporosis is four times as common in women[12] and is especially active in the first ten post-menopausal years.

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. 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.[9] 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. Risk factors for osteoporosis[22]
Personal history of adulthood fracture
First-degree relative with history of adulthood fragility fracture
Current cigarette smoking
Low body weight (less than 58 kg [127 lb])
Corticosteroid therapy greater than 3 months.
Female sex
Estrogen deficiency (menopause [especially before age 45 years], bilateral oophorectomy, prolonged premenopausal amenorrhea [greater than one year])
Caucasian or Asian race
Age
Lifelong low calcium intake
Alcoholism
Inadequate physical activity

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.

To identify osteoporosis before fractures occur, screening for this disease is important. Current guidelines from the National Osteoporosis Foundation,[17] the American Association of Clinical Endocrinologists,[1] the National Institutes of Health,[15] the U.S. Preventive Services Task Force[13] 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. Recently revised guidelines also recommend that postmenopausal women with risk factors for fracture be considered candidates for screening. To clarify the important risk factors in postmenopausal women, the Osteoporosis Risk Assessment Instrument (ORAI)[3] (based on age, weight and estrogen use) and the Simple Calculate Osteoporosis Risk Estimation (SCORE)[11] (based on race, fracture history, rheumatoid arthritis comorbidity, age, weight and estrogen use) surveys have been developed and validated for yielding good indications for screening bone density measurement.[2, 7]

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. 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.[10] 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.

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.[4, 16, 24] The utility of a workup depends on the clinical scenario. For instance, it makes little sense to pursue an exhaustive evaluation to identify a secondary cause of early-stage osteopenia in a 45-year-old perimenopausal female who was screened because of a positive family history; after all, it was the patient's underlying risk that prompted the screening in the first place. On the other hand, a fragility fracture which leads to the identification of osteoporosis in a male or premenopausal female should be thoroughly evaluated. 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 (specifically urinary N-telopeptide crosslinks) should be evaluated.

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]

As noted earlier, osteopenia and osteoporosis are best viewed as a continuum. Rather than distinguishing between the two entities, prophylaxis recommendations are based on a T-score of -2.0 or worse, though a score of -1.5 may be used as a treatment threshold if multiple risk factors are present. 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.

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.[14] 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. 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.

Monitoring the efficacy of osteoporosis treatment is medically and aeromedically important, though there is some disagreement on how to monitor appropriately.[23] The commonly accepted method to monitor sufficiency of treatment is to repeat bone densitometry at two year intervals. 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.

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.

III. Information Required for Waiver Submission.

The required work-up and documentation for waiver consideration is delineated in Table 2. Deviations from this list should be explained and coordinated through the waiver authority.

The aeromedical summary (AMS) should give special attention to the issues raised in the "Aeromedical Concerns" and "Waiver Considerations" section of this waiver guide.

Table 2. Documentation Requirement for Waiver Package		
	Initial	Renewal
Bone density measurement (total hip and lumbar spine)	X	X
Chemistry profile (electrolytes, blood urea nitrogen, creatinine, calcium, phosphorus, total protein, albumin, liver transaminases, alkaline phosphatase)	X	X
Complete blood count, vitamin D level	X	---
Clinically indicated additional tests for secondary causes (when applicable)	X	---

IV. Waiver Considerations.

Waiver will not be considered for FC I or IA, with the exception noted in Table 3, below. For FC I 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 3. Waiver Potential			
	Osteopenia/ Osteoporosis	**Waiver Authority**	**Special Circumstances/Tests**
FC I/IA	No	AETC	FC I/IA waiver may be considered if the osteoporosis 1) can be shown to have been secondary to another disease which has also been effectively treated and approved for waiver and 2) has sufficiently resolved.
FC II	Yes	MAJCOM	If fragility fracture* has occurred then case should be referred to AFMOA, for possible categorical IIC waiver (non-high performance, no ejection seat)
FC III	Yes	MAJCOM	Waiver maybe denied for initial training, or if fragility fracture has occurred, depends on career field (e.g., parachute duty)

* Fragility fracture is a fracture that occurs in a person with osteopenia/osteoporosis in a setting of insufficient trauma. Although fragility fractures are usually readily identifiable, symptomatic fracture occurring as a result of minimal trauma, an asymptomatic vertebral compression fracture may occasionally be identified on a radiograph and cause diagnostic confusion. While old films can be helpful, there is no

simple method to determine whether such a fracture is related to osteoporosis. This requires individual determination, depending in part on the degree of bone loss identified in the individual; however, in general, a single vertebral wedge fracture noted incidentally on X-ray is unlikely to represent a fragility fracture.

For aviators requiring alendronate therapy, response to therapy and waiver status should be reassessed every two years. For those with osteopenia not requiring therapy (e.g., T-score <2.0), BMD should be initially reassessed at two years; if stable, recommend waiver duration of three to five years.

A review of AIMWTS through December 2006 showed 19 cases of osteoporosis/osteopenia, ten FC II and nine FC III. Of the 19 cases, 47 percent (9/19) were disqualified (4 FC II and 5 FC III). Of the nine disqualified cases, five were disqualified due to using non approved medications (three of which would now be approved with the recent addition of alendronate to the approved medication list), two were disqualified because of fracture (one still symptomatic), and two for other medical conditions.

Waiver guide reviewed by USAF/SG Consultant for Endocrinology, Lt Col Tom Sauerwein.

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WAIVER GUIDE
Updated: Feb 00
By: Major Gee

CONDITION:
Otosclerosis/Stapedectomy/Stapedotomy

I. Overview.

Otosclerosis ("hardening of the ear") is a bony disorder of the otic capsule that may lead to conductive and in rare cases sensorineural hearing loss due to abnormal bone deposition. It exists in 8-10% of the caucasian population, is rarer among Asian and African populations, and accounts for approximately 1% of conductive hearing loss in the caucasian population. The disease shows a familial tendency with about 60% of patients with clinical otosclerosis having a positive family history. Sites of predilection for otosclerotic involvement are: 1) just anterior to the oval window, and 2) the border of the round window of the otic capsule. The incidence of bilateral involvement is about 75-85%. The most classical clinical manifestation of this disease is conductive hearing loss secondary to stapedial fixation due to otosclerotic changes in the area of the oval window. Mainstay of treatment has traditionally been stapedectomy surgery (removal of the entire footplate) , however the newer stapedotomy (small fenestration of the footplate) technique is currently favored. Tinnitus has been reported present in 79 % of otosclerosis patients and vestibular involvement has a reported prevalence of 7-30%. According to Air Force Instruction 48-123, the following conditions are medically disqualifying for flying duty and require a waiver: H-3 hearing profile (A7.4.2); vertigo (A7.3.1.7); abnormal labyrinthine function (A7.3.1.6); history of middle ear surgery (A7.3.1.1); any conditions that interfere with the auditory or vestibular functions (A7.3.1.8).

II. Aeromedical Concerns.

Most aircrew notice better hearing within the cockpit with otosclerosis due to a phenomenon called paracusis of Willis. This phenomenon actually filters out background noise to allow improved hearing. However, the disease may progress to the point of hearing loss or vestibular symptoms significant enough to compromise flight safety. Aircrew may be offered surgical repair of the condition. Fortunately complications following surgery are rare. However, surgical treatment of this disease may result in the following complications: 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. 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, 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.

III. Information Required for Waiver Submission--if post-stapedectomy/stapedotomy

A. A complete aeromedical summary
B. A copy of consultation from the ENT physician who performed the surgery annotating that there are no significant post-operative complications
C. A copy of local post-operative audiology consultation (including electronystagmogram[ENG] ***if vertigo was present preoperatively***)
D. A copy of all pre and post operative consultations and testing that were part of the work-up for this problem

VI. Waiver Considerations.

If the otosclerosis results in hearing loss and/or vertigo, then Air Force guidelines for those diagnoses should be followed. If the aviator undergoes successful surgical treatment, an evaluation at the USAF Aeromedical Consultation Service (ACS) is required for single seat high performance aircrew only, 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.

<u>USAF Experience</u>: There have been a total of 29 aviators evaluated for otosclerosis with or without stapedectomy/stapedotomy. Twelve aviators were evaluated for otosclerosis that did not require a surgical procedure, with 10 aviators receiving an unrestricted waiver and 2 aviators disqualified for other non-related diagnoses. Twelve aviators were evaluated for otosclerosis with unilateral stapedectomy/stapedotomy, with 10 aviators receiving an unrestricted waiver, 1 aviator disqualified for other non-related diagnoses, and 1 aviator disqualified because he declined an altitude chamber evaluation that was part of the stapedectomy evaluation. Five aviators were evaluated for otosclerosis with bilateral stapedectomy/stapedotomy, with 4 aviators receiving an unrestricted waiver and 1 aviator receiving a FCIIA waiver. The categorical waiver was recommended due to the stapedectomy not including a vein or tissue graft over the oval window prior to the placement of the prosthesis.

<u>Evaluation/Reevaluation at the USAF Aeromedical Consultation Service (ACS), Brooks City-Base</u>: Reevaluation at the ACS is necessary only if there are new findings or if circumstances at the time of initial evaluation require it.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Fisher

CONDITION:
Ovarian Cancer

I. Overview.

The US annual incidence of new cases of ovarian cancer exceeds 24,000, and the annual death rate exceeds 13,000. The overall incidence increases with age and is inversely related to parity. It is more common in women with a history of early menopause, a family history of ovarian cancer, or the presence of lung, colon or prostate cancer in a first degree relative. Overall, the lifetime risk of ovarian cancer is about 1%.

Most ovarian cancers are of epithelial origin and include serous, mucinous, endometrioid, clear cell and undifferentiated cell types. The remaining 10% are of germ cell derivation and include dysgerminomas, endodermal sinus tumors teratomas, mixed germ cell tumors and embryonal cell cancers. The histologic subtype of each category is prognostically insignificant. However, the histologic grade and stage are quite important and must be carefully ascertained. Tumors are generally divided into well-differentiated (grade 1), moderately well-differentiated (grade II) and poorly differentiated (grade III). Prognosis is worse for grade II and III tumors.

Staging is performed surgically and is critical to prognosis as most ovarian cancers are advanced at the time of diagnosis. Stage I is disease limited to the ovaries, stage II disease limited to the true pelvis, stage III limited to the abdominal cavity and stage IV refers to that which has extra-abdominal metastasis. Only about 10% of victims will have stage I disease at diagnosis and another 5-10% stage II. Proper staging of ovarian cancer is critical and requires extensive exploration of the abdominal cavity. The disease is often much more extensive than that suspected by limited or less-extensive surgical and non-invasive techniques.

The overall prognosis for stage I epithelial malignancies is favorable with a greater than 95% 5 year survival, and a less than 10% risk of recurrence among those with grade I or II disease. Adjuvant chemotherapy is not indicated for most cases of stage I or II disease and surgery may be curative. Germ Cell tumors, however, generally carry a poor prognosis and require radiation or chemotherapy to induce remission.

II. Aeromedical Considerations.

The vast majority of ovarian tumors are benign and do not require waiver after excision unless associated with persistent ovarian cysts. However *ovarian cancer* carries a high risk of recurrence, progressive disability, requirement for continuous chemotherapy for control of the disease, and of metastasis. Disease which carries with it a significant risk of any of these is incompatible with continued aviation service and is likely to be incompatible with continued world-wide service. The flight surgeon is reminded to consider suitability for continued world-wide service for all members with ovarian cancers.

III. Information Required For Waiver Submission.

A. Medical evaluation board result
B. Tumor board recommendations
C. AFIP confirmation of histologic type and grade
D. Report of complete surgical staging
E. Gynecologic oncology consultation and reports (must include)
1. Reports of recent CT scans, IVP, and tumor markers that have been used to document progress of the disease
2. Specialist evaluation of prognosis and recommendations for further therapy

IV. Waiver Considerations.

Patients in whom surgical therapy is considered curative (stage I or II, without recurrence or need for adjuvant therapy) may be considered for waiver after two years of observation. The use of hormonal replacement therapy following oophorectomy is acceptable. All other requirements for adjuvant chemo or radiation therapy are not compatible with aviation service. CNS metastases have been reported with advanced ovarian carcinoma; such recurrence or metastasis will be grounds for permanent disqualification.

Aeromedical experience with ovarian cancer is extremely limited. Review of DTIC and NTIS databases reveal no articles or reports of ovarian cancer in the aeromedical arena. There have been no US Air Force waivers for ovarian carcinoma.

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WAIVER GUIDE
Updated: Mar 99
By: Major Herrick

CONDITION:
Overweight Aircrew Members

I. Overview.

Obesity is one of the most common conditions in the United States, affecting over 25% of the population and has been highly correlated to a number of health care problems that includes diabetes, coronary artery disease, and decreased exercise tolerance. Obesity and overweight aircrew members in the Air Force constitute not only a health status issue but a military bearing issue as well. Flight surgeons should monitor how their aviation commanders are instituting their individual unit weight control program IAW AFI 40-502, add "weight reduction, sensible exercise and sensible nutrition programs" to their crew member briefings, monitor healthy eating patterns at mess and flight line visits, and counsel individuals as required. Additionally, slight surgeons should advise the commander that crew members exceeding height and weight standards IAW AFI 40-502 should be administratively suspended from flight duties and placed on an appropriate dietary and physical fitness program to ensure not only adequate weight loss but improved physical conditioning. Flight surgeons must remember that AFI 40-502 supersedes AFI 48-123 and that this is primarily an administrative issue with health manifestations.

II. Aeromedical Concerns.

Numerous issues are relevant in considering the aeromedical implications of a history of obesity or excess weight problems. The flight surgeon must consider foremost in the assessment, the differential diagnosis of weight problems to exclude those aviators with a primary medical diagnosis (endocrine or psychiatric) from those who have poor dietary and exercise habits (i.e. caloric input exceeds metabolic requirements). Clinically the two groups have a very different health problem with significantly different prognoses and futures in aviation. Additionally, one must examine the implication of obesity on personal protective equipment fitting and human cockpit ergonomics. Finally, one must consider the overall military and professional bearing of the crew member.

III. Information Required for Waiver Submission.

Since the grounding is administrative in nature, no formal aeromedical waiver may be granted. However, the flight surgeon must work up the patient for possible primary medical causes prior to instituting a nutrition and exercise program to help the crew member to obtain his adequate and appropriate weight and body fat. The work up includes obtaining a complete dietary history which includes noting excess consumption of high calorie, high fat, high salt, and low nutritional value foods. A psychosocial history shall also be obtained to rule out stress, anxiety, marital dysfunction, adverse changes in physical activity or a personal or family history of weight control problems. Additionally, the flight surgeon should evaluate the medical records to determine previous trends in weight gain. A complete review of systems should be obtained to rule out endocrine pathology (cold intolerance, hoarseness, changes in skin color or texture, amenorrhea, hirsutism, easy bruising, muscle weakness, visual disturbances, and headaches. A complete physical examination should be

performed, especially noting the thyroid (goiter, coarse hair, dry or thickened skin), the adrenal (moon facies, truncal obesity, peripheral muscle atrophy, pigmented striae), the gonads (adnexal mass, moderate hirsutism, testicular atrophy, poorly developed secondary sexual characteristics), the central nervous system (visual field loss, poorly developed secondary sexual characteristics). Finally, laboratory data should be obtained to include a fasting and two hour post prandial serum glucose, fasting serum cholesterol, HDL and triglycerides, serum uric acid, serum thyroid stimulating hormone, and a dexamethasone suppression test if symptoms or signs suggest Cushing's Syndrome. If the history, physical and lab data are within normal parameters, this suggests that effective weight control may be obtained by adequate dietary and physical exercise programs. If an endocrine or psychiatric diagnosis is evident then proper medical consultation and referral are in order to determine if a waiver may be obtained for that condition. Of note, the vast majority of obesity and weight problems are not due to a primary medical diagnosis, but to inadequate physical activity for the amount of calories consumed. In this case, an effective treatment is to establish a supportive rapport with the crew member with frequent follow up visits to determine progress after a dietary consultation has been performed. Safe weight loss is in the range of 2-3 pounds per week on a balanced diet rich in complex carbohydrates, fresh fruits and vegetables, high in fiber and low in fat, cholesterol, simple sugars, fried foods, red meat, and alcohol of at least 1200 calories per day. Dietary modification should also be balanced with a sensible and progressive physical fitness program of aerobic and muscle strengthening exercises three to five times per week. If satisfactory weight loss is not obtained within a specified target date, then psychological counseling should be sought for behavior modification. If this fails then by regulation, the crew member may be administratively discharged from service.

IV. Waiver Considerations.

This is primarily an administrative issue and no waiver is required. The crew member will be returned to flight duties when appropriate weight is achieved. If a primary medical diagnosis is the cause of the weight problem, then refer to the specific diagnosis for waiver requirements.

V. References.

1. AFI 40-502

2. AFI 48-123

3. ARMY APL 5-88

4. Saarni H, et al. Is there a need for a change of health examinations for sea pilots? Bull-Inst-Marit-Trop-Gdynia. 1992; 43(1-4): 25-34.

5. Webb J, et al. Unpredictability of Fighter Pilot G Tolerance Using Anthropometric and Physiologic Variables. Avia Space and Environ Med. Feb 1991: 128-35.

WAIVER GUIDE
Updated: Mar 06
By: Lt Col Linn

CONDITION:
Pancreatitis

I. Overview.

Pancreatitis is an inflammation of the pancreas in which digestive enzymes are released into the pancreas instead of the small intestine. Pancreatitis can be either acute or chronic.

Acute pancreatitis has an incidence of 70-80 per 100,000 people in the United States. It is marked by constant, dull, boring abdominal pain (often worsened by lying supine), nausea and vomiting. The pain may be surprisingly mild in less severe cases. Physical exam will generally reveal an anxious patient in some distress with tachycardia, low-grade fever, and hypotension. The abdomen will often be diffusely tender and rigid with diminished bowel sounds. Lab abnormalities may include leukocytosis, elevated amylase, lipase, trypsin or elastase levels, hyperglycemia, hypocalcemia, elevated liver function tests, hypertriglyceridemia, and hypoxia. Death is due to metabolic derangement, infection, hemorrhage, or multiorgan failure. Fortunately, the disease resolves spontaneously in 85-90% of patients. Acute pancreatitis may be further complicated by pancreatic necrosis, the formation of a pancreatic pseudocyst or by chronic pancreatitis.

Acute pancreatitis can be due to a number of causes, most frequently cholelithiasis (or microlithiasis) and alcoholism. Of note, pancreatitis due to alcohol develops after about four to seven years of drinking. Pancreatitis can be caused by trauma (especially abdominal) or can present as a postoperative complication. Metabolic causes include acute fatty liver of pregnancy, hypertriglyceridemia, 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 of pancreatitis 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 known to cause pancreatitis. These include sulfonamides, oral contraceptive pills and other estrogens, tetracycline, thiazide diuretics, azathioprine, furosemide and valproic acid. Drugs that probably cause pancreatitis include 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. Anything 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 can be truly idiopathic. If pancreatitis is recurrent and no obvious cause is found, consider occult biliary disease, neoplasm, cystic fibrosis, hypertriglyceridemia, sphincter of Oddi dysfunction, pancreas divisum, or truly idiopathic pancreatitis.

Chronic pancreatitis has an incidence of about 3-10 per 100,000 population. The most common cause is alcoholism. 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. Rare causes include Shwachman's syndrome (pancreatic insufficiency and bone marrow dysfunction), alpha-1 antitrypsin deficiency, or deficiencies of trypsinogen, enterokinase, amylase, lipase, or the proteases. Chronic pancreatitis is complicated by chronic pain (often requiring narcotics), malabsorption with malnutrition, steatorrhea, diabetes mellitus and pancreatic cancer.

Treatment of acute pancreatitis is generally supportive. Chronic pancreatitis requires pain management and management of its complications. Occasionally chronic pancreatitis can be relieved by surgery to open the sphincter of Oddi or by removing part of the pancreas.

II. Aeromedical Concerns.

Acute pancreatitis can be sudden and devastating in its onset and as such, poses a danger to flight and to mission completion. The complications of chronic pancreatitis and the drugs required to treat those complications likewise endanger flying safety and mission completion. Furthermore, the underlying cause of the pancreatitis (ex: alcoholism) 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. (Please refer to the appropriate attachments to AFI 48-123). For example, alcoholism complicated by pancreatitis is generally not waiverable; cholelithiasis corrected by surgery is. If the cause was a medication, the aviator must have been switched to a drug that is waiverable. If the underlying cause requires a Medical Evaluation Board, that should be accomplished prior to requesting a waiver. Waivers for pancreatitis caused by cholelithiasis will not be considered unless the gallbladder has been removed. Waivers for hereditary or idiopathic 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. Information Required for Waiver Submission.

Acute pancreatitis (All flying classes):
The aeromedical summary should include:
1. A discussion of the underlying cause and how it was corrected.
2. A statement that the aviator is completely recovered from his illness, that he has not suffered any complications, and that he is tolerating a normal diet, having normal bowel movements and is capable of normal activities.
3. An evaluation by a gastroenterologist that specifically addresses the likelihood of recurrence.
4. All operative reports, consultation reports and the hospital discharge summary. Imaging studies should include a post-recovery abdominal CT scan that demonstrates a healthy pancreas without pseudocyst or calcifications and an ultrasound or other study that demonstrates the absence of gallstones or sludge. Lab studies should include a CBC and complete blood chemistries to include glucose, calcium, amylase, lipase, trypsin (if available) and liver function tests.

Chronic pancreatitis:
Active chronic pancreatitis is not waiverable. If the chronic pancreatitis has been cured by a surgical procedure, the flight surgeon should proceed as outlined for acute pancreatitis.

IV. Waiver Consideration.

Review of AIMWTS revealed four flyers that were granted waivers after suffering acute pancreatitis. In all four cases, the pancreatitis was caused by cholelithiasis and treated with cholecystectomy. In two of the waivers granted the flyers had histories of chronic pancreatitis secondary to cholelithiasis that resolved after cholecystectomy. One aviator was granted a waiver for a history of recurrent pancreatitis secondary to gallstones that was treated with ERCP and sphincterotomy after the patient failed cholecystectomy. Finally, one waiver was granted to a flyer who had developed "pancreatic steatorrhea with no evidence of pancreatitis" that was secondary to gallstones.

A review of ACS records disclosed only two flyers evaluated for a history of pancreatitis. In the first case, the pancreatitis was initially diagnosed as idiopathic, but was later felt to be due to biliary sludging. The flyer also developed a pancreatic pseudocyst. He made a complete recovery with resolution of the pseudocyst after cholecystectomy and cyst gastrostomy. The ACS recommended an indefinite waiver. In the second case, the aviator had other medically disqualifying diagnoses that precluded recommending a waiver.

V. References.

1. Banks P. Epidemiology, natural history and predictors of disease outcome in acute and chronic pancreatitis. Gastrointestinal Endoscopy 2002; 56(6).

2. Fauci A, ed. *Harrison's Principles of Internal Medicine*. 14th ed. New York: McGraw-Hill; 1998.

3. Munoz A. Diagnosis and management of acute pancreatitis. American Family Physician 2000; 62(1): 164-181.

WAIVER GUIDE
Updated-3/99
By Dr. McKeon

CONDITION:
Pelvic Inflammatory Disease

I. Overview.

Pelvic Inflammatory Disease (PID) refers to the clinical syndrome, unrelated to pregnancy or surgery, that results when cervical microorganisms ascend to the endometrium, fallopian tubes, and adjacent pelvic structures. Inflammation of pelvic organs results in one or more of the following: endometritis, salpingitis, pelvic peritonitis, or tuboovarian abscess. Each year as many as 1 million women in the United States experience an episode of symptomatic PID. PID results from the spread of organisms from the endocervix to the mucosa of the endometrium and fallopian tubes. *N. gonorrhea* and *C. trachomatis* both commonly cause endocervicitis, with up to 40% of inadequately treated females subsequently developing symptoms of PID. Despite improvements in decreasing the incidence of *N. gonorrhea*, there are over 4 million cases of *C. trachomatis* each year in the United States alone. Active duty females are not without risk. A recent study in Korea revealed a prevalence of *C. trachomatis* infection of 8% among asymptomatic active duty females. Risk factors for PID include young age, history of multiple sexual partners, and new partners within the previous 30 days. Outpatient management remains controversial, but many authorities feel outpatient care should be limited to those who remain afebrile, have WBC<11,000mm^3, have minimal evidence of peritonitis, active bowel sounds and can tolerate oral nourishment. Zithromycin 1 gram p.o. may be used in lieu of Doxycycline (100mg po bid x 7-10 days). Rocephin 250 mg IM is also recommended for *N. gonorrhea* coverage. Obviously any sexual partners should be treated as well.

II. Aeromedical Concerns.

Flight surgeons need to have a strong incidence of suspicion for pelvic inflammatory disease. Intrauterine devices, strongly advocated by some physicians for deployed military females, increase the risk of perihepatitis (Fitz-Hugh-Curtis syndrome) in women infected with *C. trachomatis*. Aeromedical concerns include distraction from flying duties secondary to pain, discomfort with restraining/escape devices or, in severe cases, collapse. The prognosis for those women who have been adequately treated is excellent, however a large percentage of women with a history of PID have subsequent fertility problems.

III. Information Required for Waiver Submission.

A gynecologic consultation is required prior to initial waiver consideration.

IV. Waiver Considerations.

An unrestricted flying waiver can be granted to female aircrew who have had PID. To be considered for a waiver patients must be symptom free and not undergoing treatment.

V. References.

1. AFI 48-123, A2.19 Complications or residuals of sexually transmitted disease, of such chronicity or degree of severity the individual is incapable of performing duty. Page 86.

2. Baumgardner DJ. Abdominal Pain: Chalamydia as a culprit. Postgraduate Medicine 1989; 85: 281-8.

3. Chlamydia trachomatis genital infections—United States, MMWR, Mar 7, 1997; 46(9): 193-8.

4. Hiatt JR. Management of the acute abdomen. Postgraduate Medicine 1990; 87: 38-51.

5. Mead PP. Infections of the Female Pelvis. In: *Principles and Practice of Infectious Diseases.* 4th Ed. Churchill Livingstone, 1995.

6. McKeon J. Asymptomatic *C.* trachomatis in an active duty military female population, unpublished report.

7. Recommendations for the Prevention and Management of Chlamydia trachomatis infections, 1993. MMWR, Aug 6, 1993; 42(RR-12): 1-37.

WAIVER GUIDE
Updated: Nov 03
By: Aeromedical Consultation Service (ACS) Staff

CONDITION:
Peptic Ulcer Disease

I. Overview.

Both the understanding and the treatment of peptic ulcer disease (PUD) have undergone profound changes since the recognition of *Helicobacter pylori* as etiologic for approximately 75% of all (higher in duodenal and lower in gastric) ulcer cases. Those ulcers that are not *H. pylori* related are in large part due to use or overuse of non-steroidal anti-inflammatory drugs (NSAIDs) including aspirin. Prior to the advent of *H. pylori* treatment ulcer relapse rates averaged 75% on no acid reduction therapy, and 25% on chronic antisecretory medication, whereas recurrence after eradication *H. pylori* occurs in fewer than 5% of cases. Recurrence of an ulcer is usually caused by a failure to eradicate the organism or by continued use of NSAIDs, and up to 33% of recurrences may be asymptomatic.

Infection with *H. pylori* may be documented by several methods. If the diagnosis of PUD is made by endoscopy, *Helicobacter* infection can be established from a tissue biopsy by histopathology, culture, and/or urease (Campylobacter-Like Organism or CLO) testing. If PUD is diagnosed by contrast radiography, infection can be confirmed by urea breath test, stool antigen testing, or serologic testing. *H. Pylori* has demonstrated resistance to several antibiotics, and mono- or dual therapy is not adequate in many cases for eradication. Even with optimal therapy (triple or quadruple antibiotic 14-day regimens incorporating acid suppression) treatment fails to eradicate the organism in 5% – 20% of patients. Where treatment fails, resistance will be induced or is present, and an alternate multi-drug regimen is required. Proof of *H. Pylori* eradication may be obtained on confirmatory endoscopy, by urea breath test or stool antigen testing four or more weeks after completion of therapy. Serology will not change soon after treatment and is not indicated to prove eradication.

Esophageal gastroduodenoscopy (EGD or endoscopy) is the “gold standard” for ulcer diagnosis and is necessary to definitively demonstrate ulcer resolution. This confirms ulcer cure, can be used to document *H. Pylori* eradication, rules out gastric carcinoma (*H. Pylori* is a known (IARC class 1) human carcinogen), and allows for a definitive aeromedical disposition.

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. Information Required for Waiver Submission.

Aeromedical summary 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 particularly 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.

IV. Waiver Considerations.

100/108 (93%) of aviators and 32/33 pilots (97%) with peptic ulcer disease were granted waivers from Jan 1992 through Aug 2002. Of these, 6% had complicated ulcers and 7% had recurrent ulcers. Of the eight disqualified aircrew, 3 had concomitant disqualifying diagnoses.

V. References.

1. Garcia Rodriguez LA, Ruigomez A. Secondary Prevention of Upper Gastrointestinal Bleeding Associated with Maintenance Acid-Suppression Treatment in Patients with Peptic Ulcer Bleed. Epidemiology 1999 May; 10(3): 228-232.

2. Howden CW, Hunt RH. Guidelines for the management of *Helicobacter pylori* infection. Am J Gastroenterol. 1998; 93(12): 2330-8.

3. Lang KA, Pickard JS. Peptic ulcer disease in the military aviator: a management approach. Aviat Space Environ Med. 1998; Nov; 69(11): 1100-3.

WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Personality Disorders

I. Overview.

The diagnosis of personality disorder requires evidence of long-term patterns of thinking, feeling, and behaving which result in personal and social maladjustment, conflict, and/or distress. DSM-IV recognizes eleven personality disorder diagnoses that fall into three broad categories: odd/eccentric, emotional/erratic/dramatic, and anxious/fearful. All people have personality idiosyncrasies that from time to time cause conflict and mild distress. However, personality disorders manifest with behavior, apparent by early adulthood that is maladaptive, pervasive, and persistent over time. T he term "personality traits" (not a disorder) is often used to refer to maladaptive patterns of behavior that can be aeromedically significant even though a full-blown personality disorder is not present. Understanding these "traits" will clarify the psychological strengths and vulnerabilities of these aviators and reduce the potential for conflict among aviator, flight surgeon, and commander.

II. Aeromedical Concerns.

The diagnosis of personality disorder is not medically disqualifying for flying class (FC) II and III. It is disqualifying for FC I/IA if a determination can be made that the disorder will cause "serious chronic impairment of educational goals or chronic behavioral difficulties requiring hospitalization or prolonged treatment." Because of different screening criteria the prevalence of personality disorders may be higher among enlisted aircrew.

For all flying classes the question of "suitability" is important. Personality disorders and traits may impact performance of military duty, including aviation duty, 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. Since personality disorders are considered, by definition, conditions which existed prior to military service, they are not medically disqualifying (for military service or flying), can not be addressed by a medical evaluation board, and can not be grounds for medical retirement. Therefore, 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. Despite not being medically disqualifying, it is appropriate to DNIF such a flyer pending mental health evaluation. Later, if a personality disorder diagnosis is made, and no medically disqualifying disorder is found, the aviator must be considered medically qualified to fly, and the case referred to command for administrative action.

III. Information Required for Waiver Submission.

Personality disorders do not require waiver action because they are not medically disqualifying. This waiver guide was provided to assist flight surgeons in dealing with the occasionally difficult diagnostic and management problems associated with flying personnel who have these disorders.

IV. Waiver Considerations.

The ACS has experience in evaluation and recommendations for personality disorders (and "personality traits") in pilots and navigators. Based on a 15 year (1981-1996) review of the USAF Waiver File and ACS Cover Sheet File, 12 FC II aviators were diagnosed with personality disorders. Since the diagnosis is not medically disqualifying, all could have returned to fly; four did, seven were disqualified for other medical reasons and the final disposition of the remaining flyer was not available.

The presence of "personality traits" can occasionally be associated with the presence of another psychiatric disorder (co-morbidity) or some degree of increased emotional vulnerability to idiosyncratic situations. During the 15 year review period 114 aviators referred to the ACS for psychiatric evaluation were determined to have significant "personality traits". Of these 114, 71 were referrals from MAJCOM for psychiatric evaluation of other psychiatric diagnoses and 43 were internally referred by other medical services at the ACS to the Neuropsychiatry Branch for psychiatric consultation as a result of psychiatric questions raised during medical evaluation. The presence of "personality traits" was noted as comorbid with other psychiatric diagnoses in 90 of the 114 referred aviators. Of these 90 aviators with co-morbid "personality traits" who were referred for psychiatric evaluations, 67 (74%) were either found to be qualified to fly or received a waiver to return to fly.

IV. References.

1. American Psychiatric Association. 301.0 Paranoid Personality Disorder, 301.20 Schizoid Personality Disorder, 301.22 Schizotypal Personality Disorder, 301.7 Antisocial Personality Disorder, 301.83 Borderline personality Disorder, 301.50 Histrionic Personality Disorder, 301.81 Narcissistic Personality Disorder, 301.82 Avoidant Personality Disorder, 391.6 Dependent

Personality Disorder, 301.4 Obsessive-Compulsive Personality Disorder, 301.9 Personality Disorder NOS. *Diagnostic and Statistical Manual of Mental Disorders*. Washington, DC. 1994.

WAIVER GUIDE
Updated: Mar 99
By: Dr Ruiz

CONDITION:
Pituitary Tumors

I. Overview.

Pituitary tumors represent 10 to 20% of all intracranial tumors. A study of 100 normal volunteers were examined with CT and MRI. Approximately 10% were found to have pituitary tumors as an incidental finding. The number is also confirmed at autopsy for people dying of other causes. There are five types of tumors and they are classified by the hormones that they produce. The most common is the prolactinoma, found in 40% of these patients. In female aviators, there may be complaints of galactorrhea and amenorrhea. Males may have impotence and decreased libido. The next prevalent is the Growth Hormone secreting tumor. It is found in 15% of these tumors. It is marked by acromegaly and is associated with a decreased life expectancy. Life expectancy is also shortened in ACTH tumors found 10% of the time. A Cushing's syndrome develops with the hypersecretion of ACTH and subsequent steroid release. Less seen are FSH/LH and TSH secreting tumors. Both are seen about 2 to 3% of the time. Thirty percent of the tumors, however, are non-secretory. These are usually identified through other means. The pituitary tumor may mimic craniopharyngiomas or primary or metastatic malignant tumors. Patients with these tumors will present in one of four ways. The most common is the hypersecretory endocrine type previously mentioned. The other presentations are a mass effect headache, visual changes, or incidental findings on MRI or CT. Visual changes may be manifested by bitemporal hemiopsia when the overlying optic chiasm is affected. Ophthalmoplegia may result from the invasion of the cavernous sinus. Treatment modalities include medical management as well as surgery and is dependent on the type of tumor. Prolactinomas are 59% responsive to treatment with Bromocriptine. Therapy with this agent may be lifelong, however, as there is a 10 to 20% chance of recurrence if the drug is stopped. Newer agonist agents include Pergolide, Lisuride and cabergoline. The latter drug is 83% effective with a smaller side effect profile. If a rapid course of visual change is present or the aviator desires pregnancy at a future time, surgical treatment may be necessary. There is a 20% reoccurrence rate with surgical intervention. Growth hormone secreting tumors may be treated with Octreotide, a growth hormone release inhibitor found to be 80% effective. However, it is an injectable drug and requires two to three injections a day. Surgery is just as effective. ACTH tumors producing Cushing's syndrome are treated surgically through a transspenoid approach for a 75 to 90% cure rate. TSH secreting tumors are treated surgically as well and then radiated because of their high reoccurrence. Non-secretory tumors can be difficult to manage without a serum marker. Surgery is recommended. Mortality with this type of tumor is low and can result from intracranial bleeding. This is called pituitary apoplexy and may present with nuchal rigidity and prostration. Overall mortality is placed at less than 2%. There is a slightly higher risk with craniotomy (10%), but this procedure is usually reserved for larger, more aggressive tumors. Surgical morbidity is approximately 8% with the most common effect being a chronic CSF leak. Hypopituitary symptomology (2-3%), vision loss (1%), and sinusitis (2%) are the other most common post-operative problems.

II. Aeromedical Concerns.

A not uncommon tumor, pituitary adenomas can arise in aviators at any time during their flying career. The risk of sudden incapacitation from an event such as pituitary apoplexy is extremely small. Mental incapacitation from Cushing's-type presentations, hyperthyroid conditions, or as a side effect to bromocriptine therapy could jeopardize the mission, but again , the risk is small. Heat intolerance, diabetes insipidus, nerve entrapment syndromes, hypertension, cardiomyopathy and spondylosis could impair mission performance. Central visual field impairments or ophthalmoplegia could constitute flight safety hazards depending on the severity of the visual loss. Post-operative morbidities such as sinusitis, vision loss or chronic CSF leakage make surgical intervention less desirable if other options are available. A chronic CSF leak could predispose an aviator to risk of meningitis as ambient pressure changes can reverse the direction of CSF flow.

III. Information Required for Waiver Submission

Initial evaluation of a pituitary tumor should include a complete history and physical examination. The history should focus on the initial onset and time course of symptoms as well as their type and severity. The history should also reflect any periods of incapacitation or effect on the performance of the Airman's duties. Any history of headache or noticeable vision changes should be investigated as well. Physical examination should check for intracranial bruits, visual fields, eye grounds and extraocular muscle function. A thorough investigation of the aviator's complaints with attention to the possibility of malignancy should be undertaken. Chest radiographs, and mammograms should be done as appropriate. CT with enhancement is not as effective as an MRI to delineate the tumor. If the tumor is secretory, initial values and results of serial determinations of the declining hormonal product should be accomplished as confirmation of the efficacy of medical therapy. Endocrinology input should be sought and included. If the initial waiver is granted, yearly repeat values should be accomplished for waiver renewal. If surgery is undertaken, operative reports, confirming the surgical approach and post operative course notes should be provided. Additional information to be included are the recommendations from the medical evaluation board and tumor board and histologic confirmation from AFIP.

IV. Waiver Considerations.

Aeromedical Consultation Service (ACS) experience with pituitary tumors is extremely limited. In the last ten years, three cases have come to the attention of the ACS. Two cases were waivered and the third case was disqualified and sent for ACS review only. A waiver can be considered if sequellae are minimal. The onset of diabetes insipidus secondary to a posterior pituitary tumor and radioimplants are not waiverable. Cure rates for this type of tumor are so high (> 80%), that the return to unrestricted flying duties can be anticipated for most cases. However, chronic therapy of prolactinoma with bromocryptine or other suppressive agents is not waiverable, primarily due to the potential for psychotic reactions to these agents.

V. References.

1. Black MD. Benign tumors. Neurology Clinics of North America. Nov 1995; 13(4): 927-52.

WAIVER GUIDE
Updated: Mar 99
By: Major Hetrick

CONDITION:
Plasma Cell Dyscrasias

I. Overview.

The term plasma cell dyscrasia is nonspecific, used to describe an entire spectrum of disorders involving a neoplastic proliferation of plasma cells and an excessive production of immunoglobulin. These dyscrasias run the gamut from clinically benign conditions of uncertain significance to highly malignant, rapidly lethal plasma cell tumors. Benign monoclonal gammopathies also pose a risk to progression to multiple myeloma.

With myeloma, tumor infiltration often replaces normal marrow, leading to pancytopenia and poor immune response. Plasmacytomas destroy bone, causing painful fractures and vertebral collapse. Sixty percent of myeloma patients present with skeletal pain. Various tumor factors cause a general loss of bone mass. Bone destruction and resorption lead to hypercalcemia.

Abnormal protein concentrations may lead to the hyperviscosity syndrome. This is seen frequently in Waldenstrom's macroglobinemia, in which a malignant plasma cell clone produces excessive IgM. Denatured light chains deposited in the skin, smooth muscle, and endothelium produce a picture of primary amyloidosis. In gamma heavy chain disease, in which a paraprotein is produced, patients typically present with fever, adenopathy, infection, and hemolytic anemia. Median survival is twelve months. In alpha heavy chain disease, patients tend to have gastrointestinal symptoms such as diarrhea, pain, and malabsorption. Cryoglobulinemia poses a risk of sudden vascular accidents and neurological dysfunction.

Diagnosis is suggested by the presence of elevated serum protein levels. Major criteria for diagnosis include plasmacytosis on tissue biopsy, bone marrow plasmacytosis, and a monoclonal spike on SPEP or light chain excretion on UPEP. LDH and beta 2 microglobulin levels are thought to be prognostic.

Patients with multiple myeloma responding to therapy have a median survival of a little over three years. Only two percent of patients survive over ten years. Patients with a solitary plasmacytoma (less than 5% of all plasma cell dyscrasias) may be cured by radiotherapy, although as many as a half of these patients progress to multiple myeloma within three years.

Sometimes a monoclonal gammopathy is uncovered with a stable level of M protein and no evidence of clinical progression. Such patients may demonstrate mild to moderate plasmacytosis of the marrow. Over time, more than fifty percent of these people will develop serious disease such as multiple myeloma, macroglobulinemia, amyloidosis, or leukemia. Because of the slow evolution of disease, follow up of a patient with monoclonal gammopathy of undetermined significance must be indefinitely extended.

Current therapy for multiple myeloma includes numerous regimens of combination chemotherapy as well as treatment of complications. Chemotherapy is also employed in heavy chain disease and macroglobulinemia.

II. Aeromedical Concerns.

Plasma cell malignancy is incompatible with flight status. Such patients are seriously occupationally impaired due to tumor infiltration or abnormal protein production. Skeletal, neurologic, renal, vascular, and gastrointestinal symptoms are common. Treatment is associated with serious adverse side effects. The major proportion of plasma cell dyscrasias are progressive.

III. Information Required for Waiver Submission.

Oncology/hematology review is necessary, along with Armed Forces Institute of Pathology confirmation of diagnosis. Recommendations of the flyer's medical evaluation board and tumor board are also required.

IV. Waiver Considerations.

Only the most minimal monoclonal gammopathies will be considered for waiver. The monoclonal spikes must be less than 2g/dl and bone marrow plasmacytosis must be less than 5%. Individuals being considered for waiver must be free of bony involvement or hematopoetic effects. Amyloidosis associated with plama cell dyscrasias, heavy chain disease, cold agglutinin disease, and cryoglobulinemia are not waiverable. A patient having a solitary extra-medullary plasmacytoma in a clinically uncomplicated location could be considered for waiver following radiotherapy, provided there is no evidence of recurrence over a three year period.

USAF Experience: No cases on record.

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WAIVER GUIDE
Updated: Feb 00
By: Col Pickard

CONDITION:
Pneumothorax

I. Overview.

Spontaneous pneumothorax is best defined as "air in the pleural space of nontraumatic 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. 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. Primary spontaneous pneumothorax typically peaks in the 16 to 24 year age group, affecting males about 5 to 10 times more frequently than females. Although the incidence in the general population is usually quoted as 9 per 100,000, the real incidence is probably higher. In most large series, 1 to 2% are incidentally found on chest film; since small pneumothoraces resolve themselves 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.

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.

Depending on the size of the pneumothorax, acute treatment may consist of observation, usually combined with oxygen, which hastens resolution; simple aspiration of the air, which is successful about 65% of the time; or catheter or tube thoracostomy. (Since these are usually "air only" pneumothoraces, a small catheter with a Heimlich valve is usually successful, and much more comfortable than a standard chest tube.)

The major issue is recurrence. After an initial pneumothorax, the chance of recurrence is 20 to 50%, a risk which rises after subsequent episodes. (After two pneumothoraces, the risk of a third is 62%; of those who have had three episodes, 83% will have a fourth.) 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.

II. Aeromedical Concerns.

The most likely symptoms are chest pain and dyspnea, either of which could be incapacitating. In a review by Voge and Anthracite 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.

III. Information Required for Waiver Submission.

After complete resolution of a first episode of pneumothorax, the aviator may be returned to flying status without waiver, if a high resolution CT scan demonstrates no pathology, such as blebs or underlying parenchymal disease, which might predispose to recurrence. After a second pneumothorax, or if CT demonstrates residual blebs, waiver may be considered only after definitive surgery to prevent recurrence.

IV. Waiver Considerations.

The Aeromedical Consultation Service (ACS) has recently reviewed the available literature regarding definitive treatment of spontaneous pneumothorax. Thoracoscopic abrasive pleurodesis appears to be the procedure of choice, with minimal morbidity and a recurrence rate under 5%. Open pleurodesis showed a similar recurrence rate, but is accompanied by greater morbidity. Pleurectomy, whether through thoracotomy or thoracoscopy, offered no additional benefit, at the cost of additional morbidity. Talc poudrage showed variable results, but the only sizable series demonstrated a recurrence rate of 12%. Furthermore, talc administration has some inherent disadvantages, such as the long term risk of pleural fibrosis, which renders its use questionable in the relatively young aviator population. Chemical pleurodesis with tetracycline or similar compounds results in an unacceptable rate of recurrence.

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 tetracycline compounds is not acceptable for waiver. Talc pleurodesis is definitely not recommended, due to borderline efficacy and the risk of long term complications.

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WAIVER GUIDE
Updated: Dec 03
By: Major Bradley

CONDITION:
Pregnancy

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, 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. Information Required for Waiver Submission.

Pregnancy is disqualifying for Flying Class (FC) I and IA. Trained aviators may be eligible for FC IIB or III waivers for uncomplicated pregnancy. 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.

IV. Waiver Considerations.

No aviators have been evaluated at the Aeromedical Consultation Service (ACS) for pregnancy waiver recommendation. Waivers are approved at the local level as directed by the MAJCOM. From 1987-2003, the Air Force granted 55 FC II waivers (a maximum of 5 per year) and 56 FC III waivers (a maximum of 9 per year). The number of pregnant female aviators who did not request a waiver during this time is unknown.

V. References.

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WAIVER GUIDE
Updated: Oct 98
By: Aeromedical Consultation Service (ACS)

CONDITION:
Prostate Cancer

I. Overview.

Aviators with a diagnosis of carcinoma of the prostate are to be placed DNIF. Prostate cancer is the most common malignancy in men in the United States and is the third most common cause of cancer death in males. It is rarely diagnosed before the age of 50 and the incidence increases with age. Adenocarcinoma accounts for 95% of prostatic cancers. Tumors are frequently multifocal and have a predilection for the periphery of the gland. Gleason grading of the dominant and secondary glandular histology, independently assigning numbers 1-5 (from best to least differentiated) to each for a score of 2 to 10 correlates well with course of disease and survival. Both early and advanced prostate cancer may be asymptomatic at diagnosis. When symptomatic, presenting complaints include in order of frequency: dysuria, difficulty voiding, frequency, urinary retention, back or hip pain, and hematuria. Diagnosis is made by transrectal ultrasound-guided (TRUG) biopsy of the prostate. Complications of such a biopsy are less than 1%. If PSA is greater than 10 at time of diagnosis, a bone-imaging scan should be performed. Staging is as follows: T0 - No evidence of primary tumor; T1 - Impalpable tumor, not visualized on TRUS; T1a - Incidental tumor, <5% of tissue resected at prostatectomy; T1b - Incidental tumor, >5% of tissue resected at prostatectomy; T1c -Tumor identified by needle biopsy alone (because of elevated PSA); T2 - Tumor confined within prostate; T3 - Tumor extends through prostatic capsule; T4 - Tumor fixed to adjacent structures; N0 - No regional node metastases; N1-3 - Regional node metastases; MO - No distant metastases; M1 - distant metastases**.** Management options for patients with clinically organ-confined disease (T1-T2) include observation, radiation therapy, and radical prostatectomy. Individuals presenting with Gleason scores <5 and low-stage tumors (T1a or less) are unlikely to experience tumor related complications for 10 years or more. However, of those treated with observation, 75% will experience local progression and 20% will develop metastatic disease. Those with Gleason scores >7 and higher stage tumors are clear candidates for definitive therapy. Before therapy, PSA is a useful prognostic marker and after treatment, progressive elevation of PSA is an indication of recurrent disease. Radical prostatectomy often results in impotence and occasionally incontinence. Simple prostatectomy may be adequate in true T1a and some T1c disease. Radiation therapy consists of 60 to 70 Gy to the prostate over six weeks and is associated with acute and chronic proctitis/urethritis, impotence, occasional rectal stricture, fistula and bleeding. Serious morbidity is unusual following radiation therapy regardless of delivery. Advanced prostate cancer is treated with surgical or medical castration and hormone therapy. Chemotherapy is reserved for hormone-unresponsive tumors.

II. Aeromedical Concerns.

Impairment may result from urinary frequency/urgency or urinary tract obstruction. Metastatic disease can occur at presentation or after initial treatment affecting bony sites, especially spine, with resultant impairment to incapacitation secondary to pain or paraplegia. Sudden lower extremity weakness is an ominous sign. Ongoing treatment is generally disqualifying. Individual should be at least two years disease-free off all medications for waiver.

III. Information Required for Waiver Submission.

Aeromedical summary should include (1) initial presentation, (2) all surgical reports, (3) AFIP confirmation of histology and Gleason grading, (4) chronology of therapy and results, (5) remarks that patient is off all medications, and free of physical limitations, (6) remarks concerning future follow-up including tumor board and oncology or urology recommendations. Upgrading of flying category requires full flying physical, serial PSA determinations, recent renal functions and urinalysis. A bone scan is required if symptomatic or PSA elevated for age. Medical evaluation board (MEB) results should be included in initial package.

IV. Waiver Considerations.

Review of waiver files and ACS data reveals essentially all requests for waivers have been favorably acted upon but all were T1 or less disease without progression.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Bachmann

CONDITION:
Prostatitis

I. Overview.

Prostatitis encompasses a broad range of conditions affecting the prostate, including infectious, inflammatory and idiopathic causes. It is relatively common, generating approximately 19 office visits per 1000 men per year. Prostatitis has been divided into four general syndromes:

1. Acute bacterial prostatitis - abrupt febrile illness with urinary tract and constitutional signs and symptoms. Causative organisms are usually gram negative rods, especially *E. coli*. Prostatic massage must be avoided in these patients as it may lead to bacteremia, in addition to being extremely painful. Standard therapy is trimethoprim-sulfamethoxazole (TMP-SMX) or a quinolone for 30 days.

2. Chronic bacterial prostatitis - relapsing recurrent UTI with persistence of bacterial pathogens despite courses of antibiotics. TMP-SMX given continuously for 4-16 weeks has resulted in a cure rate of 30-40%. Other agents with reported usefulness include carbenicillin (Geocillin), erythromycin, minocycline, doxycycline, cephalexin and the quinolones. (Minocycline is not waiverable due to side effect profile.) Some authors recommend continuation of antibiotics for up to 24 weeks in pursuit of a cure. Those patients not cured are usually maintained on continuous low dose antibiotic suppression.

3. Nonbacterial prostatitis - excessive inflammatory cells in prostatic secretions despite negative cultures and no history of UTI. This is by far the most common prostatitis syndrome. The role of *Ureaplasma* and *Chlamydia* is controversial, but an empirical treatment with tetracycline or erythromycin for two weeks is usually appropriate. If the symptoms do not respond to antibiotics, further courses are not indicated, and symptom control can be gained from sitz baths and nonsteroidal antiinflammatory medications.

4. Prostodynia - no history of UTI, cultures are negative, prostatic secretions appear normal. This syndrome is thought to be related to smooth muscle tone abnormalities in the prostatic urethra. Treatment options include prazosin, diazepam, sitz baths and antiinflammatory agents; the first two options are not waiverable.

Initial diagnosis is often made based on history and physical alone. Examination of prostatic secretions (after prostatic massage), urinalysis and culture are required to delineate which type of prostatitis is occurring.

II. Aeromedical Concerns.

Acute prostatitis symptoms include urinary frequency, urgency, back and perineal pain, fever and chills. The patient should be removed from flying duties during this acute illness. Chronic bacterial prostatitis is often asymptomatic between episodes of acute UTI 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. Nonbacterial prostatitis and prostodynia should be evaluated fully and treated symptomatically. The vibration, heat and prolonged sitting in flight may make symptoms which are relatively innocuous on the ground irritating or intolerable in the air. Consultation with a urologist should be made early in the course to assure optimal treatment.

III. Information Required for Waiver Submission.

Local evaluation should include a thorough history and physical examination, urinalysis and cultures. Classification depends on examination of expressed prostatic secretions and segmental cultures. Waiver is not required for a history of acute prostatitis which has resolved. If symptoms persist or prolonged treatment with medications is anticipated, the patient should be evaluated by a urologist. Several antibiotics have been waivered for long-term suppression provided the patient obtains symptomatic relief and no adverse medication side-effects occur.

IV. Waiver Considerations.

Waiver criteria include absence of symptoms, absence of medication side effects and ongoing urologic follow-up.

There are 51 aviators in the USAF waiver file with the diagnosis of prostatitis. 24 were waivered on no medications, 24 were waivered on medications and one was disqualified while on Geocillin (due to the medication). The waivered medications were Septra/Bactrim - ten, Vibramycin - six, tetracycline - four, Geocillin - two, trimethoprim - one, and ciprofloxacin - one.

There are 16 aviators in the Aeromedical Consultation Service database who were diagnosed with prostatitis while on active duty (including ANG and AFR) since August 1991. This was the cause for grounding in only one, and he was recommended for waiver.

V. References.

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WAIVER GUIDE
Updated: May 07
By: Lt Col Gail Fancher (RAM 07) and Dr Karen Fox

CONDITION:
Psoriasis and Psoriatic Arthritis

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.[1] Onset is a lifelong threat as it has been documented at birth and up to age 108, with peak incidence at 22.5 years.[1] An early onset (before age 15) predicts more severe disease relative to the percentage of body surface involved and response to therapy.[1]

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. Trigger factors include cold weather, physical trauma, infections, stress, and drugs (lithium, beta-adrenergic blockers, angiotensin-converting enzyme inhibitors, and corticosteroid withdrawal). Psoriasis is associated with arthritis and inflammatory bowel disease.

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 five percent is mild, five to 20 moderate, and greater than 20 percent severe. 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 for moderate to severe disease. Goal of therapy is to decrease body surface area, decrease erythema, scaling and thickness of plaques, improve quality of life and avoid adverse effects.

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 a distinct form of arthritis, usually 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;[4] equal in female and male. Joint symptoms include stiffness, inflammation and swelling. Nail involvement occurs in more than 80% of patients with psoriatic arthritis, compared with 30 % of patients with uncomplicated psoriasis.[6] There are five recognized presentations of psoriatic arthritis:[6]

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 (NSAIDS) medications. Sulfasalazine is another waiverable medication used to treat psoriatic arthritis. Additional medications used for treatment such as methotrexate, cyclosporine, and anti-tumor necrosis factor-alpha therapy (etancercept, infliximab, adalimumab) are not waiverable.

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. A Köebner's phenomenon may be caused by repeated rubbing or pressure including wear of a helmet or prolonged sitting in the cockpit.

Some topical treatments may cause an irritant skin reaction. Topical calcineurin inhibitors (pimecrolimus and tacrolimus) are not approved for the treatment for psoriasis in Air Force aviators. Reasons for non-use are: (1) this is an off-label use of the drugs, (2) results have been unimpressive in the treatment of plaque psoriasis, (3) plasma levels of tacrolimus with topical application approach those seen with systemic therapy, and (4) while evidence of systemic toxicity has been largely limited to constitutional symptoms, subclinical neurotoxicity has not been addressed. 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. 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. 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.

III. Information Required for Waiver Submission.

The aeromedical summary must include:

A. A complete aeromedical summary—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 should address any interference with flight controls and egress ability.

B. If topical vitamin D_3 (calcipotriene) is used, then 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.

C. Copy of dermatology consultation.

D. All cases of psoriatic arthritis should be evaluated by a rheumatologist.

IV. Waiver Considerations.

Diagnosis of psoriasis is disqualifying for flying duties. For flying class (FC) I/IA a verified history of psoriasis after the age of eight is also disqualifying. 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).

Flying Class	Condition/Treatment for Psoriasis	Treatment for Psoriatic Arthritis	Waiver Potential Waiver Authority
I/IA	History of psoriasis after age 8 currently treated or not	History of psoriatic arthritis currently treated or not	No AETC
II	Topical steroids, calcipotriene, topical retinoids (e.g. tazarotene), UVB	NSAIDS, sulfasalazine	Yes MAJCOM
	Topical calcineurin inhibitors†, oral retinoids, methotrexate, cyclosporine, and immune modulating drugs*, PUVA	Methotrexate, cyclosporine, acitretin and immune modulating drugs*	No AFMOA
III	Topical steroids, calcipotriene, topical retinoids (e.g. tazarotene), UVB	NSAIDS, sulfasalazine	Yes MAJCOM
	Topical calcineurin inhibitors, oral retinoids, methotrexate, cyclosporine, and immune modulating drugs*, PUVA	Methotrexate, cyclosporine, acitretin and immune modulating drugs*	No MAJCOM

† e.g. tacrolimus, pimecrolimus
* e.g. etanercept, alefacept, efalizumab, infliximab, adalimumab

A review of AIMWTS through mid March 2007 showed 137 cases of psoriasis in FC I/IA, II and III flyers. The aeromedical summaries (96) for all FC I/IA (4), all disqualified (18) and 74 randomly selected cases were reviewed. Of the 18 psoriasis cases disqualified, one was FC I/IA, three were FC II and 14 were FC III. Of the 18 disqualified psoriasis cases, seven were disqualified for psoriasis (psoriasis arthritis controlled on etanercept (Enbrel®) (2), guttate psoriasis not controlled (2), psoriasis on initial FC III physicals (2), and psoriasis controlled on non approved medication (1). The other 11 disqualified had other disqualifying conditions (e.g. sleep apnea, depression, migraines, cognitive disorder, anxiety, alcohol abuse, eye conditions).

Waiver Guide reviewed by the AF/SG Consultant for Dermatology, Lt Col John G LeVasseur and by the AF/SG Consultant for Rheumatology, Col William E Venanzi.

V. References.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Psychological Factors Affecting Medical Conditions

I. Overview.

Psychological factors (PF) influence general medical conditions (GMC) of every major organ system of the body. In lay terms, stressors affect diseases (DSM-IV, pp 675-8, 1994). The association between PF and GMC may not be a causal one (Wessely, 1996), and the mechanisms may not be obvious (Kaplan, 1995). The effects may not be pathogenic (Vaillant, 1998). Psychoneuroimmunological channels are frequently involved (Anon., 1992; Anon., 1998; Cohen & Herbert, 1996). The temporal association of the PF with the onset of, exacerbation of, or delayed recovery from a GMC implies a clinically significant association. PF effects may involve:
- precipitation or worsening of the *symptoms* of the GMC (Carels et al., 1998),
- the *course* of a GMC, including its *outcome*, and
- the *treatment* or resistance to treatment of the GMC (Campbell & Roland, 1996).

Such PF manifestations differ from somatoform disorders (DSM-IV, pp 445ff, 1994), in which psychological symptoms are present without a GMC to account for the physical symptoms. If the symptoms are those of pain disproportionate to any causative somatic findings, the primary diagnoses involve pain disorders (DSM-IV, p 458, 1994).

II. Aeromedical Concerns.

Any mental health factor, whether or not it meets formal DSM-IV Axis I or II diagnostic criteria, can affect a GMC. The clinical combinations vary too widely to consider each separately, but some general principles below apply. One must consider that the PF may not be disqualifying, but the combined GMC and the PF may be. As with the somatoform and anxiety disorders, assessment of motivation to fly is important in management of these cases. If motivation to fly is questionable and the PF serve (unconsciously) to keep the aviator from flying, treatment may be unsuccessful if medical resolution means returning to fly.

- Mental disorder affecting a GMC - here, the Axis I or Axis II disorder and the GMC are of equal concern. As is true of the clinical management, the aeromedical implications of each must be considered both separately and collectively (eg, a flier with myocardial ischemia who has an associated major depressive disorder [Potts & Bass, 1995]).

- Psychological symptoms affecting a GMC - here, psychological symptoms that do not fully meet DSM-IV criteria, such as those of anxiety or depressive disorders, affect a GMC such as peptic ulcer disease. The GMC must be considered for waiver first. Then, psychological fitness, using appropriate psychiatric, psychological and neuropsychological consultations, should be thoroughly considered. Once all diagnoses are established, the flight surgeon must consider their individual *and collective* effects to determine whether this flier will be able to fly safely and effectively.

- Personality traits or coping style affecting a GMC - traits or styles may or may not reach DSM-IV diagnostic proportions. However, inappropriate hostility, along with denial of medical or physical realities, may impede aeromedical management. These factors may, for example, lead to conflict with the flight surgeon. Mental health consultation can help clarify the issues, and then aeromedical decisions can be made based on the GMC and the PF.

- Maladaptive health behaviors affecting a GMC—examples include fliers who will not comply with recommendations concerning eating, drinking, exercise, smoking, unsafe sex, and similar health-related behaviors. Although the maladaptive behavior may be cited as contributory, the primary GMC should be used as grounds for aeromedical disqualification as indicated, assuming that no other diagnosable psychopathology is present.

- Stress-related physiological response affecting a GMC—for example, stress-related responses such as chest pain, syncope or arrhythmia in fliers with coronary artery disease. If the primary GMC is not intrinsically disqualifying, the aeromedical implications of these stress related symptoms must be considered before disposition.

- Other or unspecified factors affecting a GMC—manifestations of both GMC and PF that do not clearly fit into the other categories fall here. The general principles used in dealing with the other categories should be applied to any such circumstances arising in fliers. Consider the medical condition and the psychological condition, first separately and then together, in determining fitness to fly.

III. Information Required for Waiver Submission.

A. Appropriate medical documentation concerning the GMC involved
B. Copies of initial and final mental health evaluation summaries, pertinent psychological and psychosocial information, and a treatment summary if appropriate
C. An aeromedical summary that includes consideration of GMC diagnoses, DSM-IV diagnoses, and their collective implications for flying safety and effectiveness
D. Letters from the flyer's aviation supervisor or commander, and from any treating psychiatrist and/or psychologist, supporting a return to flying status

IV. Waiver Considerations.

Review and analysis of 15 years of data from the ACS showed that 44 fliers had received diagnoses within this category, or within *Psychophysiological Disorders*, its diagnostic predecessor. Of these 44 fliers, 27 (61%) received a waiver**.**

V. References.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Psychotic Disorders

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.

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 (psychotic disorder due to a general medical condition) conditions 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. Information Required for Waiver Submission.

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. The waiver package should include: recent (within 3 months of waiver package submission) psychiatric evaluation, reports of hospitalizations, summaries of mental health treatment or monitoring (while grounded), copy of medical evaluation board (MEB) report if applicable, aeromedical summary including a discussion of any associated social, occupational, administrative, and legal problems, and a supervisor's letter supporting the aviator's return to flight status.

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 AFI 48-123 requirements for waiver of 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 on this page. 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.

NOTE: Schizophrenia, achizophreniform disorder, 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.

IV. Waiver Considerations.

While psychosis is unusual among military aviators, the USAF ACS has experience with the evaluation and disposition of these disorders. Based upon a 15-year (1981-1996) review of the USAF Waiver File and ACS Cover Sheet File , 11 FC II aviators with histories of psychosis were found and seven (64%) were waived to return to fly.

V. References:

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WAIVER GUIDE
Updated: Dec 03
By: Capt Maria Angles, Aeromedical Consultation Service (ACS)

CONDITION:
Radiofrequency Ablation (RFA) of Tachyarrhythmias

The advent of curative therapy of at least some tachyarrhythmias by radiofrequency ablation (RFA), with high success rates and low complication rates, offers the potential to waiver these individuals for 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 <u>without</u> RFA are addressed in their respective sections. 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.

Supraventricular Tachyarrhythmias

I. Overview.

A. Accessory pathways. The anomaly of concern is an accessory pathway of conduction from atria to ventricles, Wolff-Parkinson-White (WPW) being the most common type. WPW electrocardiographic (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 is considered the likely cause of sudden death and some studies have reported atrial fibrillation rates up to 40%. 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.

B. Atrioventricular node reentrant tachycardia (AVNRT). AVNRT is the most common mechanism of SVT (about 60% of all SVT cases). The anomaly of concern is 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%.

C. Other atrial 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 and in many cases considered investigational.

D. Atrial flutter. Atrial flutter is an uncommon rhythm, usually 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, pure atrial flutter without associated AF is rare and residual AF often complicates successful atrial flutter ablation. There is limited published experience regarding long-term outcomes of RFA of atrial flutter.

E. Atrial fibrillation (AF). Lone AF is 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 patients who have one or a few triggering arrhythmogenic sites, most commonly in or near the pulmonary vein ostia. Reported success rates range from 50-80%, much lower than for ablation of WPW or AVNRT. And many of these patients 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. For chronic AF patients with several triggering arrhythmogenic wavelets, the use of catheter techniques or surgery to create multiple ablation lines in both atria are investigational. There is limited published experience regarding long-term outcomes of RFA of AF. Possible pulmonary vein stenosis after the ablation will need to be followed, in addition to monitoring for recurrent atrial fibrillation.

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 atrial 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 uncommon as an isolated rhythm and 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 atrial flutter RFA.

E. Atrial fibrillation (AF). 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 pulmonary vein stenosis in 1-5%, which may be assessed by serial scanning with computed tomography (CT) or magnetic resonance imaging (MRI) or by serial transesophageal echocardiography.

III. Information Required for Waiver Submission.

Specific waiver guidelines for RFA of accessory pathways and AVNRT follow. The ACS will consider RFA of other SVT mechanisms, atrial flutter and atrial fibrillation on a case-by-case basis. Waiver for RFA of atrial fibrillation will not be considered for FC I/IA. **If RFA is being performed for aeromedical rather than clinical indications, then ACS review and/or evaluation are highly recommended before performing RFA**. After RFA, evaluation directed by the ACS is required for waiver consideration. Aeromedical summary and reports and actual tracings of all pertinent ECGs, rhythm strips, treadmills and Holter monitors as well as the official reports of the RFA and electrophysiologic study/studies (EPS) are required for waiver submission. Follow-up EPS is no longer routinely required. However, further noninvasive and/or invasive testing may be required by the ACS for individual cases due to presenting characteristics, such as significant hemodynamic symptoms or very rapid rate SVT. **In the absence of compelling clinical indications for ablation, FC I applicants should have an echocardiogram performed and reviewed (videotape copy and report) by the ACS before RFA is performed, to exclude other disqualifying disorders**.

A. WPW ECG pattern only (no SVT or suggestive symptoms). WPW pattern is disqualifying for all classes of flying duties. Without RFA, waiver is not recommended for FC I/IA but may be recommended for FC II/FC III after ACS evaluation/review. After successful RFA, waiver may be considered for any class of flying duties, including FC I/IA, after ACS evaluation/review. Follow-up ECGs at 2 months, 3 months and 4 months, with review by the ACS, are the only routinely required post-RFA studies for WPW ECG pattern. Waiver will generally be valid for three years with ACS reevaluation/ review at that time for waiver renewal.

B. WPW syndrome (documented SVT or suggestive symptoms) and AVNRT. WPW syndrome and AVNRT are disqualifying for all classes of flying duties. After successful RFA, waiver may be considered for any class of flying duties, including FC I/IA, after ACS

evaluation/review. Follow-up ECGs at 2 months, 3 months and 4 months, with review by ACS, are the only routinely required post-RFA studies for WPW syndrome. ECG is normal pre and post RFA in AVNRT, so serial ECGs are not required. For AVNRT submit an AMS for ACS review after 4 months post-RFA observation. Waiver will generally be valid for three years with ACS reevaluation/review at that time for waiver renewal.

IV. Waiver Considerations.

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. More recently, the ACS database was searched from Jan 1993 through Feb 2002, identifying 45 aircrew with electrophysiologic studies (EPS) and/or RFA performed for a tachyarrhythmia or for WPW ECG pattern. Current waiver criteria were met for 43/45 (96%). One aviator declined RFA for WPW syndrome and the other had unsuccessful RFA for automatic atrial tachycardia. RFA was performed in 41/45. RFA was considered successful by the ACS in 40/41 (98%). The majority of the aircrew with RFA had WPW ECG pattern, WPW syndrome or AVNRT (80%). Follow-up EPS was performed in 24/41 with RFA and documented cure in 22/24 (92%). The other two had repeat RFA and documented cure on a second follow-up EPS. However, these two cases occurred early in our RFA experience and had only weak residual function of their accessory pathway after first RFA. Currently, they would probably receive waiver recommendation without a second RFA. Based on this experience, routine follow-up EPS is no longer indicated for WPW and AVNRT, but may be required for select cases.

Ventricular Tachycardia

I. Overview.

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 elsewhere in the waiver guide. Most published experience with ablation for VT deals with ablation performed for sustained or hemodynamically symptomatic 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.

II. Aeromedical Concerns/Waiver Considerations.

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 is disqualifying without waiver recommendation due to unfavorable prognosis. Idiopathic VT is VT occurring in the absence of underlying cardiac disease. RFA of idiopathic VT will be considered on a case-by-case basis.

III. Information Required for Waiver Submission.

RFA of VT is disqualifying for all classes of flying duties. Waiver will not be considered for FC I/IA. For FC II/FC III waiver consideration of RFA of idiopathic VT, submit for ACS review an aeromedical summary; reports and actual tracings of all pertinent ECGs, rhythm strips, treadmills and Holter monitors; and any other cardiac studies, as well as the official reports of the RFA and electrophysiologic studies. ACS evaluation is required if ACS review of the reports is favorable for waiver consideration.

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WAIVER GUIDE
Updated: ?99
By: ?

CONDITION:
Raynaud's Phenomenon

I. Overview.

This condition was first described in 1862 by Maurice Raynaud as cold-induced digital pallor followed by cyanosis and erythema. Varying terms are used in the literature to differentiate primary (benign, innocent) Raynaud's disease from secondary Raynaud's syndrome, associated with systemic connective tissue disease such as scleroderma, rheumatoid arthritis, or lupus. Raynaud-like syndromes can result from vibration trauma, occupational exposures, smoking, and some drugs.

Raynaud's disease is thought to be as common as hypertension or diabetes. There is marked geographic difference in prevalence, with up to 20% of the population in cold-climate London affected compared to 4% in milder-climate South Carolina. The prevalence rates are higher in women than men. Persons with Raynaud's disease exhibit a marked hyperreactivity to cold exposure, resulting in vasospasm and the characteristic blanching of the digits.

Diagnosis of Raynaud's disease, using the modified Allen and Brown criteria, includes: absence of digital gangrene, absence of underlying disorders usually associated with Raynaud's syndrome, and absence of occlusive vessel disease. Work-up should include complete history and physical examination, blood testing for rheumatoid factor, antinuclear and anticentromere antibody, liver function tests, and thyroid function tests to exclude underlying connective tissue disorders. Ulnar or carpal tunnel syndrome should be ruled out, and the absence of a cervical rib documented. Cold tests have been used to measure the recovery of finger blood flow after a standard cooling test. Methods to measure finger blood flow include plethysmography, thermography, nailfold capillaroscopy, and finger skin temperature, among others. Cold tests can be variable in the hands of different investigators, possibly due to failure to control environmental factors.

Treatment of primary Raynaud's disease includes avoidance of exposure to cold conditions, wear of woolen gloves or mittens, treatment with alpha sympatholytic agents, and use of nifedipine or ketanserine. Between 1990 and 1993, the literature reports 37 different interventions for Raynaud's disease, with no clear consensus on which treatment is best. Direct-acting vasodilators such as nitroglycerine and nicotinamide are no longer in use.

II. Aeromedical Concerns.

Discomfort in the affected digits during an attack, as well as possibly reduced ability to manipulate cockpit switches are cause for concern. Raynaud's syndrome, associated with an underlying connective tissue disease, is not compatible with flying. Unavoidable exposure to cold conditions, especially while deployed, may increase the frequency of episodes and interfere with the performance of flying duties. The presence of primary Raynaud's disease, not associated with underlying connective tissue disorders, is in itself benign and carries no negative prognosis.

III. Information Required for Waiver Submission.

A detailed history with attention to inciting factors, frequency, severity and duration of attacks, smoking history, and family history of Raynaud's disease or connective tissue diseases is required. Thorough physical examination, looking for evidence of peripheral vascular disease, peripheral nerve entrapment syndromes, and related radiographic studies are required. Blood tests, including rheumatoid factor, antinuclear antibody, anticentromere antibody, liver and thyroid functions are all required. Medical evaluation board (MEB) may be indicated.

IV. Waiver Considerations.

The USAF has had limited experience with flyers with Raynaud's disease. Of the 14 individuals in the waiver files with this diagnosis, 13 received temporary waivers. Several of these individuals were air traffic or weapons controllers, not rated air crew members.

V. References.

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WAIVER GUIDE
Updated: Feb 07
By: Dr Karen Fox

CONDITION:
Refractive Errors (Myopia, Hyperopia and Astigmatism) and Anisometropia

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 2006 prevalence study of corrective lens use based on aircrew spectacle orders in the Spectacle Request Transmission System (SRTS) among USAF pilots showed 38.4% of active duty (AD) pilots require corrective lenses to meet vision standards for flight versus 39.4% in 1995. 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, 86.4% 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 80% of all spectacle orders falling between plano and -2.62 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 1.9% of the time. Corrective lens use was relatively constant across aircraft platforms. Pilots of high performance (high “G”) airframes were just as likely to be using lenses as were pilots flying tanker, transport, bomber (low “G”) aircraft. The prevalence of corrective lens use was also relatively age independent for those pilots under 40; however, there was a small increase in lens use for pilots 41-45 and 76% of pilots over the age of 45 required lens corrections.

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 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. Information Required For Waiver Submission.

For initial waiver for excessive myopia the aeromedical summary 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 initial waiver for excessive hyperopia the aeromedical summary 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. Results of stereopsis testing (OVT or VTA testing)
C. Optometry/ophthalmology exam to include all test listed in AFI 48-123 V3 A4.12.1. (stereopsis, ocular motility and alignment testing)

For initial waiver for excessive astigmatism the aeromedical summary 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. Results of corrected vision with spectacle correction alone
D. Results of stereopsis testing (OVT or VTA testing)
E. Optometry/ophthalmology exam to include slit lamp and fundus exam

For initial waiver for anisometropia the aeromedical summary 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. Results of stereopsis testing (OVT or VTA testing)

C. Optometry/ophthalmology exam to include all test listed in AFI 48-123 V3 A4.12.1. (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.

IV. Waiver Considerations.

The following tables cover the different flying classes, waiver potential and ACS review/evaluation for myopia, hyperopia, astigmatism and anisometropia.

Table 1: Myopia

Flying Class	**Refractive error**	**Waiver Potential** **Waiver Authority**	**ACS review/evaluation**
I	> -1.50 but ≤ -3.00 > -3.00	Yes AETC No AFMOA	No
IA	> -1.50 but ≤ -4.50 > -4.50	Yes AETC No AFMOA	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 AFMOA	Yes Yes
IA	> +3.00 but ≤ +4.00 if waiverable degradation in stereopsis** > +3.00 but ≤ +5.50 if no degradation in stereopsis	Yes AFMOA Yes AFMOA	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/IA	>1.50 but ≤3.00	Yes AFMOA	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 AFMOA	Yes
IA	> 2.50 and if normal stereopsis or waiverable degradation in stereopsis* and no asthenopic symptoms or diplopia	Yes AFMOA	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) showed 542 cases of myopia for FC I/IA, II and III flyers for 2006, of which 113 aeromedical summaries were reviewed; all disqualified (50) and 53 randomly selected. Fifty-six (56/113) were waivers for photorefractive keratectomy (PRK) or LASIK; 15 disqualified and 41 granted waivers. Of the 35 myopia cases disqualified, 20 were FC I/IA, two were FC II, and 13 were FC III. Of the 20 FC I/IA, ten were outside waiver criteria, six had other eye conditions (defective color vision, not correctable to 20/20, defective depth perception) and four had other disqualifying conditions. Of the two disqualified FC II, both were initial FC II and had other disqualifying conditions (one with additional eye conditions and another with desensitization to fire ants). Of the 13 disqualified FC III (all initial FC III), four had myopia which was not correctable to 20/20, three with myopia only, three with other non-eye disqualifying conditions, two had myopia with history of retinal tears and one with defective color vision.

Review of AIMWTS (ICD 9 code 367.0) showed 91 cases of hyperopia for FC I/IA, II, and III flyers for 2005 and 2006, of which 51 aeromedical summaries were reviewed, all disqualified (35) and 16 randomly selected. Of the 35 hyperopia cases disqualified, 17 were FC I, 12 were FC IA and six were FC III. Six were disqualified for hyperopia only, 26 for hyperopia and additional eye conditions (defective stereopsis, astigmatism, anisometropia, defective color vision) and three were disqualified due to other non-eye conditions (asthma, stroke, medications usage).

Review of AIMWTS (ICD 9 code 367.2 – 367.23 and "astigmatism") showed 194 cases of astigmatism for FC I/IA, II and III flyers for 2006, of which 50 aeromedical summaries were reviews, all disqualified (24) and 26 randomly selected. Of the 50 aeromedical summaries reviewed, 30 (13 disqualified and 17 granted waivers) did <u>not</u> have astigmatism that was aeromedically disqualifying (required a waiver). Therefore, of the 11 disqualified for astigmatism, six also had myopia, four had hyperopia and one was not correctable to 20/20.

Reviewed by Chief, Aerospace Ophthalmology at Aerospace Consultation Service, Lt Col John M. Gooch.

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WAIVER GUIDE
Updated: ? 99
By: ?

CONDITION:
Reiter's Syndrome

I. Overview:

Reiter's syndrome is the most common cause of inflammatory oligo arthropathy in the young American male. The classic syndrome consists of the triad of arthritis, nongonococcal urethritis, and conjunctivitis, but incomplete forms of the disease are not uncommon. Strongly associated with the HLA-B27 histocompatibility antigen, Reiter's syndrome is related to the seronegative spondyloarthopathies, such as ankylosing spondylitis, psoriatic arthritis, and the arthritis of inflammatory bowel disease. The disease is also associated with specific infective agents, occurring one to three weeks following a precipating urethritis (Chlamydia) or enteritis (Salmonella, Shigella, Campylobacter, Yersinia) - hence the descriptive term "reactive arthritis."

Diagnosis is clinical, based on a number of classification schemes. The arthropathy characteristic of Reiter's syndrome is a local enthesopathy, affecting the tendinous insertions rather than the synovium. Sausage-shaped fingers and toes, Achilles tendonitis, and plantar fasciitis are common features. The onset of the arthritis is abrupt. The urethritis is nonpurulent and may be accompanied by balanitis. Conjunctivitis may affect one or both eyes. Hyperkeratotic lesions may appear on the palms and soles and painless ulcers may affect the mucosa.

II. Aeromedical Concerns.

When active, the clinical manifestations of Reiter's syndrome are incompatible with flying duties. About twenty percent of Reiter's syndrome patients develop sacroiliitis and spinal disease, obviously impacting negatively on flying fitness. Also of concern is the fact that cardiac conduction disturbances may develop in 5-13% of patients early in the disease course.

Unfortunately, in many cases this rheumatologic disease is quite persistent. Adequate observation time must occur to ensure resolution of symptoms. It is currently incurable and is treated symptomatically with anti-inflammatory drugs. There is evidence to suggest that prolonged treatment with doxycycline in venereally precipitated cases reduces the severity and chronicity of arthritis.

III. Information Required for Waiver Submission.

Rheumatologic consultation with detailed narrative of clinical course is required. Include HLA-B27 serology and titer, bacterial antibody titers if enteric, or gram stain and Chlamydial assay results if venereal. A current ECG to exclude cardiac complications is also necessary.

IV. Waiver Considerations.

Waiver experience for this entity is quite limited. Only fifteen aviators have undergone Aeromedical Consultation Service (ACS) evaluation for Reiter's syndrome, incomplete Reiter's

syndrome, or a spondloyarthropathy considered a variant of Reiter's syndrome. Eighty percent of these cases were granted waivers to continue flying.

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WAIVER GUIDE
Updated: Mar 07
By: Lt Col Jeanine Czech (RAM 06) and Dr Karen Fox

CONDITION:
Renal and Ureteral Stones (Nephrolithiasis)

I. Overview.

Urinary stone disease is the third most frequent urinary tract disorder, exceeded in frequency only by infections and prostatic disease.[10] Men are affected more frequently than women, with a ratio of 2:1.[15] Incident rates are highest in non-Hispanic Caucasians, followed by Hispanics, then African-Americans and other racial/ethnic groups.[15] 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 lives.[23]

There are few studies regarding the natural history of incidentally found and asymptomatic renal calculi. The most recent, with 107 subjects, estimates that 32% of individuals with asymptomatic renal calculi will develop symptoms over a 5 year period.[7] Of important note: an increasing number of renal calculi are diagnosed incidentally on CT scans. The natural history of asymptomatic renal calculi diagnosed on CT scan has not been studied, so that results of the small study described above may not be applicable to contemporary populations and may overstate the risk for symptom development over time.

The risk of a recurrent stone is about 50% within five to seven years; a lifetime recurrence rate of 70% has been reported. In patients who have required an intervention for stones, the reported recurrence is 80%.

Diet and fluid intake may be important factors in the development of urinary stones. Persons with diets high in protein and/or sodium may have higher risk of developing renal stones. Persons in sedentary occupations have a higher incidence of stones than manual laborers. Genetic factors may contribute to urinary stone formation, such as for patients with cystinuria and renal tubular acidosis.

The 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. The pain may occur episodically and may radiate anteriorly over the abdomen, or 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 with severity of symptoms. Urinalysis usually reveals microscopic or gross hematuria. Urine pH is a valuable clue to the cause of the possible stone; persistent urine pH below 5.5 is suggestive of uric acid or cystine stones, both relatively radiolucent on plain X-ray films. Persistent pH above 7.2 is suggestive of struvite infection stones.

In initial evaluation, the first radiograph usually obtained is the plain kidney-ureter-bladder (KUB). Unenhanced helical computed tomography (CT) is the best 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. Intravenous pyelogram (IVP) was the gold standard before CT and is still being utilized. Ultrasound is a noninvasive method for demonstrating both the urinary stone and the resultant hydronephrosis and has a high specificity. However, ultrasound imaging has a very low sensitivity, typically in the range of 11 to 24 percent.[24]

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.[12]

Approximately 75% of renal stones are made of calcium oxalate.[8] Furthermore, approximately 50-75% of calcium oxalate stones are due to idiopathic hypercalciuria, and 5% are due to primary hyperparathyroidism. Hyperoxaluria may predispose to the formation of calcium oxalate stones. Hyperuricosuria may predispose to the formation of uric acid stones, calcium stones, or a combination of both.

Idiopathic hypercalciuria is diagnosed with the help of a 24-hour urinary calcium excretion. The upper limit of normal for women is 250mg (6.2mmol) /day and 300 mg (7.5mmol) /day for men or alternatively, 140mg (3.5mmol) /gm of creatinine or 4mg (0.1mmol) /kg body weight in patients of either sex. If the 24-hour urinary calcium levels are above this and the serum calcium level is normal, suspect idiopathic hypercalciuria. Primary hyperparathyroidism will cause an increased serum calcium level. The upper limit of normal is 10.1mg% (2.52mmol/liter). The differential diagnosis of hypercalcemia in persons who form stones includes sarcoidosis, familial hypocalciuric hypercalcemia, malignant neoplasms, use of a thiazide diuretic, overuse of vitamin D supplements, treatment with lithium, and other uncommon causes.

Hyperoxaluria will result in an elevated urinary oxalate level. Normal levels for both males and females are 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, comprising the second largest category. They consist of magnesium, ammonium and phosphate, mixed with carbonate. Two conditions must exist for the crystallization of struvite, urine pH of 7.2 or above and ammonia in the urine. This is caused by bacteria that produce urease which splits urea with the generation of ammonia. The usual causative bacteria include Proteus, Klebsiella, Pseudomonas species and Enterococci but never E. coli. Those who produce only struvite stones may present with large stones that cause bleeding, obstruction or infection without stone passage; they rarely have idiopathic hypercalciuria and often have reduced renal function. Struvite stones require complete surgical removal and possible 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 type of stone are measuring the blood pH and serum bicarbonate level. If metabolic acidosis is present, along with 24-hour urinary pH values above 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 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 of 1200mg (7.1mmol) or greater excreted daily. The frequency of uric acid stones in gout is about 20%. Treatment is 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 20s and 30s of age. Cystine stones form because cystine is poorly soluble with the range of normal urinary pH. A level of greater than 250 mg per 24 hours is usually diagnostic of cystinuria. Hydration and alkalinization of the urine above 7.5 is first line of treatment.[9] If volume plus pH adjustment are insufficient, treatment with penicillamine or tiopronin is used; these are not aeromedically acceptable medications.

TREATMENT OF NEPHROLITHIASIS.

In most cases, stones less than 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 will often pass spontaneously, especially in the distal ureter.[22] In these cases, conservative observation with appropriate pain medication is appropriate for the first four weeks, as long as no infection is present.[8] In a prospective study by Miller et all of 76 subjects, 95% of stones less than 4 mm passed spontaneously within 40 days, and 50% of subjects with stones of 5 mm or greater required intervention for refractory symptoms or failure of stone to pass.[13]

Spontaneous passage of ureteral stones can be facilitated with hydration and oral alpha 1 adrenergic antagonists.[5, 6]

Individuals with large stones (not likely to pass), evidence of infection, refractory symptoms or high-grade obstruction should not be managed conservatively and should be considered for intervention. Persistent ureteral obstruction for four or more 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 shock wave lithotripsy 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 of ureteral stones can be used in proximal ureter stones. Open surgery and blind basket extraction or other options, but not first-line treatment. 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, therefore should be followed with serial abdominal radiographs and/or ultrasound. If calculi are growing or becoming symptomatic, intervention should be considered. Renal stones in a papillary duct or more distal part of the collecting system are more likely to enter the collecting system. However, removal of these calculi may not be possible if they can not be visualized. Renal stones less than 2 cm in diameter can be treated successfully with ureteroscopy, extracorporeal shock-wave lithotripsy (ESWL), or percutaneous nephrolithotomy. Larger stones and those located in lower pole calyces may not respond well to ESWL but can be successfully treated with ureteroscopy or percutaneous nephrolithotomy, depending on patient anatomy and other clinical considerations.

Prevention of recurrence: Those afflicted with urinary stone disease are encouraged to remain well hydrated (>2L/day) and maintain a diet restricted in sodium and animal protein intake.[2] Excess intake of oxalate 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 treatment to reduce occurrence of new stone formation may include thiazide diuretic for hypercalciuria, allopurinol or potassium citrate for hyperuricouria and potassium citrate for hypocitraturia, depending on factors identified by a metabolic evaluation.

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.[11] 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.

III. Information Required for Waiver Submission.

A full investigation is necessary to try to determine if there is an underlying cause of stone formation. In addition to detailed history, including family history of stone disease, fluid loss, dietary aberrations (low fluid intake, high animal protein, high salt, low calcium intake and vitamin D supplements), and medications, the basic investigations required in a patient who has passed first stone are:

A. Stone analysis
B. Urinalysis, including urine pH and urine culture
C. Serum electrolytes, blood urea nitrogen (BUN), serum creatinine, calcium, phosphate, and uric acid.
D. Radiological investigations: KUB and unenhanced helical computed tomography or IVP or ultrasound.
E. In patient with family history of stones, history of gout, and stones composed of cystine, uric acid or struvite, 24-hour urine assessment should be accomplished as listed below.
F. Urology consult

For FC I/IA, the physical exam should list the full workup for initial stone (either done earlier or if not then as part of physical exam) to include radiographic evidence of no retained stone(s).

A waiver is required for FC I, IA, II and III when there is a history of recurrent (2 or more episodes) renal calculus, bilateral renal calculus, or retained renal calculus. An initial waiver request should include a complete aeromedical summary with attention to possible etiologic events and providing results of the work-up as listed above (first stone). In addition, the following items should be addressed:

A. 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. Urine creatinine is measured to determine the accuracy of urine collection.
B. Parathyroid hormone
C. Nephrology consult addressing prophylactic treatment.
D. Urology consult addressing treatment and if retained stone addressing likelihood of stone entering collecting system.

For waiver renewal:

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 consult if not obtained previously.
C. Also radiological evidence of no new stones, or growth or movement of retained stones.
D. If on prevention medication then annual 24-hour urine to monitor impact of intervention.

IV. Waiver Considerations.

Flying Class	**Category**	**Waiver Potential** **Waiver Authority**
I, IA	Single episode	No waiver required, but full workup should be reported on FC I/IA physical.
	Recurrent	No AETC
	Bilateral or retained[1]	Maybe AETC
II	Recurrent or bilateral	Yes MAJCOM
	Retained[1, 2]	Yes MAJCOM
III	Recurrent or bilateral	Yes[3] MAJCOM
	Retained[1]	Maybe[3] MAJCOM

[1] Stone in renal parenchyma or cyst, with no possibility of movement into collecting system, waiver likely for trained asset.
[2] If exact stone location uncertain, possibly in some part of proximal collecting system, then waiver restricted to IIA and initial waiver granted by AFMOA.
[3] Initial FC III waivers are unlikely.

Unrestricted waiver is also allowed for retained stones provided they are in the renal parenchyma, renal cyst, or calyceal diverticulum with no possibility of migrating into the collecting system, that metabolic and renal function are normal and they are asymptomatic. Class IIA waiver is possible in borderline cases. In cases where the calculus is retained in a papillary duct or more distal part of the collecting system waiver is unlikely.

AIMWTS was reviewed through November 2006 by searching for ICD 9 range of 592.0 – 592.9 and 788.0 and showed 316 cases for FC I, II and III flyers. Aeromedical summaries (117) for all FC I (8), all disqualified (27) and 86 randomly selected cases were reviewed. Of the 117 aeromedical summaries reviewed 57 (49%) had recurrent stones, 30 (26%) had retained stones, 20 (17%) had recurrent and retained stones, four (3%) had bilateral stones and six (5%) had single episodes (not actually disqualifying but waiver requested and acted upon). Of the eight FC I flyers, four had retained stones (two granted waivers and 2 disqualified (one of which had multiple other medical problems)) and one had recurrent stones (disqualified, also had paroxysmal supraventricular tachycardia). The remaining three FC I flyers had only single episodes of a kidney stone, thus not requiring waiver (one of which disqualified for another medical condition). Of the remaining 23 disqualified, 13 were disqualified for only their kidney stone history of recurrent (6), recurrent and retained (5), bilateral (1) and retained (1). Examples of these disqualifications included initial FC III, repeated episodes during deployment, mission flights diverted due to renal colic, very frequently occurring episodes, and evidence of growing kidney stones with hematuria.

Waiver Guide reviewed by the AF/SG Consultant for Urology, Lt Col Edith Canby-Hagino and AF/SG Consultant for Nephrology's designee Maj Laveta McDowell, nephrologist at Wilford Hall Medical Center.

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WAIVER GUIDE
Updated: ?99
By: ?

CONDITION:
Retained Hardware

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. Retained hardware, except in the case of joint replacement consists primarily of screws, plates and wires. These components are placed to stabilize the fracture and allow for adequate healing. Once the bone has healed, in most cases the materials may be removed without detriment to the patient, whereas prosthetic joint replacement devices are life long. Occasionally the orthopedic specialist will defer removal of ORIF hardware due to the complexity of the procedure and the risk of surgery outweighing the benefit of removing an unoffending foreign body. If the retained fixation device is intact, not subject to trauma, and does not cause the patient pain or a reduction in function, it can usually remain and the patient may be considered for waiver. Fixation devices in the spine are not waiverable.

II. Aeromedical Concerns.

The chief aeromedical concerns of aircrew members with retained hardware are the actual underlying orthopedic diagnoses. If the ORIF hardware has to remain in place due to a bony defect then the condition can not be waived whereas a prosthetic joint may be waived. Other concerns are discomfort due to the hardware, risk of re-fracture, adequacy of function, soft tissue inflammation, increased risk of infection leading to osteomyelitis, stress shielding and fatigue failure of the devices which all may lead to flight safety issues and failure to complete mission requirements. Finally in the case of prosthetic joint replacements is the concern that they generally wear out in 10 to 15 years.

III. Information Required for Waiver Submission.

A request for waiver for a retained fixation device or prosthetic joint should be accompanied by appropriate x-rays, orthopedic consultations, operative reports, physical therapy reports regarding muscle strength and functionality and a written opinion from an orthopedist that the hardware should not be removed and that it is unlikely to cause problems during the patient’s lifetime.

IV. Waiver Considerations.

Patient is grounded until evidence of bone healing and return of full function can be documented. Waiver is not required on recovery from fractures where full function has been restored without retained fixation devices or when fixation devices have been removed. Waiver should be applied for when function is compromised or where fixation devices are retained. Waiver is generally not granted for long bone intramedullary rods, femoral and tibial plates, hip screws or pins, spinal fixation devices or where location could lead to trauma. In the realm of joint prosthetics, a Class

IIB (non-ejection seat) waiver may be considered for hip or shoulder replacement and unrestricted waivers may be applied for in other joint replacements. The Air Force experience is fairly low with both retained ORIF hardware and joint prosthetics, but of those applying, over 80% have obtained a waiver in the past.

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WAIVER GUIDE
Updated: Jan 07
By: Maj David Sarnow (RAM 07) and Dr Karen Fox

CONDITION:
Retinal Breaks (Holes and Tears), Retinal Detachment and Retinoschisis

I. Overview.

A retinal break is any full thickness defect in the neurosensory retina. Retinal breaks may be classified as holes (operculated or atrophic) or tears. 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 tension. These are considered low risk retinal breaks and almost never require treatment. Atrophic holes occur due to retinal thinning; vitreous traction is not the pathogenic mechanism. Atrophic retinal holes are often associated with lattice degeneration (LD). The incidence of retinal holes in LD ranges from 18-42%. Atrophic holes are usually located in the central lattice. The vitreous overlying areas of LD has typically liquefied as part of the pathogenic changes associated with LD. Atrophic holes or tears at the edge of the LD patch are associated with vitreo-retinal traction and predispose to a relatively higher risk of retinal detachment (RD) development. Multiple holes/breaks of different types may be present in the same area of LD. Tears in the peripheral retina typically form a horse shoe shape, result directly from vitreo-retinal traction and represents the highest risk for progression to RD. Active vitreo-retinal traction is often associated with photopsia (spontaneous light flashes) and may be exacerbated with eye movement.

RD is the 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 "floaters" are common presenting complaints. There are three primary types of RD:

> Rhegmatogenous retinal detachment is the most common type. The essential conditions necessary for a rhegmatogenous retinal detachment are a full thickness retinal break and vitreous liquefaction. As the vitreous body naturally liquefies over time, structure is lost, and separation from the retina occurs except for the vitreous adherent to the far peripheral retina. When the vitreous separates from the posterior pole of the eye, the area of the macula and optic nerve, this is termed posterior vitreous detachment (PVD). PVD occurs typically in patients between the ages of 50 and 75 years. Due to the tractional forces created during the evolution of a PVD, areas in the peripheral retina where the vitreous remains attached 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 RD. Not all retinal tears progress to detachment, but, if liquefied vitreous enters the tear, it can dissect between the neurosensory retina and the RPE, resulting in a RD. Rate of progression of the RD depends on size of the retinal break, location of the break and movements of the eye. Loss of visual field, "curtain effect," increases as the detachment enlarges; central visual acuity is lost when the subretinal fluid passes beneath the macula. If high risk retinal breaks are detected early, outpatient laser retinopexy or cryopexy therapy can be successfully accomplished in the clinic setting. This treatment is over 95% effective in preventing progression of a retinal tear to RD. However, if an RD has developed, surgical reattachment will be required. Surgical correction of the RD aims to relieve vitreoretinal traction, close retinal tears and holes, remove subretinal fluid and reattach the

retina. Scleral buckling techniques achieve reattachment in over 90% of cases. An alternative or concomitant procedure is posterior vitrectomy, it relieves vitreoretinal traction by removing vitreous humor, and is successful in 75 to 90%. Reattachment may also be aided by incisional drainage of subretinal fluid, and/or using expansile gases or silicone oil to push the retina back 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. Visual outcome can be good if the macula is spared. Risk of occurrence in the fellow eye is 12% within 5 years.

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. These intraocular pathological conditions predispose to development of fibrous vitreo-retinal bands which contract over time. The mechanical forces generated pull the retina from the RPE. Treatment requires surgical lysis of the intraocular fibrous tissue by vitrectomy. Visual outcomes are generally poor due to co-existing ocular pathology.

Serous (exudative) retinal detachment is usually the result of an associated medical 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 RD patients do not have full thickness retinal break. Exudative RDs are gravity dependent. The subretinal fluid will respond to the force of gravity and shift the location of the RD depending on the patient's position. 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.

The incidence of RD is approximately 1 in 10,000.[6] Risk factors for rhegmatogenous RD include advancing age, previous cataract surgery, high myopia, focal retinal atrophy (lattice degeneration) and trauma. Lifetime risk for RD without lattice degeneration in an emmetrope is 0.3% while in a myope over -5.0 diopters life time risk is 2.2%.[3] Individuals with myopia exceeding -5.0 diopters and have associated LD, the life time risk for RD increases to 35.9%.[3] Detachments tend to cluster in the 20s and then again in the 40s-50s age groups. Approximately 25% of rhegmatogenous RDs are found in patients with LD of the retina. LD is present in approximately 10% of adults. Severe ocular trauma is believed to be responsible for 10-15% of RDs, and up to 50% of patients who have a diagnosis of cytomegalovirus retinitis develop a rhegmatogenous RD within one year.[11]

Retinoschisis is the splitting of the retina: in the juvenile form the splitting occurs in the nerve fiber layer, and in the adult degenerative form the splitting occurs in the external plexiform layer. Both forms of retinoschisis cause an absolute scotoma (dense visual field defect) in the corresponding visual field to the area of retina affected, whereas, retinal detachments cause a relative scotoma "curtain effect" in the visual field. Clinical RDs occur in association with degenerative retinoschisis in up to 6% of consecutive detachment cases, but, retinoschisis is responsible for less than 2.5% of all rhegmatogenous RDs.[4] There are two types of RDs associated with retinoschisis: a localized and relatively stable form with outer retinal holes only; and a symptomatic, rapidly progressive detachment with retinal breaks in both of the layers. Localized and relatively nonprogressive RDs occur more frequently than a progressive RD by a ratio of 178:1.[4] Treatment for retinoschisis should be limited to patients who develop symptomatic, progressive RDs.[10]

II. Aeromedical Concerns.

Retinal breaks (holes and tears) can lead to RD. RD can result in loss of visual acuity, loss of stereopsis, significant visual distortion (metemorphopsia), 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. These sequelae are obviously key concerns for adequate performance in aviation or special operations duty. Furthermore, consideration must be given to the risk of recurrence or involvement of the fellow eye based on the etiology (as described above). Although routine exposure to G-forces has not been shown to increase the risk of RD, the risk is increased with pre-existing vitreoretinal abnormalities, especially in the case of tractional RD, and this should be considered in the case of unrestricted waivers. 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 RD, (i.e. subretinal fluid), are present. This is best accomplished by a retinal specialist.

III. Information Required for Waiver Submission.

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 Aeromedical Consultation Service (ACS) evaluation/review.

Initial waiver aeromedical summary should include the following items:

A. Complete aeromedical history to include pertinent negatives (trauma, myopia, lattice degeneration, etc.)

B. Retinal specialist consult (history, positive risk factors, exam findings, treatment, and surgical outcome)

Waiver renewal aeromedical summary should include:

A. 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.

IV. Waiver Considerations.

Table 1: Potential waiver eligibility

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 evaluation
II	Yes	Yes	Yes	Yes	MAJCOM	ACS evaluation for initial waiver
III	Yes	Yes	Yes	Yes	MAJCOM	ACS evaluation/ review for initial waiver

* 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 -5.00 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.

A review of AIMWTS database through Dec 06 showed 108 cases of retinal holes, tears or retinoschisis for flying class I/IA, II and III flyers. Aeromedical summaries (51) for all FC I/IA (27), all disqualified (10) and 20 randomly selected cases were reviewed. Sixty-one percent (31/51) had retinal holes, 23 percent (12/51) had retinoschisis and 16 percent had retinal tears (8/51). Of the disqualified, 19 percent (6/31; 3 FC I/IA and 3 FC III) were retinal holes, 25 percent (2/8; 2 FC I/IA) were retinal tears and 17 (2/12; 2 FC I/IA) percent were retinoschisis. Of the 10 disqualified, all were disqualified because of their eye condition(s) except one who also had depression.

Review of AMWTS through mid-Dec 06 showed 31 cases of retinal detachment in FC I (2), II (20) and III (9) flyers. Twenty-two (71%) were granted waivers and nine (29%) were disqualified. Of the nine disqualified, five were on initial flying class exams (2 – FC I and 3 – FCIII), three were disqualified because of below normal best corrected visual acuity the effected eye, and one was disqualified for other unrelated medical conditions.

Reviewed by Chief, Aerospace Ophthalmology, Aeromedical Consultation Service, Lt Col John M. Gooch.

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WAIVER GUIDE
Updated: Sep 06
By: Dr William Kruyer

CONDITION:
Right Bundle Branch Block and Fascicular Blocks

I. Overview.

Complete right bundle branch block (RBBB) and left anterior and posterior fascicular block (LAFB, LPFB, also called hemiblock) are discussed in this waiver guide. These electrocardiographic (ECG) findings may be associated with underlying cardiac disease. Incomplete RBBB is considered a normal variant; as such it does not require aeromedical evaluation or waiver.

RBBB prevalence has been reported as 0.2%-0.4% in military aviators and 0.2%-2.0% in civilian populations. Prevalence of LAFB and LPFB were reported as 0.9% and 0.1%, respectively, in one study of military aviators. In another study of military aviators the prevalence of each type of fascicular block was only 0.01%. In civilian populations, LAFB has been reported in 1%-14%. For the purpose of this discussion, bifascicular block is defined as RBBB plus either LAFB or LPFB. Prevalence figures for bifascicular block in aviators or healthy populations are not readily available.

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 typically recommended for indefinite, unrestricted waiver after Aeromedical Consultation Service (ACS) review of the ECG and requested local noninvasive test results.

In a study of 372 military aviators with RBBB, 94% were normal, only 3% had significant coronary artery disease and 3% had other abnormalities. Over 10 years of follow-up, only 1 of the 372 developed third degree AV block, 2 experienced syncope, 4% died, 6% developed coronary artery disease, and 6% developed hypertension.

According to the general cardiology literature and ECG textbooks, fascicular blocks and bifascicular block are more likely to be associated with underlying cardiac disease than is RBBB. However, in the above referenced study of 372 military aviators with RBBB, the incidence of cardiac disease was no different for RBBB with normal axis versus RBBB with LAFB or LPFB (bifascicular block). RBBB, LAFB, LPFB, and bifascicular block do not seem to carry an increased risk of cardiac death, progressive conduction system disease or other adverse events in the absence of underlying heart disease. Noninvasive evaluation with echocardiography and/or graded exercise testing should be sufficient for most cases. If any of these ECG findings occur in a young aviator (35 years or younger) with a low cardiac risk profile, graded exercise testing is unlikely to be helpful.

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 echocardiograpy 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.

III. Information Required for Waiver Submission.

All aviators/aircrew with RBBB, LAFB, LPFB or bifascicular block require ACS review prior to waiver consideration. DNIF status is not required during the evaluation but may be done at the discretion of the local flight surgeon. For RBBB, a local echocardiogram is required for evaluation. For LAFB, LPFB and bifascicular block, local treadmill and echocardiogram are required for aviators older than 35 years; local echocardiogram only is required for aviators 35 years or younger. Incomplete RBBB is considered a normal variant; as such it does not require aeromedical evaluation or waiver.

For ACS review for initial waiver recommendation submit:

A. Aeromedical summary.
B. Original 12-lead electrocardiogram demonstrating the finding.
C. Copies of reports and tracings of requested cardiac tests performed locally (e.g. echocardiogram, treadmill).
D. Copies of reports and tracings of any other cardiac tests performed locally for clinical assessment (e.g. Holter, nuclear stress imaging, stress echocardiogram).

Note: The ECG library is part of the ACS and thus, if the case has been reviewed by the ECG library and a letter received, this shall suffice as an ACS review concerning submitted ECG and cardiac studies. In these cases, the ECG library letter should be attached to the aeromedical summary in AIMWTS for waiver.

IV. Waiver considerations.

RBBB, LAFB, LPFB and bifascicular block are disqualifying for all classes of flying duties. If noninvasive evaluation results are acceptable by ACS review, recommendation for all classes of flying duties is typically for unrestricted, indefinite waiver. Follow-up local or ACS testing would then not be required.

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WAIVER GUIDE
Updated: ?99
By: ?

CONDITION:
Salivary Gland Disorders

I. Overview.

Disorders of the salivary glands cover a wide variety of different diseases and can be broken down into neoplastic and non-neoplastic. Non-neoplastic disorders can be further separated into inflammatory and non-inflammatory. Inflammatory diseases of importance to aerospace medicine include acute suppurative sialadenitis, chronic sialadenitis, sarcoidosis and Sjogren's syndrome. Non-inflammatory disorders include sialolithiasis, cystic lesions, radiation injury, trauma and sialadenosis.

The most common non-neoplastic disease diagnoses mentioned in the aeromedical waiver file include sialolithiasis and sialadenosis. Concerning sialolithiasis, approximately 80% of calculi occur in the submandibular gland, 20% in the parotid gland and less than 1% in the sublingual gland. Calculi occur more often in middle aged men, 75% of cases have a single stone and only 3% involve multiple glands. Gout is the only systemic disease known to cause salivary gland stones. Although x-rays frequently reveal submandibular stones, sialography is almost 100% effective in making the diagnosis. Complications from stones include acute suppurative sialadenitis, ductal ectasia, and stricture. Sialadenosis is a term used to describe a non-inflammatory, non-neoplastic enlargement of a salivary gland where an exact mechanism or etiology cannot be identified. The parotid gland is most commonly affected and it has been associated with obesity, malnutrition, alcoholic cirrhosis and other diseases that interfere with the absorption of nutrients.

Salivary neoplasms may be benign or malignant and an accurate pathologic diagnosis is key in their management. 80% of the tumors originate in the parotid gland and approximately 80% of these are benign, whereas only 50% of submandibular tumors and less than 40% of sublingual tumors are benign. Of the benign tumors, the pleomorphic adenoma is the most common and accounts for 65% of all salivary gland neoplasms. Adenoid cystic carcinoma is the most frequent salivary gland malignancy and the mucoepidermoid carcinoma is the most frequent malignancy of the parotid gland. Patients with a salivary gland tumor usually present with a painless mass and etiologic factors are poorly understood. The treatment of choice for salivary gland tumors is surgical excision. Combining radiation therapy with surgery has been shown to improve outcomes. Five year survival rates range from 80-97% for low-grade tumors (acinous cell and low-grade mucoepidermoid carcinomas) and 30-82% for high-grade tumors (adenocarcinoma, squamous cell, undifferentiated carcinomas, etc.). Besides tumor type, size, and metastasis, facial nerve paralysis, skin involvement, pain and the results of DNA flow cytometry are used to determine the prognosis.

II. Aeromedical Concerns.

Sialic stones may cause pain or discomfort in flight, particularly after eating or drinking. Sialadenosis and undiagnosed salivary gland tumors may interfere with fit of the oxygen mask. With neoplasms, the likelihood of recurrence must be quantified as well as determining if the residual effects of therapy could impact the flying environment. Speech as well as facial

deformity/paralysis are significant concerns following surgery. Xerostomia following surgery or radiation therapy can be a significant problem and also affect speech quality.

III. Information Required for Waiver Submission.

If tumor is involved, AFIP confirmation of histology must be obtained and the flyer should be disease-free, fully recovered from all treatments, and must undergo MEB and Tumor Board evaluation. Sialic calculi should be removed, swelling resolved and gland function returned to normal. Sialadenosis should be resolved and a thorough search to rule out any underlying disease process documented. The ability to speak clearly and wear an oxygen mask properly should also be evaluated. Surgical/ENT and oncologic consultations are also required. MRIs, CAT scans and/or bone scans performed to rule out metastasis should accompany waiver package.

IV. Waiver Considerations.

The USAF experience with salivary neoplasms reveals that six out of seven flyers with parotid gland tumors, and one case of a submaxillary gland tumor received waivers. Six cases of history of, or recurrent sialolithiasis were waived along with one case of retained salivary calculi.

Individuals who are disease-free and fully recovered will be considered on a case by case basis.

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WAIVER GUIDE
Updated: ?99
By: ?

CONDITION:
Sarcoidosis

I. Overview.

Sarcoidosis is a disease of unknown etiology with the highest incidence among the 20-40 age group. Distribution is world-wide, with marked variability in prevalence and pattern of organ involvement. The characteristic histopathologic finding is that of multiple noncaseating epithelioid granulomas which may resolve spontaneously, or proceed to fibrosis. The commonest clinical presentations in North America are asymptomatic abnormal CXR findings (usually bilateral hilar and right paratracheal adenopathy), and nonspecific respiratory symptoms (cough, dyspnea). Natural history of the disease is highly variable; most cases (80%) presenting with bilateral hilar adenopathy (BHA) alone resolve spontaneously within 2 years, while those with symptoms at presentation are less likely to regress. However, even those with asymptomatic BHA have a 5-10% chance of developing progressive pulmonary fibrosis. Ten to 50 percent will have erythema nodosum (with Europeans, especially females, predominating); the presence of erythema nodosum is the most reliable indicator of a favorable outcome. Fifteen percent will have uveitis, and severe vision loss is possible due to secondary glaucoma. The presence of ocular involvement or chronic tonsillitis has been reported to be associated with a worse prognosis. Roughly 5% develop cardiac sarcoidosis. The most common cardiac conduction abnormalities are heart block, bradyarrhythmias, and ventricular tachycardia. One study reports a risk of 40-50% for sudden death among those with cardiac sarcoid. The left ventricle and interventricular septum are most often involved. Cardiomyopathy, CHF, mitral valve abnormalities, papillary muscle dysfunction, and pericardial effusions are the more common structural cardiac abnormalities. Since healed myocardial granulomata may lead to arrhythmias, patients in remission who have had myocardial involvement remain at risk for sudden death. Although liver biopsy will show sarcoid granulomas in 70% of cases, altered liver function due to granulomatous hepatitis is rare. Nervous system involvement has been estimated to be 5% based on literature reports, but this is almost certainly an overestimate resulting from reporting bias. Diabetes insipidus is most often due to granulomatous involvement of the hypothalamus, resulting in either primary polydipsia or defective release of vasopressin. Lytic or sclerotic bone lesions are present in 10% of cases. Disordered calcium metabolism, due to granulomatous conversion of vitamin D, most often results in hypercalciuria, with an attendant risk of nephrolithiasis; hypercalcemia is much less common.

No patient should fly while undergoing treatment. Common corticosteroid regimens consist of prednisone or methylprednisolone, although 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 steroid therapy. Treatment is indicated for those with progressive pulmonary disease, cardiac involvement, CNS disease, uveitis, and hypercalcemia. For the 10% requiring treatment who fail to respond to corticosteroids, chlorambucil and methotrexate are alternative medications.

II. Aeromedical Concerns.

Uncomplicated, asymptomatic sarcoidosis found incidentally on CXR usually proves to be of little aeromedical concern. However, roughly 10% of sarcoidosis cases develop systemic complications. Myocardial involvement (arrhythmias, conduction block, sudden death), restrictive pulmonary disease, CNS disease (cranial nerve palsies, encephalopathy, seizures), ocular complications (uveitis, iritis, chorioretinitis), and renal calculi all have direct aeromedical implications.

III. Information Required for Waiver Submission.

Diagnosis by clinical/radiographic means, without histologic confirmation, is often used clinically. Whether a biopsy is necessary to confirm sarcoid in a patient with asymptomatic BHA is controversial. However, such a conservative course requires at least a year of follow-up to effectively rule out lymphoma or TB. Such prolonged grounding without a diagnosis is rarely acceptable when dealing with an aviator, thus tissue confirmation is required. If physical examination demonstrates involvement of superficial lymph nodes, skin, conjunctivae, or salivary glands, biopsy should be directed toward that site. If not, transbronchial biopsy is the procedure of choice, with a yield of 70-80%. Liver biopsy is not recommended due to low specificity. Scalene fat-pad biopsy is obsolete.

Recent chest x-ray, lymphocyte count (leukopenia is common), angiotensin converting enzyme (unreliable as a diagnostic test but serial values are helpful in tracking disease progress/remission), serum calcium, 24 hour urinary calcium, pulmonary function testing, 24 hour Holter monitor with resting 12-lead EKG, and ophthalmology consultation with slit lamp exam, are required at the time of first submission of the waiver package. The Holter tape should be forwarded to the ACS ECG library for review. Echo, thallium, and cardiac MRI should only be considered if Holter results suggest myocardial sarcoidosis. Neurology consultation is indicated only in cases of positive findings on the H&P. With the exception of ophthalmology consultation, all the tests required for the initial waiver need to be repeated for follow-up waiver requests. All cases with possible systemic, especially cardiac, sarcoid should be referred to the ACS.

IV. Waiver Considerations.

Aircrew identified as having probable sarcoidosis should be grounded for a minimum of three months, to confirm the diagnosis and determine disease stability. Patients with pulmonary parenchymal disease or abnormal pulmonary function tests should remain grounded, as should those with uveal, cardiac, or CNS involvement. (Except for cardiac or neurologic involvement, a distinction is normally made between histologic involvement versus functional involvement of an organ. Thus, a positive transbronchial biopsy in a patient with BHA alone is evidence of histologic involvement of the lungs, but pulmonary function is not affected.) Waiver may be considered for the above cases following resolution of all symptoms; however, those with a history of cardiac or neurologic sarcoid are typically permanently disqualified. Unrestricted waiver should be possible for those with only asymptomatic disease, normal chest x-ray or stable hilar adenopathy, and no evidence of other functional organ involvement. Hypercalcemia is disqualifying; hypercalciuria per se is not.

US Air Force Experience. A total of 143 cases of sarcoidosis are on file. One hundred thirty eight are for FC II (122 [88%] waived, 16 [12%] disqualified), 1 is for FC IIA (waived), and 4 are for FC

III (3 [75%] waived, 1 [25%] disqualified). Twenty six of those on FC II received indefinite waivers. Essentially all such waivers were granted in the early 1970's, or earlier, before the complications of cardiac and neurologic sarcoid were widely recognized. Twenty cases were subsequently waived followed periods of initial disqualification, mostly for symptomatic sarcoidosis, with few additional cases for steroid use and abnormal cardiac exams which later normalized. Nine of the 17 disqualified showed evidence of CAD by ETT, thallium or fluoroscopy.

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WAIVER GUIDE
Updated: Mar 06
By Lt Col Emmel and Lt Col Jaffe

CONDITION:
Seizures/Epilepsy/Abnormal EEG

I. Overview.

Epilepsy is defined as recurrent (two or more) unprovoked seizures. Epilepsy is unequivocally disqualifying for all flying duties. A single unprovoked convulsion may be sufficient to constitute a diagnosis of a seizure disorder for Air Force purposes. No waivers have been granted for epilepsy or 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 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, vasovagal syncope (convulsive syncope), and acceleration induced (G-LOC). See the respective sections in AFI 48-123 and the waiver guide, for additional guidance. (Syncope, Head Trauma, Meningitis, TIA, Neurological Tumors).

Many abnormal EEG's on their own merit, independent of another medical condition (including epilepsy) are disqualifying for FC I, II and III.

The risk of developing new onset epilepsy ranges from about 0.04% at age 20, to 0.02% at age 50 before rising sharply to 0.08% by age 70. The late rise is because of the increase in precipitating factors such as neuronal degeneration and cerebrovascular disease. After a single, unprovoked seizure in adults assuming all studies (neurological exam, MRI, EEG) are normal, the risk of recurrence is about 35% for 5 years. Of the 35%, about 50% occur in the first 6 months and about 60% within the first year. The risk of a second seizure increases with risk factors such as previous neurological insult or a sibling with epilepsy. Relapse even after a symptom-free interval of several years without therapy is possible. The major etiologies of epilepsy are cerebrovascular disease (13%), developmental (6%), head trauma (4%), brain tumor (4%), infection (3%), degenerative disease (2%), and idiopathic (68%). 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.

Diagnosis is based on a neurologist's evaluation, complete with detailed history, exam, diagnosis, treatment, and prognosis. A MRI with coronal cuts to evaluate for mesial temporal sclerosism and an EEG (awake and sleep-deprived with anterior temporal electrodes and photic stimulation and hyperventilation) should be part of the neurologist's work up.

Medication therapy is not waiverable.

II. Aeromedical Concerns.

The risk of seizure in flight is obvious. Incapacitation is in most cases sudden, unpredictable, unavoidable, prolonged, complete, and potentially more frequent in the stressful flying environment, and constitutes a direct threat to the health and safety of self, others, and the success of the mission.

III. 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 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 MRI scan. MEB is required for an unprovoked seizure and should precede an ACS evaluation. ACS evaluation may also be necessary.

IV. Waiver Considerations.

A history of febrile convulsions before the age of 5 is waiverable for FCI and IA, but requires normal neurology consult, EEG studies, and MRI scan at a minimum. Convulsive movements during G-LOC while centrifuge training do not require waiver application or DQ. Truly epileptiform abnormalities such as spikes, sharp waves, and spike-wave complexes are disqualifying. However, other EEG findings considered normal variants, (small sharp spikes [SSS], benign epileptiform transients of sleep [BETS], wicket spikes, 6 Hz [phantom] spike and wave, rhythmic temporal theta waves of drowsiness [psychomotor variant] and 14 or 6 Hz positive spikes) are not necessarily disqualifying. Almost 50% of those with abnormal EEGs have returned to flight status. All other cases of convulsive episodes or altered consciousness events compatible with possible epilepsy, whether treated or untreated, are disqualifying and thereby immediately DNIF until further evaluated. No patients with epilepsy have received waivers to date.

V. References.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Sexual Dysfunctions, Paraphilias, Gender Identity Disorders
Sexual Dysfunctions due to a General Medical Condition

I. Overview.

Disturbances of sexuality may involve widely varying degrees of behavior. Some are troublesome, while others are clearly pathological. DSM-IV (1994) lists the following explicit diagnostic categories:
- Sexual dysfunctions: 1) disturbances in desire and in the response cycle, and 2) cause clinically significant distress and interpersonal difficulty. Examples include problems with sexual arousal, performance and climax, and with sexual pain (dyspareunia, vaginismus).
- Paraphilias: 1) intense, recurrent sexual urges, fantasies or behaviors concerning unusual objects, activities or situations, and 2) cause clinically significant distress or impairment in important areas of function (eg, social or occupational). Examples include exhibitionism, fetishism (including heterosexual cross-dressing), voyeurism, and pedophilia.
- Gender identity disorders: 1) a strong, persistent cross-gender identification, and 2) persistent discomfort with one's assigned sex.
- Sexual dysfunction due to a general medical condition: primary etiology of dysfunction is a specified physical disorder.
- Sexual disorder not otherwise specified: other, non-classified disorders of sexual functioning, including such behaviors as anomalous preoccupation with masturbation, pornography and promiscuity. Note that cultural standards vary considerably in such matters.

II. Aeromedical Concerns.

Flyers with sexual dysfunctions may have concurrent emotional disturbances such as anxiety, depression, or substance abuse/dependence that may be aeromedically significant, and such fliers should be individually assessed. Sexual dysfunctions other than gender identity disorder are not medically disqualifying unless they are associated with another DSM-IV Axis I disorder, in which case waiver standards would be those for that disorder. Significant aeromedical threats may come from the effect of these disorders, associated personality disorders or the concomitant problems associated with marital or other relationships and detract from aviation performance and/or safety. Legal problems or a fear of discovery may also be of aeromedical concern in that reliability, integrity, and security issues are raised. Highly specialized and effective behavioral techniques are available to treat sexual dysfunctions not associated with another disorder. Such treatments are not intrinsically disqualifying.

In the military aviation environment, where high-level performance and close collaboration with others is necessary for safety and success, knowledge that a crew member or squadron member has a paraphilia may disturb unit morale and optimum crew interaction, even if the disorder does not interfere with the person's ability to perform duties. Some fliers with fetishes or cross-dressing behavior have served successfully for years, but only because they were able to keep their disorders secret. Depending upon the circumstances, paraphilias, if discovered, may be dealt with

administratively, legally, or psychiatrically. Descriptions such as "sexual perversions" and "psychosexual disorders" are medical-legal rather than DSM-IV terms, and are grounds for medical evaluation board (MEB) action. These actions may render aeromedical considerations moot.

Compulsive sexual behaviors may be classified into three tiers (Carnes, cited in Koffman et al, 1998). The first tier includes secretive behaviors and "victimless crimes" such as compulsive masturbation, excessive promiscuity and preoccupation with pornography. The second tier includes paraphilias, the acting out of sexual fantasies. These may be shocking, but are generally non-violent. Paraphilia treatment success, as reported in the civilian literature, is rare, but patients do sometimes respond to behavior modification. Behavioral treatments are not specifically inconsistent with flying duties, though great care should be taken in returning such fliers to flying duties while they remain in treatment. Any co-existent Axis I diagnosis must be waived separately. Treatment involving continued use of serotonin reuptake inhibitors is disqualifying. If a flyer remains medically and administratively qualified for military duty, and the flight surgeon believes that the flyer is aeromedically *unfit* to fly, disqualification may be recommended under the miscellaneous causes for rejection. The third tier of compulsive sexual behaviors involves violence or violation, such as pedophilia, rape and incest. Such criminal activities are quite sufficient to terminate military flying careers on an administrative or UCMJ, rather than medical, basis.

III. Information Required for Waiver Submission.

Waiver application for these disorders requires:
A. Copies of initial and final mental health evaluation summaries, appropriate psychological information, and a treatment summary
B. An aeromedical summary that includes consideration of any pertinent medical factors and a discussion of any social, occupational, administrative or legal problems associated with the case
C. An analysis of the aeromedical implications of this particular case history
D. Letters from the flyer's aviation supervisor or commander, and from the treating psychiatrist and/or psychologist, supporting a return to flying status

IV. Waiver Considerations.

Review of USAF Waiver File and ACS Cover Sheets yielded little informative data. Another military service referred one civilian instructor pilot to the ACS for evaluation following successful male-to-female transsexual treatment that included hormonal, surgical and mental health modalities. This patient was also evaluated by local civilian consultants with specific expertise in this field. All evaluations were within acceptable aeromedical limits, and the pilot was returned to her job as a military training center civilian flight instructor with subsequent satisfactory performance for many years. This case did not engage the issues of unit cohesion in operational circumstances.

Disturbances of sexuality affect the ordinary human emotions of everyone who must deal with them, regardless of rank or profession. The flight surgeon that must make aeromedical judgments about such disturbances will benefit from clear thinking and careful consideration of the significant issues: aviation performance and safety. See Koffman, Berg and Moore (1998) for discussion of the aeromedical considerations in cases involving disturbances of sexuality in aviators.

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WAIVER GUIDE
Updated: ?99
By: ?

CONDITION:
Short Stature

I. Overview.

Current height standards for flight status are: 1) standing height no less than 64 inches or greater than 77 inches; 2) sitting height no less than 34 inches and no greater than 40 inches for FCI, no less than 33 inches and no greater than 40 inches for FCIA and Initial FCII for flight surgeons. There are no sitting height standards for FCIII (AFI 48-123, Attach 6.29).

Short stature is not a health problem unless associated with an endocrine disorder. In most cases, it is not even an occupational hazard. However, many cockpit environments are currently ill-suited, and possibly even dangerous, for individuals below 64 inches or above 77 inches in height. This issue has emerged as an area of concern primarily as the result of the increasing number of female aviators and their recent introduction into high performance aircraft. Previous cockpit design was based on accommodating the 5th through 95th percentile anthropometric dimensions of Caucasian male pilots. This range currently excludes many females and some males from particular ethnic backgrounds. Ongoing research is focusing on cockpit-specific anthropometric dimensions necessary for flight safety and potential cockpit modifications for future aircraft.

II. Aeromedical Concerns.

The issues are more complex than height alone. Short stature is usually associated with a lower body weight. Weight is considered the most critical parameter in ejection seat safety due to its effect on acceleration of the system. Shorter individuals may be at increased risk for spinal injuries from ejection. Optimizing the field of vision often involves upward seat adjustment which in turn may interfere with arm reach for controls and/or leg reach for rudder control. Proper fit of shoulder harnesses for adequate seat retention and adequate strength to operate ejection and emergency releases are also critical issues.

III. Information Required for Waiver Submission.

Currently, individuals outside the height standards for either standing or sitting height are not eligible for FCI/IA waiver. There are some exceptions in the Air National Guard when individuals are targeted for training in specific aircraft. Individuals may be eligible for FCII and III waivers depending on their duty position and weapon system assigned. Waiver requests should be submitted with standing and sitting height annotated. If appropriate, a cockpit-specific evaluation for leg and arm reach, field of vision, etc. by a flight surgeon and instructor pilot should be included in the waiver packet. Evaluation at the Aeromedical Consult Service is not required.

IV. Waiver Considerations.

As research data on cockpit-specific anthropometrics become available, waivers may be granted on the basis of a panel of individual measurements. Most personnel currently granted FCII waivers for

short stature are flight surgeons. Many individuals granted FCIII waivers are medical personnel, but waivers have been granted to other personnel as well. Refer to AFI 48-123, Attach 15 for designated waiver authorities for different flying classes.

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WAIVER GUIDE
Updated: Mar 07
By: Maj Scott Cummis (RAM 08) and Dr Karen Fox

CONDITION:
Sickle Cell Disease/Trait

I. Overview.

Hemoglobin S 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.[3] The polymerization of deoxy hemoglobin (Hb) S is essential to vasoocclusive phenomena.[3] However, polymerization alone does not account for the pathophysiology of sickle cell disease. Changes in red cell membrane structure and function, disordered cell volume control and increased adherence to vascular endothelium also play an important role.[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] Disease manifestations are most severe in patients with sickle cell anemia, Hb SS.

Sickle cell anemia and Hb S-β° thal are characterized by a severe hemolytic anemia with intermittent painful vasoocclusive crises. Other typical acute complications of sickle cell anemia include 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. Hb S-β+ thal and Hb SC are characterized by rare crises and aseptic necrosis. Sickling is said to occur when the PO_2 falls below 60 mmHg, similar to the PO_2 at standard cabin altitudes.[6] Thus, sickle cell disease is clearly incompatible with a career in aviation.

Sickle cell trait (SCT) (Hb AS) is a benign condition where 20-45% of hemoglobin is Hb S. Normally human blood consists of 96-98% Hb A, 2-3% Hb A2, and <1% Hb F. SCT is <u>not</u> associated with anemia, change in red blood cell survival, or life expectancy alteration. Cases of red cell sickling in patients with SCT have been reported at altitudes as low as 9,000 feet; however, the majority of patients with SCT are unlikely to sickle below 21,000 feet.[7] Though persons with SCT are generally regarded as clinically normal there has been rare association of sickle cell trait with acute medical issues. The 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.[5]

Sickle cell disease/trait occurs often in sub-Saharan African populations and sporadically in those of Mediterranean, Middle Eastern or Indian descent. Between 7 and 9% of African Americans have sickle cell trait (SCT). It should be noted that the genetic defect that produces sickle cell occurs in Caucasians and that, in Europe, carriers are physically indistinguishable from the general population. Due to this, screening in the military is not limited to black recruits.

Until 1982, the US military restricted individuals with sickle cell trait from entering flight training, aircrew duties, and even attendance to 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." Currently, each individual is tested for sickle cell disease/trait prior to accession to the US Armed Services. A recruit will be allowed into the US Air Force with an Hb S level of up to 45%.

The blood of sickle cell trait carriers is tested by hemoglobin electrophoresis for percentage of Hb S and to evaluate for other co-existing hemoglobinopathies. The following table summaries electrophoretic patterns in common hemoglobinopathies.[4]

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.

Individuals with sickle cell disease have a severe risk of splenic infarct and other vasoocclusive episodes involving the abdomen, lungs or nervous system when exposed to hypoxia, infection, dehydration or exposure to cold. Sickle cell trait except for rare occasions is not associated with increased aeromedical risk.

III. Information Required for Waiver Submission.

Asymptomatic sickle cell trait (Hb AS) confirmed on hemoglobin electrophoresis does not require a waiver. During initial flying class physical a Sickledex™ result is required; if positive then hemoglobin electrophoresis is required. Hb AS, with Hb S up to 45 % is acceptable for flying duties. Results of Sickledex™, hemoglobin electrophoresis, complete blood count and history of no vasoocclusive episodes should be annotated on the initial flying class physical and forwarded to the certification authority.

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. The aeromedical summary should include the following:

A. A thorough history for any symptomatic vasoocclusive episodes, negatives included
B. Complete blood count
C. Hemoglobin electrophoresis
D. Hematology consult

IV. Waiver Considerations.

Condition	**Waiver Required**	**Waiver Potential Waiver Authority**
Asymptomatic sickle cell trait (Hb S ≤45%)	No	N/A*
Symptomatic sickle cell trait	Yes	No AFMOA/MAJCOM†
Hb SS, Hb SC, Hb S +thal, Hb S 0thal	Yes	No AFMOA/MAJCOM†

* Test results must be sent (PEPP) to certification authority annotated on initial flying class (I, II, III) physical
† FC I/IA – AETC; FC II – AFMOA; FC III - MAJCOM

The AIMWTS waiver file through January 2007 revealed 32 waiver submissions for the diagnosis of SCT for FC I/IA (4), FC II (7) and FC III (21). Waivers were granted in 29 of the 32 cases. 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. Of the three disqualified cases, one was a combination sickle cell trait/α-thalassemia with anemia; the other two had other disqualifying medical conditions (hepatitis C and H-3 hearing with hearing aids). No aviators were disqualified for a sole diagnosis of sickle cell trait.

Waiver Guide reviewed by the AF/SG Consultant for Hematology/Oncology, Lt Col Dave Ririe.

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WAIVER GUIDE
Updated: Feb 07
By: Aeromedical Consultation Service (ACS)

CONDITION:
Sleep Disorders

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, one of the commonest causes of excessive sleepiness, particularly in young adults, is poor sleep hygiene. Chronic sleep deprivation due to individual behavior patterns 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 to get six to eight hours of sleep for a twenty-four hour period, on a reasonably regular schedule. Careful attention must also be paid to alcohol use, since heavy use may disrupt sleep patterns, and may induce or worsen sleep apnea.

In civilian practice, insomnia is the commonest sleep complaint. The pattern of disturbance is usually helpful; 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 sleep-disordered breathing.

While narcolepsy was the classic sleep disturbance, the first description dating back to 1880, it is actually relatively rare. Narcolepsy is an exception to the rule noted above; narcoleptics tend to have a disrupted pattern of sleep, but the hypersomnolence is not simply related to sleep deprivation. Instead, narcolepsy appears to be a neurologic disorder characterized by the early onset of rapid eye movement (REM) sleep, with an age of onset usually in childhood or adolescence. The intrusion of REM patterns into different parts of the sleep-wake cycle may lead to unusual manifestations, such as hypnagogic (predormital) and hypnopompic (postdormital) hallucinations, and sleep paralysis. While classic, these manifestations usually occur only in about a quarter of narcoleptic patients. The essential disorder in narcolepsy is nearly uncontrollable attacks of sleepiness leading to brief naps, from which they usually awake feeling refreshed. Narcoleptics also experience episodic lapses of consciousness typified by automatic behavior and amnesia. Most subjects if questioned carefully have also had some form of cataplexy, characterized by loss of postural control (e.g., head drooping, knees buckling, even falling) associated with laughter or other emotions.

Obstructive sleep apnea (OSA) has emerged as a major 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. Prevalence among military aviators is unknown, but because obesity is much less common in that population, the rate is likely to be considerably lower. The key in 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 considerably depressed in stages III and IV of non-REM sleep, a pattern which continues throughout 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. A

modest amount of obstruction results in snoring, while a greater amount of obstruction may lead to hypopnea (>50% reduction of airflow for >10 seconds) or apnea (total cessation of airflow for >10 seconds). The disordered breathing causes either awakening or a lighter stage of sleep, which in turn results in fragmented sleep, while apneic episodes of sufficient duration may produce arterial hypoxemia. More recently it has been recognized that the increase in airway resistance itself, even in the absence of an actual decrease in airflow, may be enough to cause sleep fragmentation, a phenomenon known as the upper airway resistance syndrome (UARS). While the existence of this entity has been documented by esophageal manometry, with awakenings correlated to excessively negative intrathoracic pressures, the use of an esophageal balloon is too invasive for most clinical situations. Instead, UARS is usually diagnosed presumptively when the snoring patient with hypersomnolence and sleep fragmentation responds to a diagnostic trial of nasal CPAP during polysomnography.

The predominant symptom is typically daytime sleepiness; the greater the degree of sleep apnea, the more likely the individual is to fall asleep, especially when involved in boring or repetitious activity. He or she may feel an urge to nap, but unlike in narcolepsy these naps are usually not refreshing, since the disordered breathing occurs there as well. Sleep apnea may be associated with restless nocturnal behavior, choking sensations resolving immediately upon awakening (as opposed to esophageal reflux with aspiration), vivid dreams of strangulation/drowning, and in severe cases with morning headache (due to hypercarbia). While these symptoms are classic for OSA, the only symptom in moderate cases is typically hypersomnolence of varying degree. Recent development or worsening of symptoms is frequently due to weight gain. When symptoms are variable, particularly when a symptomatic patient has a negative polysomnogram, one should pay particular attention to the alcohol history.

Sleep apnea is clearly associated with hypertension. Sleep apnea patients have a 41% prevalence of systemic hypertension, about double what would be expected. The cause is unclear, though it may be due to sympathetic overstimulation from multiple arousals. Nocturnal hypoxia may occasionally result in cardiac arrhythmias, including ventricular tachycardia, a phenomenon primarily seen in older patients. Those with severe sleep apnea may develop diurnal hypoxia and hypercarbia, and eventually pulmonary hypertension and right-sided congestive heart failure.

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 polysomnogram suggests narcolepsy, multiple sleep latency testing needs to be performed the following day. 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. 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, it is strongly recommended that the initial diagnostic evaluation be arranged at Wilford Hall Medical Center to ensure consistency.

While multiple treatment options usually exists for sleep apnea, not all are compatible with aviation or worldwide duty. Positional therapy is likely to be effective only in mild OSA, and even then only when a significant positional component is identified during the sleep study. Medications have largely been ineffective for OSA, and those that have been tried are not waiverable drugs in and of

themselves. Oral appliances, which attach to the teeth or more rarely the tongue to advance the lower jaw, are frequently effective in moderate OSA, and are fully waiverable. 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. Compliance with long-term use has been a problem. For active duty personnel, the more immediate problem is that the use of CPAP is incompatible with worldwide qualification, since the device needs a continuous power supply. Several surgical options are available for OSA, including such procedures as palatoplasty and mandibular advancement; if effective at controlling the problem, any of these is waiverable. Tracheostomy would obviously not be waiverable, but is no longer performed for OSA. Narcolepsy is controlled by medications, but neither the disease nor the medications are waiverable for military aviation.

II. Aeromedical Concerns.

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 sleep deprived respond by altering sleep patterns, e.g., going into REM early or even immediately, but 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 flier who may deploy several time zones away and would still be expected to perform flying duties.

III. Information Required for Waiver Submission.

As noted earlier, the initial diagnostic workup need not be performed at Wilford Hall Medical Center, although this is certainly encouraged, particularly when one has a high index of suspicion for sleep apnea. Any aviator with a documented sleep disorder will require an ACS evaluation prior to returning to flying status. The ACS evaluation will include a polysomnography at Wilford Hall Medical Center Sleep Disorders Laboratory and neuropsychologic testing to evaluate cognitive function.

If an aviator is diagnosed with OSA, it is reasonable to treat him or her with an oral appliance to try to control the problem prior to the waiver evaluation. However, given the extreme variability in civilian 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 disorder should be confirmed at Wilford Hall Medical Center before considering a surgical procedure.

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, there have been several instances of aviators who were improperly diagnosed as narcoleptic.

IV. Waiver Considerations.

Aviators with mild OSA documented at the ACS are waiverable for full FC II duties. Aviators with moderate or severe OSA must be controlled by either an oral appliance or surgery before waiver will be considered. However, aviators with mild to moderate OSA may be considered for waiver if results of neuropsychologic testing are normal.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Somatoform and Factitious Disorders

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 e.g. panic disorder. The symptoms must cause clinically significant distress or impairment in social, occupational, or other areas of function. The somatoform disorders include: somatization disorder, conversion disorder, pain disorder, hypochondriasis, body dysmorphic disorder, undifferentiated somatoform disorder, and somatoform disorder NOS.

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.

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 status.

III. Information Required for Waiver Submission.

Waivers for flying duties may be considered for those cases which are successfully treated and remain asymptomatic and off medications for 6 months. The waiver package should include: a mental health evaluation, copy of the medical evaluation board (MEB) if applicable, an aeromedical summary outlining any social, occupational, administrative or legal problems associated with the diagnosis, and a letter from the aviator's supervisor supporting a return to flying status. Malingering is dealt with administratively.

IV. Waiver Considerations.

The ACS experience with these disorders is limited. Most questions concerning disposition and flying status are resolved in the field and are not referred to the ACS for an opinion. Based upon a

15 year (1981-1996) review of the USAF Aeromedical Consultation Service Cover Sheet File and the USAF Waiver File, six FC II aviators were found with these diagnoses, and three (50%) were granted waivers for return to flying status.

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WAIVER GUIDE
Updated: Jun 98
By: Lt Col Evan Kapp

CONDITION:
Spinal Curvature, Abnormal

I. Overview.

The center of gravity of the upper torso lies in front of the spine. Whenever loads are applied along the spinal axis, as in ejection, a torque is produced which increases as the disparity between the long axis of the spine and the line of application of the force is increased. While a Class IIB waiver may be granted to aircrew who are already trained, there is little point in considering for a waiver those who desire initial training involving ejection seat aircraft. The long term outcome in cases of scoliosis up to 30° is very favorable but above 30° is uncertain. Note that there is a 3-5° error in measurements taken by the Cobb method. Waiver is not necessary for cases of scoliosis of less than 25°. A waiver may be considered for individuals with scoliosis from 25-30°. Waiver is not normally granted when there is any noticeable deformity when the patient is dressed, when there is pain or interference with function or when the condition is progressive.

II. Aeromedical Concerns.

Excessive kyphosis, scoliosis, lordosis or combinations of them may make the spine unstable during ejection and more prone to injuries. Symptomatic conditions may cause distracting backache during flight. Surgical treatment is disqualifying.

III. Information Required for Waiver Submission.

Orthopedic consultation with measurement of any scoliosis by the Cobb method. Cardiology consultation may be required to exclude pulmonary hypertension in those cases where right axis deviation leads to ECG abnormalities.

IV. Waiver Considerations.

Approximately 80% of applicants with the condition have been found qualified. Those who had completed training usually received Flying Class IIB waivers.

V. References.

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Kapp

CONDITION:
Spinal Fracture

I. Overview.

Most RAF vertebral fractures occur at the T11,12/L1 level, with cervical spine injury rate reported as 1-2% of ejections within the envelope. Of the latter, the commonest injury is anterior compression of C5, which is usually stable. Stable injuries in the thoracolumbar spine are dependent upon the integrity of the posterior column structures (based on the three column model by Denis) especially the posterior ligamentous complex. By definition the middle column is intact preventing extrusion of bone or disc into the spinal canal or subluxation. This represents the majority of the compression fractures as they have less than 40-50% compression and are without posterior ligamentous disruption. Greater than 50% compression or multiple contiguous compression fractures, especially of the thoracic spine, may be relatively unstable, producing an unacceptable kyphotic deformity. However, burst fractures, tend to be acutely unstable because they represent a minimum of two column injured and one being a fracture of the middle column making neurologic involvement much more likely. Delayed degenerative joint disease of the spine has been reported even in those who have ejected only once. There does not appear to be a higher incidence of immediate spinal injury in aircrew who have ejected for a second or subsequent time.

II. Aeromedical Concerns.

There is a potential risk of damage to the spinal cord during ejection or high +Gz maneuvers. Decreased mobility following healing, spinal fusion or fixation may limit lookout from the cockpit. Aeromedical disposition is predicated on the success of the treatment whether surgical or spinal orthosis and upon recurrence of symptoms. The aviator should be fully rehabilitated postsurgery and without complications. Recurrences should be absent or rare and the aviator should be off medications.

III. Information Required for Waiver Submission.

Full orthopedic evaluation is required. Internal fixation may be required but will always result in categorical waiver.

IV. Waiver Considerations.

Fractures of transverse processes are not disqualifying if they are asymptomatic. Unrestricted waiver for compression fracture involving <25% of a single vertebra is possible and likely when the lesion has healed and is asymptomatic. More extensive fractures and multiple fractures may be considered for Class IIB waiver. Disposition will depend on the extent of the injury and any residual disability or retained internal fixation devices. In the UK, aircrew with crush fractures of the vertebrae are given strict bed rest for 3 weeks and are not allowed to return to flying duties for 3 months. Up to 90% of aircrew with simple, stable, crush fractures of vertebrae will return to full

flying duties, approximately half of whom required categorical waivers (Flying Class IIA, IIB or IIC).

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WAIVER GUIDE
Updated: Nov 05
By: Lt Col Timothy R. Paulding

CONDITION:
Splenectomy

I. Overview.

The spleen is the most commonly injured organ in blunt abdominal trauma. The traditional treatment for splenic injuries has been splenectomy. Splenectomy may also be performed for certain medical indications: (1) staging or treatment of Hodgkin's disease, and other lymphomas or leukemias, (2) symptom reduction in massive splenomegaly, or (3) correction of sequestrative or immune-mediated cytopenias (anemia, thrombocytopenia) resulting from another disease process (Banti disease, Leishmaniasis, malignant lymphoma, idiopathic thrombocytopenia, etc.). Spontaneous rupture of the spleen, though rare, may also require splenectomy.

Splenectomized patients have a life-long increased risk of overwhelming infection (overwhelming post-splenectomy infection, or OPSI) by encapsulated bacteria such as *Hemophilus influenza* type B (HIB), *Neisseria* species and especially, *Streptococcus pneumoniae*. Immunization against these bacteria reduces but does not eliminate this risk. The indications for splenectomy have become more conservative during recent years. This trend will likely persist as the threat of penicillin-resistant pneumococci increases. Some studies suggest an improved immunologic outcome following conservative management of splenic injury.

II. Aeromedical Concerns.

The aeromedical risk following therapeutic splenectomy is due to the underlying disease process necessitating the splenectomy and the long term risk of serious infection and, perhaps, vascular disease. Splenectomy greatly reduces the host's B-cell response which is particularly important in fighting infections with encapsulated bacteria. Rapid on-set, overwhelming bacterial sepsis may result. Early diagnosis and coverage with broad-spectrum antibiotics is necessary to prevent rapid decompensation and death. Mortality can be 50-70% despite appropriate therapy. The lifetime risk of postsplenectomy sepsis is about one to two percent. Higher rates have been reported among patients with Hodgkins's disease or thallassemia. Other serious bacterial infections (pneumonia, meningitis, peritonitis, and bacteremia) are also more common (4.5 per 100 person-years), particularly in the first few years post-splenectomy. Postsplenectomy risk is more common in those who are young and/or immunologically naïve at the time of splenectomy. Splenectomized patients are also susceptible to serious infections with unusual organisms such as *Babesia* and *Bartonella* species. Studies suggest an increase in thromboembolic events following splenectomy, possibly due to an increase in the duration that damaged red cells remain in circulation. Though data on this risk are sparse, patients with other risk factors for coronary artery disease may warrant special consideration.

III. Information Required for Waiver Submission.

The information required is determined by the underlying condition. IAW AFI 48-123 splenectomy for traumatic injury of a healthy spleen or hereditary spherocytosis does not require a waiver.

1. Aeromedical summary outlining circumstances of splenectomy and documenting the status of the underlying condition.
2. Complete blood count (CBC).
3. If the splenectomy was due to spontaneous rupture of the spleen, then a work up must prove the absence of malaria, infectious mononucleosis and leukemia.
4. Explanation of any additional conditions with potential for immunocompromise.
5. Documentation of the timing of initial immunization (and any boosters) with the polyvalent pneumococcal vaccine, HIB and meningococcal vaccines.
6. Consider prophylactic antibiotics against pneumococcus during the first few years post-op in higher risk patients.

IV. Waiver Considerations.

USAF Experience: there were 14 aviators in the Aeromedical Consultation Service (ACS) database as of Aug 05 that were status-post splenectomy. All but three (79%) had received waivers for their splenectomy. The reasons for waiver rejection of those three were the conditions leading to splenectomy or additional unrelated diagnoses, rather than the splenectomy itself. There were five aircrew members in AIMWTS with active waivers for splenectomy as of Aug 05.

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WAIVER GUIDE
Updated: Mar 99
By: Dr. Mun

CONDITION:
Spondylolisthesis

I. Overview.

Spondylolysis and spondylolisthesis appear to be manifestations of a fracture or cleft in the pars interarticularis of the vertebrae. In spondylolysis, there is no concomitant vertebral slippage. In spondylolisthesis, the vertebral body involved slips anteriorly on the vertebral body inferior to the affected vertebral body. These defects appear to reduce the ability of the spine to withstand the application of mechanical force. An increased incidence of back pain has been reported in patients with spondylolysis and high G forces may produce symptoms in an individual with spondylolisthesis. Such considerations preclude a recommendation for flying if the individual will be exposed to high G forces. Aircrew members who have frequent symptoms should not continue to fly. Further slipping of the vertebra can occur with exposure to G_Z forces, ejection or even during normal activities on the ground. Some cases who have only infrequent symptoms and therefore do not warrant surgery may need to be banned from ejection seats. Medical treatment consists of bedrest, analgesics and bracing. Surgical correction by spinal fusion is indicated if there is further forward movement of the vertebrae or if the flyer has recurrent symptoms. Spinal fusion is compatible with FCII waiver in appropriate cases. Cervical fusions at multiple levels generally receive FCIIB waivers.

II. Aeromedical Concerns.

Spondylolisthesis is unlikely to cause incapacitation in flight but if symptomatic, will cause considerable distraction. Theoretically, spondylolisthesis could cause severe problems on ejection.

III. Information Required for Waiver Submission.

Spondylolisthesis is a radiological diagnosis made after initial presentation. Most commonly seen is L5 on S1 spondylolisthesis. A complete history and physical exam and plain x-rays is usually all that is required. A CT scan of the spine may be required in selected cases.

IV. Waiver Considerations.

Over 90% of the small number of aircrew applicants with this condition have received waivers. Waivers will be decided on a case by case basis. AFI 48-123 finds both spondylosis and spondylolisthesis disqualifying if symptomatic. If surgery has been performed, a medical waiver request could be submitted after surgery once 6 months have elapsed and there has been full rehabilitation. Waiver authority for FCII is MAJCOM/SG; if categorical waiver is sought, waiver authority is AFMOA/SGPA. Terms of validity are decided by the waiver authority.

V. References.

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WAIVER GUIDE
Update: Mar 06
By: Lt Col Mark Krautheim

CONDITION:
Subarachnoid Hemorrhage, Non-Traumatic

I. Overview.

Subarachnoid hemorrhage (SAH) is the presence of blood in the space between the arachnoid membrane and the pial covering of the brain or spinal cord, the space usually occupied only by water-like cerebrospinal fluid (CSF). The most common cause of this condition is traumatic injury. In trauma the SAH is typically more peripherally located over the convexity of the brain and usually accompanied by other injuries. For waivers considerations related to head trauma refer to the head injury waiver guide, this discussion is limited to non-traumatic SAH.

The most common non-traumatic cause is the rupture of a cerebral aneurysm; this is responsible for about 85% of spontaneous SAH (1). These aneurysms are most commonly located at the base of the brain where the major cerebral arteries have traversed the dura and are bifurcating and transiting the basal CSF cisterns. Cerebral aneurysms typically arise at one of these bifurcation points, and rupture leads to escape of blood into these relatively large CSF spaces. Occasionally bleeding may extend directly into the brain parenchyma or track through the subarachnoid space to the cerebral ventricles. If the patient survives the initial hemorrhage, they are at risk for secondary complications such as re-bleeding, hydrocephalus and cerebral infarcts due to vasospasm. Vasospasm is felt to be an inflammatory response of the cerebral vasculature caused by the blood clot and its breakdown products in the CSF. Other less common causes of SAH include arteriovenous malformations, tumors, bleeding diathesis, spinal vascular malformations. Occasionally no other underlying cause of SAH is identified; a unique instance of this appears to be SAH confined to the perimesencephalic cistern. This entity follows a rather benign course when compared with aneurysmal hemorrhage (2).

The risk of aneurysmal SAH increases with age to a maximum incidence around age 55. As with other causes of stroke; hypertension and smoking are important risk factors. A sentinel headache may have been present a few days to weeks before a SAH in up to 20% of cases, but for the majority it is a sudden severe “worst headache” of their life that presents in a thunderclap fashion (maximal intensity within 2 minutes of onset) and heralds the SAH. Depending on the severity of the hemorrhage, the neurological presentation may vary from headache with mild evidence of meningeal irritation such as nuchal rigidity and photophobia up to coma with unstable vital signs. The initial case fatality rate is around 50% (2). Clinical grading schemes have been used to describe the severity of the SAH. The Hunt and Hess scale has been popular for many years. A scale proposed by the World Federation of Neurological Surgeons that includes the Glasgow Coma Scale has gained in popularity as it may offer a more reproducible assessment (6).

SAH is diagnosed by CAT scan. In cases in which there is clinical suspicion of SAH but the CAT scan is not diagnostic, lumbar puncture may be required. CSF studies must also include evaluation of xanthochromia following centrifuge. This must be specified as this test is not routinely done by clinical labs on CSF samples. The vascular anatomy is typically defined by digital subtraction angiography but CT angiography is becoming more reliable with resolution comparable to

conventional angiography (3). MRI may have some role in defining early infarcts or looking at the anatomy of partially thrombosed aneurysms, but the degree of illness and monitoring required usually makes MRI and MRI angiography impractical in the early phase of this disease (2).

Patients suffering a spontaneous SAH require intensive care preferably in a facility with a neurological/neurosurgical ICU. Blood pressure, if elevated, is controlled with intravenous medications. The oral calcium channel blocker, Nimodipine, has been shown to have some benefit in decreasing strokes from cerebral vasospasm. Since the risk of rebleeding is highest in the first few days after a SAH, treatment to obliterate the aneurysm, either direct surgical clipping or endovascular occlusion with platinum coils is usually done early in suitable patients(4). Deliberate hypertension, volume expansion and balloon angioplasty are techniques used in the treatment of cerebral vasospasm.

II. Aeromedical Concerns.

Even if the patient has an aneurysm successfully treated and escapes early complications only about 20-25% report no or minor symptoms at one year (5). Neuro-psychological deficits occur in up to 46% of survivors (2). Rebleeding can occur after treatment if the aneurysm is not completely secured and some residual aneurysm neck remains. The risk of rebleeding during the first year is 3.6% in the surgery group and 4.2% in the endovascular group. The rebleeding risk then drops to <0.1% in both categories after the first year. The risk of seizure from the time of discharge to the end of the first year is 4.1% in the surgery group and 2.5% in the endovascular group (5). Although the risk of seizure drops after the first year there is not enough data to support an earlier return to flying.

III. Information Required for Waiver Submission.

Waiver consideration would be unusual after an aneurysmal SAH and would require a prolonged period (5 years) of observation as with severe head trauma. Neuropsychological testing done locally when the flyers condition has stabilized may be helpful in identifying residual deficits and in selecting flyers appropriate for waiver consideration. A complete neurology and / or neurosurgical consultation with EEG and the appropriate angiographic imaging to rule out any residual or additional cerebral aneurysms will be required with waiver submission. An ACS evaluation with full neuropsychological evaluation is suggested for flyers considered for waiver.

IV. Waiver Consideration.

A search of ACS data base from 1976 -2002 yielded seven flyers evaluated with a primary diagnosis of SAH. Waiver was recommended in three and not recommended in four. Waiver consideration for SAH due to something other than an aneurysm or without a defined cause, such as SAH limited to the perimesencephalic cistern, will need to be evaluated on a case by case basis. A search of AIMWTS revealed only one case for non-traumatic SAH; waiver granted for a bleeding incident due to an ENT procedure on nasal polyps.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITION:
Suicide Attempt

I. Overview.

Suicide is not a psychiatric disorder but a "complicated, multidimensional, conscious and unconscious "choice" of the best possible practical solution to a perceived problem, dilemma, impasse, crisis, desperation." (Shneidman, 1985) Simply put, suicide results from unendurable emotional pain, and the belief that only continuation or cessation of pain are options and thus cessation of pain is preferable; elements of despair, distress and loss of control are common. Suicide attempt (parasuicide-attempters) is a somewhat different phenomenon from suicide (completers); attempters report less precipitating pain and the desired outcome is more likely to be a cry for help rather than death. Attempters most often use medication overdose while completers use a gun, carbon monoxide or hanging. Little is known about aviator suicide or suicide attempts. In an unpublished paper (Patterson, 1988) USAF aviator attempters and completers were studied. 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 most often variously signal their intentions. However, since aviators are known for their use of denial, rationalization, etc. and compartmentalization, aviator suicidal intentions may be subtle and may not be perceived by aviator colleagues who are similarly psychologically defended. 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. 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 nearly 11.6 per 100,000 people; the rate for attempts compared to completed suicides is approximately 23:1. Within the Air Force, statistics collected over the past 5 years show the rate for completed suicides has decreased from 16.4 per 100,000 Airmen in 1994 to 9.4 per 100,000 Airmen in 1998. The overall rate for officers is lower (2.8 per 100,000 in 1998, for example). There are no separate data for aircrew members included in these reports.

II. Aeromedical Concerns.

From the little that is known about aviator suicide, the incidence is small, and probably much less than most other military or civilian occupational groups. However, suicidal ideation or activity must always be taken seriously in any individual, and such factors are of particular concern in aviators 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. 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, intimate relationship deterioration, etc.

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 (see AFI 44-109, *Mental Health and Military Law*). 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 (see AFI 36-2104, *Nuclear Weapons Personnel Reliability Program*), if applicable.

III. 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.

Any psychiatric diagnosis established in such circumstances should be considered disqualifying until successfully treated and resolved (see applicable waiver guide). 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.

Perhaps half of suicide attempts involve the ingestion of alcohol. 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*.

IV. Waiver Considerations.

A 15-year review (1981-96) of the USAF Waiver File and the ACS Cover Sheet File showed that 14 FCII fliers (excluding flight surgeons) were disqualified for attempted suicide. Of these fliers, 11 (79%) ultimately received a recommendation for FCII waiver.

V. References.

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WAIVER GUIDE
Updated: May 99
By: Lt Col Clemens

CONDITION:
Supraventricular Tachycardia

I. Overview.

Supraventricular tachycardia (SVT) is defined as 3 or more consecutive non-ventricular ectopic heart beats at a heart rate of greater than or equal to 100bpm. In 1992 the ACS reviewed 430 aviators with 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. There were an additional 21 (5%) with recurrent, sustained, asymptomatic SVT. Recurrent is defined any recurrence. Sustained is defined as SVT lasting greater than 10 minutes in duration.

The study 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 those with recurrent sustained SVT or those with WPW pattern on ECG and any degree of SVT were at higher risk for future symptomatic events.

II. Aeromedical Concerns.

The aeromedical concerns with SVT are 1) hemodynamic symptoms associated with any degree of sustained or nonsustained SVT and 2) recurrent episodes of sustained SVT.

III. Information Required for Waiver Submission.

Only those free of hemodynamic symptoms will be considered for waiver. (Palpitations are not considered to be a hemodynamic symptom.)

For a single asymptomatic episode of SVT of 3- to 10-beats in duration, a local evaluation only, should be performed and sent for ECG Library/Aeromedical Consultation Service (ACS) review. The local evaluation includes thyroid function tests, a total of three Holter monitors (can be performed as quickly as one a day for 3 days), an echocardiogram and a treadmill test.

Those individuals with recurrent episodes of SVT or an episode greater than 10 beats in duration will require local evaluation as above and ACS evaluation if considered waiverable after the local evaluation has been reviewed.

IV. Waiver Considerations.

Prior to October 1992, only 36% of flyers with SVT obtained waivers. After the ACS management group report, the policy change has allowed up to 80% of flyers with SVT to return to flying duties.

Disqualification is mandatory in cases of SVT with hemodynamic compromise, single sustained SVT with gradeable CAD, recurrent, sustained SVT when the recurrence is at intervals <3 years and any SVT associated with a pre-excitation pattern on ECG. Depending on the mechanism of SVT, waiver may be considered on a case-by-case basis after successful radiofrequency ablation. For such cases, the ACS should be consulted prior to ablation; if considered, ablation should/would probably be done in conjunction with an ACS evaluation.

ACS follow-up after evaluation is not required for cases of single, nonsustained SVT (< 10 minutes in duration) but is mandatory every 3 years for all others.

V. References.

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WAIVER GUIDE
Updated: Feb 07
By: Col Jon Casbon (RAM 08)

CONDITION:
Syncope

I. Overview

Syncope is a temporary loss of consciousness and postural tone due to global cerebral hypoperfusion.[5] "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.

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.[4] The etiology is diverse: syncope can be caused by disturbances in homeostasis or neurally-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.

The most common causes of syncope in people without underlying disease are *vasodepressor* and *vasovagal* syncope. These terms are often used synonymously; however, vasodepressor syncope refers to the collapse of peripheral resistance and hypotension without bradycardia, while vasovagal syncope involves both collapse of peripheral resistance and vagus-mediated bradycardia.[5] These result from disturbances in the homeostatic mechanisms that normally interact to maintain normal cerebral perfusion. These homeostatic mechanisms are affected by a variety of neural influences including visual and emotional stimuli.[5] 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.[2] The overall recurrence rate for vasovagal syncope has been estimated at 30 percent.[2] 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.[2,6]

In contrast, syncope due to underlying cardiac disease or arrhythmia is associated with significantly higher all-cause and cardiovascular mortality, and risk of recurrence.[6] Thus it is important to evaluate patients with a history of syncope for potential cardiac causes.

In addition, it is very important to distinguish syncope from epileptic seizures, since the latter have a high risk of recurrence and cause severe incapacitation.

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.[5]

Posture: Syncope almost always occurs in the upright position, while seizures may occur in any position. Significant cardiac dysrhythmias can cause loss of consciousness in any position.

Pre-syncopal symptoms: Vasodepressor or vasovagal syncope is often preceded by a prodrome which may last for several minutes. Symptoms may include nausea, repetitive yawning, deep breathing, visual symptoms (tunnel vision or abnormal perception of color), sweating and dry mouth. The individual may appear pale, and the skin may be cool and clammy.[5] This prodrome should be distinguished from the "aura" of seizures. Arrhythmias may cause sudden loss of consciousness without a prodrome.

Syncopal episode: In syncope, collapse is sudden, with complete loss of muscle tone. Duration of vasodepressor or vasovagal syncope is usually brief, usually 5-20 seconds, unless restoration of cerebral perfusion is prevented due to a non-supine position. Breathing is usually shallow; pulse may be weak and/or bradycardic. Recovery following vasodepressor/vasovagal syncope is rapid, with little or no amnesia or confusion. *Convulsive accompaniments*, manifested by asynchronous myoclonic jerks, twitching of the face and hands and tonic posturing, are common in syncope, especially if duration is prolonged due to upright posture. This is due to global hypoxia as opposed to the excessive neuronal discharges seen in epilepsy. In contrast, seizures are associated with prolonged post-ictal confusion; generalized and prolonged tonic-clonic movements are more likely; and tongue-biting is common.[3] Urinary incontinence may occur in up to 10 percent of patients with syncope, so it is not useful in distinguishing seizure from syncope.[3,5]

Syncopal Setting: It is very important to determine the sequence of events or environmental factors that might have contributed to the suspected syncopal episode. Vasodepressor or vasovagal episodes are frequently induced by prolonged standing, venipuncture, heat exposure, painful or noxious stimuli, fear of bodily injury, or exertion. Dehydration, salt loss, fluid loss, concurrent illness, alcohol consumption or medications may alter homeostatic mechanisms. Sudden standing from a recumbent or squatting position may precipitate orthostatic hypotension. Other physiologic activities or maneuvers, such as voiding, defecation, cough, swallowing or inadvertent carotid massage may induce reflex hypotension.[3,5]

II. Aeromedical Considerations

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.

Only the following limited circumstances do not require waiver:

A. An isolated (single) episode of "neurocardiogenic" (vasovagal or vasodepressor) 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.[1] NOTE: multiple or recurrent episodes require 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.[1]

C. (1.) High-G loss of consciousness (G-LOC) during a centrifuge run, unless there are neurologic sequelae, or evidence that the G-LOC occurrence is associated with coexistent

disease or anatomic abnormality. (2.) In-flight G-LOC caused by an improperly performed anti-G straining maneuver (AGSM), or a disconnect of the anti-G protective suit, and is managed as a physiological incident.[1]

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 waiver submission.

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. Information Required for Waiver Submission

Waiver submissions require the following information:

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. Electrocardiogram (ECG).

C. 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.

D. Additional tests and evaluations: Submit 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. should be submitted, if possible.

IV. Waiver Considerations

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. Summary of waiver requirements for syncope.

Nature of syncope	Flying Class	Waiver required?	Waiver authority	ACS evaluation required?
• Single episode with benign precipitating cause, <1 min. duration* • "Simple" physiologic* • "Simple" G-LOC* *(Paragraphs II.A-C, above)	All	No	NA	No
All other loss or disturbance of consciousness	I, IA,	Yes	AETC	No
	II		AFMOA	Yes
	III		MAJCOM	No

A query of AIMWTS revealed the following waiver experience:

A. Flying Class I/IA: 10 entries; 5 approved for waiver, 5 disapproved. Most approved waivers had single syncopal episodes with well-defined precipitating factors and minimal aeromedical risk, or remote history of syncopal episode. Disapproved waivers tended to have multiple syncopal episodes, low threshold for syncope, or atypical syncopal features.

B. Flying Class II: 40 entries; 26 approved for waivers (22 FC II, 4 FC IIA, 1 FC IIC), 13 disapproved. Approved waivers had similar characteristics to approved FC I waivers. In addition, two FC IIA waivers were given for recurrent G-LOC or inability to pass centrifuge training. Disapproved waivers were similar to FC I disapprovals, but also included several cases of uncertain etiology or episodes suspicious for seizures.

C. Flying Class III: 36 entries; 19 approved for waiver; 17 disapproved. Approved and disapproved cases were similar to FCs I and II. In addition, several disapproved cases had positive tilt table results and required non-approved medications for control of symptoms. One disapproved case had a profound in-flight syncopal episode suspicious for cardiac arrhythmia.

This waiver guide was reviewed by the ACS Neurologist, Dr Stephen McGuire and the ACS Senior Cardiologist, Dr William Kruyer.

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WAIVER GUIDE
Updated: Mar 99
By: Col Falk

CONDITION:
Testicular Tumors, Nonseminomatous (NSGCT)

I. Overview.

Testicular tumors account for 1% of all tumors and 0.1% of all cancer deaths in men. Sixty percent of testicular germ cell tumors are **nonseminomatous** (embryonal cell carcinoma, teratocarcinoma, and teratoma).

The peak incidence of nonseminomatous tumors occurs at 20 years of age. Approximately 33% of patients present with disease limited to the testis (stage I). Of concern in evaluating and managing a newly diagnosed patient is the limited diagnostic accuracy of current staging methods. Despite negative imaging studies and serum tumor markers (clinical stage I disease), 30% of NSGCT patients have pathologic evidence of metastatic disease (clinical stage II or greater). Metastasis is most commonly found in the retroperitoneal lymph nodes.

Based on BEP (Bleomycin, Etoposide, Cisplatinum) chemotherapy, reported cure rates for NSGCT are greater than 95% for low stage disease. Management options with similar cure rates for clinical stage I disease include retroperitoneal lymph node dissection (RPLND) versus close observation. Salvage chemotherapy in the event of reappearance of tumor is so successful that careful monitoring of tumor markers, chest x-rays, and abdominopelvic CT imaging is acceptable. Some clinicians believe that RPLND is preferable because two-thirds of the patients found at surgery (pathologic stage II) to have retroperitoneal node involvement are cured by surgery alone. Consequently, a similar controversy exists on whether to perform RPLND on clinical stage II patients or to proceed directly to primary chemotherapy. Cure rates are reported from 95 – 98% for both of these therapeutic pathways.

With current nerve-sparing surgical techniques, there is little long-term morbidity following RPLND. The ejaculatory/seminal emission problems historically associated with this procedure have been greatly reduced without compromising outcome. Late complications of BEP chemotherapy include decreased renal function, Raynaud's phenomenon, neurotoxicity, major vascular occlusion, chronic pulmonary toxicity and secondary malignancies.

II. Aeromedical Concerns.

The aeromedical concerns primarily include the logistics associated with surveillance of clinical stage I patients and the potential long-term morbidity of chemotherapy. Requirement for frequent CT and tumor marker studies could impact assignability and deployment of aircrew involved in non-surgical surveillance protocols for stage I disease. The mortality associated with RPLND is essentially zero, and morbidity is reported as immediate post-operative small bowel obstruction and pneumonia. Chemotherapeutic morbidity, particularly pulmonary toxicity associated with bleomycin, must be ruled out in the flying community.

III. Information Required for Waiver Submission.

Serum tumor markers (Alpha fetoprotein and Beta human choriogonadotropin), chest X-ray and abdominopelvic CT are the standard tools for evaluation of relapse or metastasis in NSGCT. Postchemotherapy aircrew should also have pulmonary function tests and a general evaluation for any evidence of morbidity. Studies have also shown a significant increase in psychological stress, particularly among some patients required to undergo frequent surveillance studies. Evidence of change in psychological profile, related to stress or fear of relapse or related to potential neurotoxicity of chemotherapy should be referred to the Aeromedical Consultation Service (ACS) for evaluation.

IV. Waiver Considerations.

Historically, more than 80% of NSGTC patients have been returned to flight status. This includes a patient with a lung metastasis surgically excised. Clearly, the majority of patients evaluated will have either stage I or stage II disease. However, cure rates in more advanced NSGCT warrant waiver consideration if the patient's general physical condition is consistent with return to flight status.

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WAIVER GUIDE
Updated: Jan 07
By: Dr Jeannemarie Hinkle and Dr Karen Fox

CONDITION:
Testosterone Replacement for Hypogonadism

I. Overview.

Acquired male hypogonadism is an increasingly recognized phenomenon. The presentation includes fatigue, depression, decreased libido, impotence, decreased strength and infertility. Due to the ease of application of new replacement formulations, there has been increased interest in diagnosis and treatment. The diagnosis is based on the above symptoms and a documented low 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. Because testosterone is highly protein bound, at least one measurement of free testosterone should be done if there is a reasonable concern about protein binding abnormalities (common situations of this are obesity and male senescence).

Primary hypogonadism is caused by testicular failure. Lab testing would reveal low testosterone levels and sperm counts and elevated gonadotropin {follicle stimulating hormone (FSH) and luteinizing hormone (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 (Klinefelter's syndrome) or idiopathic. Primary hypogonadism is more likely to be associated with gynecomastia. On the other hand, central (secondary or tertiary) hypogonadism is evidenced by the same low testosterone levels in the face of low or inappropriately normal FSH and LH levels. 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.

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 better tolerated than the injection forms. 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 of above and below normal levels. In contrast, the *transdermal* testosterone preparations have few side effects other than those of the drug itself. Sometimes there is a local reaction to the patch that 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 of their association with substantial hepatotoxicity, including the development to benign and malignant neoplasms.

Testosterone is a controlled substance 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.

The major advantage of transdermal administration is maintenance of relatively stable serum testosterone concentrations, resulting in a more consistent energy, mood, and libido. Testoderm TTS® relies upon chemical means to increase the absorption of testosterone across nonscrotal skin, and it is meant to be worn on the arm or torso. It 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, experience exacerbation of benign prostatic hyperplasia (BPH) and, possibly, of prostate cancer, because both are testosterone dependent diseases. Sleep apnea and erythrocytosis may be worsened.

Transdermal preparations for primary male hypogonadism or hypogonadotropic hypogonadism include:
Androderm®: apply two systems nightly to clean, dry area on the back, abdomen, upper arms, or thighs for 24 hours for a total of 5mg per day.
AndroGel®, Testim(tm): 5g (to deliver 50mg of testosterone with 5mg systemically absorbed) applied 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. The value should be well within the normal range (400 to 800ng/dL [13.9 to 27.7nmol/L]). 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 initially measure a true peak, three to four days after injection, and the trough, one to two days before the next dose; ensuring levels are not to high or low. Once dosing with injectable testosterone is well established then serum testosterone can be measured midway between injections.

II. Aeromedical Concerns.

Hypogonadism from any cause is associated with decreased strength, decreased muscle mass, anemia, and 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-theraputic levels prior to the next shot. If injections are used, one method to decrease this variability is to shorten the time between injections, two weeks at the most.

III. Information Required for Waiver Submission.

Documentation of an adequate work-up for the hypogonadism is required for an <u>initial waiver</u>. This includes:

A. History of symptoms; need to include symptoms of BPH or sleep apnea (pertinent negatives also)
B. Physical examination; need to include prostate exam if over age 50 (also PSA).
C. Two or more pre-treatment testosterone levels less than 200ng/dl.
B. FSH and LH levels (with normal ranges specified); in order to establish primary or central hypogonadism.
C. For primary hypogonadism, a careful history for causes, especially a history for genetic abnormalities or cryptorchidism; list pertinent negatives.
D. For central hypogonadism, this would include basic chemistry and liver tests, prolactin and thyroid stimulating hormone (TSH) levels, an MRI of the sella turcica, and endocrinology consult. No further testing is indicated if these values are normal.
E. Baseline hemoglobin and hematocrit
F. Current treatment doses, formulations, and documentation of therapeutic testosterone levels once the dose strength is stabilized.

The following information will be required for <u>waiver renewal</u> every three years (if any abnormalities surface in the interim, they will need to be addressed appropriately):

A. Documentation of history for symptoms of BPH or sleep apnea in follow-up visits.
B. Current treatment doses, formulations and documentation of therapeutic testosterone levels (at least annually once established).
C. Hemoglobin and hematocrit should be measured initially after three months and then annually.
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.

Table 1 is a summary of the requirements for both initial waiver and waiver renewal.

TABLE 1: Requirements for Initial Waiver and Renewal of Waiver

Type of Study or Test	Needed for Initial Waiver	Needed for Renewal of Waiver
AMS	Yes	Yes Comment on: symptoms of BPH and/or symptoms of OSA
≥2 pre-treatment testosterone levels ≤200ng/dl	Yes	N/A
History of primary hypogonadism	Yes Comment on: genetic abnormalities and/or cryptorchidism	N/A
History of central hypogonadism	Yes Additional tests: Chem 6, LFT, serum prolactin, TSH, and MRI of sella turcica	N/A
Current treatment formulations	Yes	Yes
Current treatment dosage	Yes	Yes
Documentation of therapeutic testosterone levels	Yes; once dose strength has stabilized	Yes and every 3 months after any dose change of medication or change in the preparation of medication (especially to a gel)[1]
Hemoglobin/hematocrit	Yes	After 3 months of therapy then annually
Male patient > 50 years of age: digital exam	Yes; biopsy if positive for nodule	Yes; biopsy if positive for nodule
Male patient > 50 years of age: serum PSA	Yes	Yes; biopsy if rise of PSA is >0.75ng/ml per year over 2 years or > 1.5ng/ml in one year

[1] 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.

IV. Waiver Considerations.

Table 2 is a summary of the waiver potential and authority for hypogonadism treated with testosterone.

TABLE 2: Waiver Potential and Authority per Flying Class

Flying Class	Waiver Potential Waiver Authority
FC I/IA	No AETC
FC II	Yes MAJCOM
FC III	Yes MAJCOM

Review of AIMWTS through November 2006 showed 17 cases of hypogonadism (12 - FC II and 5 – FC III) treated with testosterone. Twelve were treated with topical and five with injectable testosterone. All were granted waivers except two and they had other medical conditions that were not waiverable (depression and diabetes).

Waiver Guide reviewed by the AF/SG Consultant for Endocrinology, Lt Col Tom Sauerwein.

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WAIVER GUIDE
Updated-12/99
By Dr. Butler

CONDITION:
Thallassemia

I. Overview.

Thallassemia denotes an inherited production abnormality of hemoglobin subunits. It is an autosomal recessive disease most commonly affecting people of Mediterranean or Asian origin (the heterozygous condition partially protects from malaria). The hemoglobin subunits involved include alpha, beta, delta, and gamma chains. Normal hemoglobin, Hgb A, is a tetramer composed of two alpha chains and two beta chains. Homozygous disease is not compatible with a long life. In "thallassemia major," there is a defect in beta chain production. Here, a significant amount of hemoglobin is Hgb F (two alpha chains and two gamma chains). This tetramer is unstable, readily breaks down, and results in severe microcytic, hypochromic anemia. In contrast, "hemoglobin H disease" has a defect in alpha chain production. The resultant tetramer, Hgb H (four beta chains), is unstable producing severe microcytic, hypochromic anemia. Because Hgb H binds oxygen very tightly seldom do these individuals survive long life. Another more virulent alpha chain defect (four gamma chains---Hgb Bart's) causes the deadly *hydrops fetalis*. Needless to say, it is heterozygous disease that is encountered in aircrew evaluations. In "thallassemia minor," beta chain underproduction is countered with delta chain overproduction. Hemoglobin A_2 (two alpha chains and two delta chains) is the result. This hemoglobin is also unstable; however, since it makes up only 3–7% of the RBC hemoglobin mass, rarely is there more than a mild anemia seen. Likewise, heterozygous alpha thallassemia (characterized by very small amounts of Hgb H and/or Hgb Bart's) rarely produces more than a mild anemia.

II. Aeromedical Concerns.

The homozygous thallassemias are incompatible with long life, let alone aircrew duties; however, the heterozygous thallassemias generally do not impair normal life and are compatible with aircrew duties. The only potential concern is a mild, microcytic, hypochromic anemia.

III. Information Required for Waiver Submission.

Because iron deficiency anemia is a major cause for microcytic, hypochromic anemia, serum iron, TIBC (total iron binding capacity), and serum ferritin are required for initial waiver. In addition, hemoglobin electrophoresis is required for initial waiver.

VI. Waiver Considerations.

The asymptomatic aircrew member is a waiver candidate. Likewise, the aircrew member with minimal anemia is a waiver candidate. In fact, review of the Aeromedical Consultation Service experience revealed 85 aircrew with thallassemia (all heterozygous). None of the twelve with mild anemia was disqualified. All told, almost 97% have received waivers. Waiver guidance for heterozygous thallassemias associated with other hemoglobinopathies can not be generalized and require individualized evaluation.

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WAIVER GUIDE
Updated: May 07
By: Maj Lisa K. Snyder (RAM 08) and Dr Karen A. Fox

CONDITION:
Thrombocytopenia, ITP, and TTP

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.

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 10,000/mm^3 and treatment is usually initiated if platelets are less than 30 X 10^9/L.[5]

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

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.[10] 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.

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%.[20] 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, and rifampin. 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.[14]

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.[22] 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.[6] ITP occurs more commonly in women during the second and third decades but can occur in either sex and at any age.[3] 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.[6]

In childhood, ITP is usually acute in onset and many cases resolve with and without treatment.[2, 21] If ITP was diagnosed in childhood (<18-years-old) and complete resolution was achieved,

regardless of treatment,[17] prognosis is excellent with no long term sequelae.[23] 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.[23] 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).[17]

It is estimated that the lifetime risk of fatal hemorrhage for a person with ITP is approximately 5%.[5] The risk of a nonfatal major hemorrhage was found to be 3% per year for patients less than 40 years of age.[5] No conclusive data exist regarding the ability of clinical or laboratory parameters at presentation to predict the risk of major bleeding.[21]

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.[16] Treatment includes 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. However, most patients (70 to 95%)[4] either do not respond adequately or relapse as the corticosteroid is tapered; splenectomy can achieve a remission in about ⅔ of these patients.[14] Of the 30 to 40% of adults that require therapy after splenectomy, the incidence of intracerebral hemorrhage ranges from 2 to 3% per year.[3]

Thrombotic thrombocytopenic purpura (TTP): 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.[9] 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).[15, 19]

Plasma exchange is the only treatment for TTP in adults which has firm data supporting its effectiveness.[9] 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.[18] Many patients describe persistent cognitive abnormalities for many years following recovery that can be documented by tests of new learning and recent memory.[18]

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. Information Required for Waiver Submission.

Waiver is required for persistent thrombocytopenia under 100 X 10^9/L and history of ITP or TTP.

The aeromedical summary for <u>initial</u> waiver 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 glucocorticoid steroids waiver guide)
F. Medical evaluation board (MEB) results for ITP, TTP and thrombocytopenia associated with splenomegaly.

The aeromedical summary for <u>renewal</u> waiver should include the following:

A. Comprehensive history and physical
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

IV. Waiver Considerations.

Table of FC I/IA, II and III waiver potential for thrombocytopenia, ITP and TTP.

Flying Class (FC)	Condition/Treatment	Waiver Potential Waiver Authority
FC I/IA **Initial FC II** **Initial FC III**	Thrombocytopenia or ITP (childhood, < 18-years-old) that resolved. ITP/TTP/causes other than transient (≥18-years-old).	Yes AETC No AETC
FC II **FC III**	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 AFMOA (FC II) MAJCOM (FC III) No MAJCOM Yes AFMOA (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 Aeromedical Consultation Service (ACS) evaluation is likely.

Review of AIMWTS through March 2007 showed 12 cases of thrombocytopenia; two were FC I, eight were FC II and two were FC III. Of the 12, ten were granted waivers and two were disqualified. The two disqualifications were for initial FC I in a cadet with previous ITP (19-year-old at initial presentation) and history of urticaria and for FC II in an experienced pilot with recurrent ITP, symptomatic and on long term immunosuppression.

Waiver Guide reviewed by the AF/SG Consultant for Hematology/Oncology, Lt Col Dave Ririe.

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WAIVER GUIDE
Updated: Mar 99
By: Col Saenger

CONDITION:
Thyroid Cancer

I. Overview.

Cancer of the thyroid is rare; death from it is rarer still. Overall the relative 10 year survival rate is better than 90% (second only to nonmelanoma skin cancer). Cancer of the thyroid should be considered whenever a thyroid mass is found. Most thyroid cancers are diagnosed at a local stage (61%), occur in non-Hispanic whites (79.5%) and in females (74.6%). There are four histologic types of thyroid cancer: papillary (74% of thyroid cancers), follicular (18% of thyroid cancers), medulary, and undifferentiated (anaplastic). Age at diagnosis, stage and histologic types are important prognostic indicators.

Papillary Cancer:
- Age at diagnosis: Most frequently 10-50 years old
- 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.
- Prognosis: Excellent. Ten year relative survival better than 0.98. Patients younger than 40 years have better prognosis than older patients.

Follicular Cancer:
- Clinical Course: Tends to metastasize hematogenously to bone and lungs. Often the bone lesion (lytic lesions and pathologic fractures) is the presenting symptom. Small primary lesions in the thyroid may be overlooked.
- Prognosis: Excellent. Ten year relative survival rate greater than 0.92 in SEER study. Patients younger than 40 years have 86% cure rate, while those over 60 years have only 26% cure rate.

Medullary Cancer:
- General: Accounts for 3% of thyroid cancers. Arises from parafollicular cells which produce thyrocalcitonin.
- Clinical Course: Two patterns - a unifocal lesion occurring sporadically in elderly and a bilateral form often associated with pheochromocytomas which tend to be bilateral and malignant (autosomal dominant multiple endocrine neoplasia type II). Clinical syndromes include asymptomatic elevated serum calcitonin, intractable diarrhea, Cushing's syndrome, and carcinoid syndrome.
- Prognosis: Overall 10/15 year survival rates were 69.2/64.7% in the Bergholm study. When the familial forms were excluded these rates dropped to 60.8 and 53.7% respectively. Ten year relative survival was 0.80 in the SEER study. 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 than 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.

Undifferentiated Cancer:
- Clinical Course: Extremely rapid growth and local invasion can lead to strangulation or esophageal obstruction. Symptoms include a discernibly growing mass, stridor, and/or hoarseness.
- Prognosis: Grave in spite of combined surgery, radiation, and chemotherapy. Death can occur within 6 to 12 months. Ten year survival around 20%. The ten year relative survival was 0.13 in the SEER study.

Pathogenesis. Exposure to neck irradiation in childhood (usually for benign conditions) significantly increases the incidence of thyroid cancer. 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.

Diagnosis: Carcinoma is a concern in any thyroid nodule. A thyroid scan (^{99m}Tc-pertechnetate) is indicated for thyroid nodules. Hot nodules require no further workup or treatment except ablation if the patient is hyperthyroid. For cold nodules, ultrasound may help distinguish purely cystic lesions (if less than 4 cm are seldom malignant). Mixed cystic-solid and solid lesions may contain carcinoma. Fine-needle aspiration with cytology has become the dominant approach to diagnosis of solitary cold thyroid nodules.

Treatment: Surgery (96.6% of cases treated with surgery), usually followed by suppressive doses of thyroxine. Regular follow-up to identify local recurrence or lung metastases.

II. Aeromedical Concerns.

Post-surgical hypothyroidism; small risk of damage to recurrent laryngeal nerves due to local invasion and of surgical damage to parathyroid glands.

III. Information Required for Waiver Submission.

Waiver can be submitted once treatment is complete and the flyer is euthyroid. Tumor board recommendations, AFIP confirmation of the histology, and medical evaluation board (MEB) are required. The waiver authority for initial FC II waiver is AFMOA/SGPA.

IV. Waiver Considerations.

Ten individuals have been evaluated at the ACS for thyroid carcinoma. Four received waivers, four were disqualified, and waiver status was not known for two. In the USAF Centralized Flying Waiver Repository (WAVR File) there are 51 rated officers with waivers for thyroid carcinoma. The histologic breakdown is as follows: papillary 51%, adenocarcinoma/malignant adenoma/carcinoma 19.6%, follicular 15.7%, mixed papillary-follicular 11.8%, and angiosarcoma 2% (one case).

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WAIVER GUIDE
Updated: Dec 05
By: Lt Col. Packard

CONDITION:
Transient Ischemic Attack (TIA)

I. Overview.

Transient ischemic attack (TIA) is currently defined as a neurologic deficit lasting less than 24 hours that is attributed to focal cerebral or retinal ischemia. This definition was meant to exclude those patients with infarction; however, evidence of infarction is now identified by newer techniques of magnetic resonance imaging (MRI) such as diffusion weighted imaging (DWI) in up to 50% of those patients who meet these criteria.[1] Therefore, the diagnostic subclassification of cerebrovascular disease into TIA versus stroke can be somewhat arbitrary in any given patient based on the timing of any resolution and the availability and sensitivity of neurodiagnostic imaging modalities. Overall, cerebrovascular disease is the third leading cause of death in developed countries after heart disease and cancer with an overall prevalence of 794 per 100,000. TIA is a risk factor for stroke and exhibits an overall 5-year stroke risk of 29%, or about 6% per year.[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, and heart, carotid, or peripheral vascular disease.

Cerebrovascular disease is caused by one of several pathophysiologic processes involving the blood vessels of the brain:
1. The process may be intrinsic to the vessel, as in atherosclerosis, lipohyalinosis, inflammation, amyloid deposition, arterial dissection, developmental malformation, aneurysmal dilatation, or venous thrombosis.
2. The process could originate remotely as occurs when an embolus from the heart or extracranial systemic circulation lodges in a cranial vessel.
3. The process could result from inadequate cerebral blood flow due to decreased perfusion pressure or increased blood viscosity.
4. The process could result from the rupture of a vessel in the cranium.

Any of the first three processes could result in findings and symptoms of either a TIA or ischemic stroke depending on the severity and duration of neurologic deficits. The fourth process listed would result in a hemorrhagic stroke.[3] In addition to true transient ischemic attacks, several conditions can mimic TIAs. These include, but are not limited to migraines, seizure, vasovagal syncope, arrhythmia, compressive neuropathy, hypoglycemia or electrolyte imbalances, hyperventilation, anxiety, and conversion disorder.[1] This extensive diagnostic differential can make the diagnosis of TIA problematic. In the Oxfordshire Community Stroke Project only 38% of the 512 patients originally referred to the project actually had a TIA when the work-up was completed.[2]

Recently, there has been a great deal of interest in the association of cryptogenic stroke and heart abnormalities such as patent foramen ovale (PFO) or atrial septal aneurysm (ASA). Of those individuals under the age of 55 that suffer a stroke, a patent foramen ovale is found in up to 50%. This has led to much debate over its significance and what recommendations should be made regarding secondary prevention. In one such study, having a patent foramen ovale increased the

risk of recurrent cerebral ischemic events over a 46-month period from 5% per patient/year (without PFO) to 12% per patient/year (in those with a PFO). What's more, of the 14 patients that had their PFO surgically closed, there were no ischemic events over a mean follow-up period of 43 months.[4] Another study of 581 ischemic stroke patients (age 18 to 55 years) without an identifiable cause revealed a 4-year risk of recurrent stroke of 2.3% among patients with a foramen ovale alone, 15.2% among patients with both a patent foramen ovale and atrial septal aneurysm, and 4.2% among patients with neither of these cardiac abnormalities.[5] Several studies are now under way to better delineate the relationship between atrial septal defects and cerebrovascular events and to what extent closure of the defect affects the risk for recurrence.

II. Aeromedical Concerns.

Symptoms of TIA are abrupt, usually unrelated to any particular activity, and depend on the distribution of the blood vessel concerned. They can range from distracting to incapacitating and can include weakness, paresthesia, speech disturbance, visual deficit, vertigo, ataxia, and, rarely, loss of consciousness. The differential diagnosis should always include seizures, migrainous phenomena, generalized or global ischemia, and a labyrinthine source for vertigo. Intracranial tumors, vascular malformations, and intracranial hemorrhage can also mimic TIA. Because of the high risk for recurrence or subsequent stroke, and the usually sudden and often incapacitating nature of symptoms and signs, TIAs present a very significant threat in the aerospace environment. Even with TIA ruled out, the other causes of the above symptoms are usually disqualifying in and of themselves for aviation duties.

III. Information Required for Waiver Submission.

A full neurologic, laboratory, and diagnostic work-up is required after any symptoms of TIA 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. Initial work-up and treatment after a possible TIA event should be driven by clinical concerns such as proper identification of etiology and appropriate therapy for secondary prevention. The aeromedical disposition should be addressed subsequently. Once the patient appears stable without any neurologic deficits and all predisposing conditions have been evaluated and treated, only then should a waiver application for flying be contemplated. Evaluation at the ACS will be required for any potentially waiverable candidate with a history of TIA. An initial waiver request should include the following:

1. A full history 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).
2. A consultation report from a neurologist.
3. An MRI of the brain with diffusion-weighted imaging 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.
4. A 12-lead EKG.
5. Transthoracic echocardiography (TTE) of the heart with bubble contrast to look for a right to left shunt within the heart. If this study is negative, a transesophageal echocardiogram (TEE) may be considered depending on the history and results of other evaluations.
6. A 24-hour Holter monitor.
7. Laboratory tests to include: CBC, ESR, chemistry panel, partial thromboplastin time (aPTT), lipid profile, and RPR.

8. 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.

Additional confirmatory or follow-up diagnostic tests may be required if any abnormalities are found on the above listed tests. For instance, if abnormalities are seen in the carotid arteries on MRA, a carotid duplex scan should be ordered to better delineate the abnormalities. Likewise, if any cortical lesion is seen on MRI or if there was any associated transient loss of consciousness by history, a sleep-deprived EEG will be required.

IV. Waiver Considerations.

Irrespective of whether the etiology is embolic, thrombotic or hemodynamic (migraines not withstanding), the flier will likely be permanently disqualified from flying duties. Waivers will usually not be considered unless a non-vaso-occlusive cause is determined and treatable to the extent that any risk of recurrence is less than 1% per year. Any anatomic abnormality (i.e., scar) seen on imaging of the brain leaves a potential seizure focus risk in addition to the risk of recurrent TIA/stroke. If an intracardiac shunt is found such as a PFO, it is clinically up to the flyer and his treating physicians whether or not to pursue surgical closure or occlusion with a transcatheter device. A flyer with a history of TIA and an existing PFO or other shunt would not be looked at favorably for waiver. If the PFO has been surgically closed or occluded with a transcatheter device and no residual shunt exists, the neurologic event recurrence rate is about 1% to 5% per year for the first year, 0% to 1.5% for the second year, and falls to 1% or less per year thereafter.[6,7] Therefore, waiver after surgical closure of a PFO would be considered only after a minimum of 12 to 24 months observation after the surgery or occlusion.

A search of the ACS database up to January 1998 for those with at least one reference diagnosis of TIA revealed that 51 aviators have been evaluated. While 11 (22%) of these were granted waivers, a more careful record review revealed that only four (8% of total) had true transient ischemic events; the others were due to migraine, presyncope, vasovagal response, transient ischemia during cardiac catheterization, or +Gz-induced loss of consciousness (G-LoC). In all four cases, the events were solitary and brief, with no recurrence and in no case was there a confirmed cause due to vascular thrombosis or embolism. Since 1998, seven flyers were evaluated with TIA. Of these, three were medically disqualified. Of the four who eventually received waivers, one had experienced an isolated TIA (transient partial visual loss) in a centrifuge at 7.5 G's. He was granted a FC IIA waiver after a normal work-up. The second was found to have an ateriovenous malformation in the lung that was successfully occluded with a coil device while the other two had PFO's that were successfully occluded with transcatheter devices without sequellae. All three were returned to flying status after a 1 to 2-year observation period.

V. References and Footnotes

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WAIVER GUIDE
Updated: Nov 05
By: Lt Col Eveline Yao

CONDITION:
Ulcerative Colitis

I. Overview.

Ulcerative colitis (UC) is a chronic, relapsing inflammatory condition of unknown etiology affecting the mucosal layer of the colon. UC (and Crohn's disease) 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 commensal gut flora. 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. 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 histology lesions are crypt abscess and pseudopolyps. Incidence in the US is approximately 15 per 100,000 persons and the prevalence is 200 per 100,000 persons, with no gender difference. Peak age of onset is between 20 and 25 years of age. The absolute risk of inflammatory bowel disease is 7% among first-degree family members. 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.

UC is characterized by intermittent exacerbations and remissions of typical symptoms. The initial attack of UC usually presents with crampy abdominal pain and bloody diarrhea. Symptoms vary with the degree of colonic involvement. Overall, about ⅓ of patients have pancolitis (extension beyond the splenic flexure), 30-40% will have disease limited to the rectosigmoid, with the remainder having an intermediate form. Other symptoms include fecal urgency and tenesmus. 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 30% will require colectomy within 3 years of onset from uncontrollable disease. Extraintestinal symptoms can include reactive arthropathies, anklylosing spondylitis, eye involvement with uveitits and episcleritis, skin disorders of erythema nodosum and pyoderma gangrenosum, thromboembolism, nephrolithiasis, and primary sclerosing cholangitis. Local complications of UC include massive hemorrhage, fulminant colitis, intestinal perforation and stricture or toxic megacolon (both rare). The most feared long-term complication is colorectal cancer. Disease duration and extent of colonic involvement are strongly correlated with colon cancer risk. Patients with pancolitis for ≥10 years have a 20- to 30-fold increase in risk compared to the general population. Colonic surveillance, consisting of multiple biopsies taken every 10 cm, should be offered to all UC patients with disease of at least 8 years duration.

Medical management is used to treat acute disease and for maintenance of remission. The mainstay of treatment is the 5-aminosalicylate compounds (5-ASA, mesalamine), either topically (when

disease is limited to the distal colon) or orally, and are effective in sustaining remission. The prototypical agent was sulfasalazine, a 5-ASA conjugate with a sulfa moiety, but compounds such as Pentasa and Asacol are much preferred, since most of the toxicity associated with the older drug was due to the sulfa portion. When inadequate, corticosteroids, antibiotics, or immunosuppressive drugs may be indicated. Patients 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.

II. Aeromedical Concerns.

Aeromedical disposition of UC is considerably simpler than Crohn's; 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 occurred. 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 aminosalicyclates have proven effective to sustain remission and reduce relapse. Dose-related toxic effects of sulfasalazine include headache, nausea, vomiting. Hypersensitivity reactions include rash, fever, aplastic anemia, agranulocytosis, hepatitis, pancreatitis, nephrotoxicity, pulmonary fibrosis and hemolysis. The therapeutic benefit of sulfasalazine is due to the 5-ASA while the toxicity is due to the sulfa moiety to which it is complexed. Although delayed-release forms of mesalamine (e.g., Asacol, Pentasa) are more costly than sulfasalazine, these agents are preferred to minimize adverse effects. 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 can be confirmed with endoscopy documenting mucosal healing (absence of ulceration, granularity and friability). Only 10% of patients will have significant work loss each year. The probability of maintaining work capacity has been measured at 93% after 10 years. Stable disease requires surveillance colonoscopy after 8 years of disease, but still is compatible with flying operations in austere environments. In general, in individuals maintained on 5-aminosalicylates, the major determinants of flying status are the presence and severity of diarrhea and abdominal pain.

III. Information Required For Waiver Submission.

Disposition of continued service and world-wide qualification must be accomplished by the Medical Evaluation Board (MEB) prior to waiver submission. The following recommendations apply to both initial and renewal waiver requests, except that repeat endoscopy is not required for renewal waiver provided the disease appears quiescent (e.g., no current symptoms, no interval relapse, normal CBC). History should document results of work-up, disease course, current therapy, presence of complications and surgical resection, if applicable; history should not only address gastrointestinal symptoms, but also the presence or absence of any symptoms that might suggest extraintestinal disease. Internal medicine or gastroenterology consultation is required for each waiver submission. To validate remission after the initial flare (or after a relapse), follow-up colonoscopy with results of mucosal biopsy must accompany waiver submission. Lab results including CBC, ESR, LFTs, and albumin must be reported. Cancer surveillance screening in UC should be performed per current prevention guidelines.

IV. Waiver Consideration.

Aviation personnel need to fulfill all of the following applicable qualifying criteria for favorable consideration of waiver:

General Criteria:

Ulcerative Colitis
Unrestricted FC II, FC III
• No worse than mild disease (mild diarrheal symptoms, < 4 bowel movements / day without bleeding) • Stability of disease for 3 months prior to waiver submission (1 month if limited to proctitis on original endoscopy) • Colonoscopy with biopsy documenting mucosal healing (no ulcerative lesions, no crypt abscesses) after 3 months of stable disease (follow-up endoscopy not required for the currently asymptomatic patient with proctitis only) • No complications, such as anemia • Authorized medications include aminosalicylates as tablets (Pentasa, Asacol) or enemas (steroid enemas are allowable, but 5-ASA enemas have generally proven superior for control of proctitis) • Colectomy with ileoanal anastomosis will be considered on a case-by-case basis • Any extraintestinal manifestations should be addressed as separate diagnoses and will require individual work-up.

UC is disqualifying for FC I/IA; waiver is not recommended.

Since the implementation of AIMWTS, there have been 60 waiver submissions for UC (ICD-9 556.XX) with 52 waivers granted (87%). ACS experience with UC reveals 26 finalized cases with 18 receiving waiver recommendation (69%).

Special thanks to Dr. Kevin Franklin, GI consultant to AF/SG and Dr. Jeb Pickard, Aeromedical Consultation Service

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Benjamin

CONDITION:
Uterine Cancer

I. Overview.

Uterine carcinoma is the most common of the female genital tract cancers. The age-adjusted incidence rate is about 24/100,000 after having peaked in the 1970's at 30/100,000 with the now antiquated use of unopposed estrogens. It is predominantly a disease of older women with only 5% of cases accounted for by women under 40 years of age (cervical cancer considered separately). Anovulation, obesity and infertility are risk factors in premenopausal women. Natural progression of uterine cancer starts as endometrial carcinoma and directly invades the myometrium, uterine cervix and lymphatic channels. Adenocarcinoma is the most common cell type with other cell types having a poorer prognosis. Further spread to the pelvic or para-aortic lymph nodes indicates advanced disease. The prognosis for cancer limited to the endometrium or even the myometrium (stage I) is good with an average five year survival rate of 75.1% while patients with stage I grade I lesions have a 96% five years survival rate. Five year survival rates fall to and below 50% with spread beyond the myometrium to the abdomen and chest. One year survival for patients with pulmonary metastases is 25%. Fortunately 74.3% of endometrial carcinomas are discovered in stage I and 14.7% in stage II. Along with the decrease in the incidence rate of endometrial carcinoma since the 1970's, the survival rate has also decreased, likely because the carcinoma which develops in the face of excess estrogen has a favorable prognosis compared to that which develops in the normal or atrophic endometrium.

II. Aeromedical Concerns.

Aeromedical concerns include the likelihood of recurrence after therapy and residual effects of the therapy. Therapy for lower stage carcinoma and favorable histological grade may be treated with hysterectomy alone. Radiation and/or chemotherapy may be used with other stages and grades. With full recovery after hysterectomy and no evidence for residual disease, a waiver may be considered 6 weeks following uncomplicated surgery. Disease requiring post-operative radiation or chemotherapy may be considered for waiver after two years provided there is no evidence of sequelae or recurrence. Anemia may be an aeromedical concern if dysfunctional uterine bleeding preceded the treatment of uterine cancer. Return to normal hematocrit levels should be assured.

III. Information Required for Waiver Submission.

Waiver may be considered only in those cases where disease has been eliminated. Medical evaluation board, tumor board and AFIP histology are all required for waiver. An intravenous pyelogram and abdominal CT scan should accompany a consultation from a gynecologist and an oncologist.

IV. Waiver Considerations.

A total of three waivers have been granted in the Air Force for uterine carcinoma with no disqualifications. All three requested flying class III waivers. None have been seen at the Aeromedical Consultation Service (ACS).

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WAIVER GUIDE
Updated: Mar 99
By: Lt Col Benjamin

CONDITION:
Uterine Fibroids

I. Overview.

Lieomyomas are the most common pelvic tumor in women. These benign uterine tumors are composed of smooth muscle with some fibrous elements. Fibroids occur in 20-25% of women, most frequently in the fourth and fifth decade of life. Myomas are most commonly located in the muscle wall of the uterus, although some may present as submucosal or subserosal tumors. Fibroids may be stimulated by estrogen. GnRH antagonists have been successfully used to shrink myomas prior to surgery. However some reports have been made of high dose progesterone stimulating fibroids as well. Malignancy is rare with leiomyosarcoma occurring in less than 1% of fibroids. Myomas are subject to a variety of changes. Calcification, hyalinization, cystic degeneration, fatty degeneration or necrosis may occur. Though most of these complications continue to be benign, some may produce signs and symptoms requiring treatment. With the exception of lower abdominal pressure, the various symptoms of pain and bleeding do not correlate to the size of the myoma.

II. Aeromedical Concerns.

Asymptomatic fibroids require no waiver. Symptomatic fibroids require a waiver and may manifest with dysmenorrhea or menorrhagia leading to anemia. Degeneration of the fibroid may lead to pain. Size and location of the tumor may cause frequency and urgency of urination. Symptomatic fibroids may be waived if uncorrected anemia or distracting pain or pressure do not occur. If hysterectomy is performed to treat a symptomatic fibroid, no waiver is required. Return to flying duties should be delayed while any gonadotropin releasing hormone antagonist is used.

III. Information Required for Waiver Submission.

For a symptomatic uterine fibroid treated conservatively, evidence of a stable hematocrit along with a gynecology consultation is required. If a fibroid is treated surgically, either by myomectomy or hysterectomy, AFIP confirmation of the histology is required.

IV. Waiver Considerations.

A total of five waivers have been granted in the Air Force for fibroids with no disqualifications. All five requested Flying Class III waivers. None have been seen at the Aeromedical Consultation Service.

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WAIVER GUIDE
Updated: Jun 99
By: Aeromedical Consultation Service (ACS)

CONDITION:
Uveitis

I. Overview.

Uveitis is a general term used by ophthalmologists to describe any inflammation of the uveal tract, or one of its derivatives, such as the iris or ciliary body. In some cases such inflammations may extend into the retina or vitreous cavity. The list of systemic diseases that are associated with uveitis is robust. Prevalence of unexplained uveitis/iritis increases with increased age. Henderly et.al. reported in 1987 that 12.1% of their patients had no identifiable cause of uveitis. However, other authors have found that up to 75% of all cases will have no identified etiology. The association with systemic disease and trauma is high. A list of diseases traditionally associated with uveitis may be found on page 400 of Principles and Practice of Ophthalmology, 1994. Sarcoidosis, ankylosing spondylitis and Reiter's syndrome account for 5% of all cases of uveitis. However, up to 20% of ankylosing spondylitis cases will have uveitis, which may often be the presenting condition. The anterior uveitis of herpes zoster occurs in 40% of patients with ocular involvement and can last for 2 years. Toxoplasmosis uveitis is rare in adults but can occur. The Oxford Textbook of Medicine warns that "atypical and indolent cases of uveitis especially in those with military, naval or traveling backgrounds," is frequently due to syphilis. Nowadays, AIDS must also be considered in the differential diagnosis of uveitis. The most common type of uveitis is iritis, usually following trauma or a corneal abrasion, but fortunately uncomplicated recovery after traumatic iritis is the norm.

II. Aeromedical Concerns.

The acute condition can cause distracting pain. Floaters and blurred vision can impair performance and affect flight safety. Long term sequelae include cataract, glaucoma, retinal scarring, retinal detachment, keratopathy and loss of vision.

III. Information Required for Waiver Submission.

Ophthalmology consultation is mandatory. Associated diseases causing uveitis, such as sarcoidosis, ankylosing spondylitis, AIDS, tuberculosis, syphilis, sinus disease, dental pathology and toxoplasmosis should be excluded.

IV. Waiver Considerations.

ACS database contains 69 aircrew with the diagnosis of uveitis. Three people were permanently disqualified on initial evaluation. Two received temporary disqualification and were waivered after their condition resolved. Four others initially received waivers, however, their condition later became chronic or recurrent and they were ultimately disqualified. Approximately 90% of patients obtained waivers. Patients should be grounded during the active phase of the disease and while treatment and evaluation are occurring. Aircrew with chronic or recurrent uveitis may have to be

permanently disqualified. There is no requirement for waiver to allow return to full flying duties following successful recovery from traumatic iritis.

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WAIVER GUIDE
Updated: Feb 02
By: Neuropsychiatry Staff, Aeromedical Consultation Service (ACS)

CONDITIONS:
"V" Code Diagnoses

I. Overview.

In DSM-IV, V codes are used to describe "other conditions or problems that may be a focus of clinical attention." The V codes are broadly divided into three groups. *Relational problems* (such as marital or parent-child problems) occur when maladaptive patterns of individual behavior within some sort of unit or group cause symptoms in the individuals, or impair function of the unit or group. *Problems related to abuse or neglect* (such as spouse abuse or child neglect) may involve physically or sexually abusive behavior. The a*dditional conditions* (such as an occupational problem or spiritual problem) vary from non-compliance with treatment through bereavement to phase of life problems (eg, Moriarty et al., 1996; Spruijt & de Goede, 1997). The 23 "V codes" are listed in DSM-IV (1994, pp 680-6). V codes are recorded on DSM-IV Axis I.

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 (Alkov, 1985; Green, 1985; Voge, 1989). What becomes most relevant to aeromedical judgments 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 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 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 *full mental health workup* as the most rigorous local appraisal of whether the flier should continue to fly. If a diagnosis seems warranted, establish it in accordance with DSM-IV criteria, and see that the flyer receives proper treatment. *NOTE: beware of delaying or withholding proper treatment solely in order to avoid DNIF.* Then decide whether the situation as a whole should be grounds for disqualification, and act accordingly. When 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).* In some cases, the flyer

may be able to resolve the troubling issue without being placed in a DNIF status. However, when 1) a flyer becomes so disturbed as to be placed DNIF, and 2) **IF**, at the end of that period of DNIF the flight surgeon decides that the situation warrants a formal diagnosis requiring waiver action, then Section III below applies.

III. Information Required for Waiver Submission.

If the V code diagnosis is a byproduct of an Axis I mental disorder, waiver action should be taken in accordance with the requirements of that diagnosis. If the V code diagnosis stands alone as an Axis I diagnosis, then the submission should be along the lines of:
A. A recent mental health evaluation, along with treatment summaries and present status
B. Any psychological testing or evaluation reports
C. An aeromedical summary that includes any pertinent social, occupational, legal or financial information
D. A letter from the flier's supervisor rendering an opinion about the aviator's readiness to return to flying status.

IV. Waiver Considerations.

A 15-year review (1981-1996) of the USAF Waiver File and the ACS Cover Sheet File revealed that 107 FC II aircrew members (excluding flight surgeons) were rendered V code diagnoses. The most common V codes were partner-relational problem (41) (previously marital problem) and occupational problem (24). Of the total, 55 met DSM IV criteria for a concomitant Axis I disorder (e.g., mood disorder, anxiety disorder, etc.). Of the 52 remaining aircrew members with V codes and no concomitant Axis I disorder, 6 (10.9%) were disqualified due to the severity of their V code conditions; of the four who were seen for later re-evaluation, 100% received a recommendation for a waiver.

V. References.

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WAIVER GUIDE
Updated: May 07
By: Dr William Kruyer (ACS senior cardiologist), Maj James Strader (ACS staff cardiologist) and Dr Karen Fox

CONDITION:
Valve Surgery - Replacement or Repair

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. 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)
2507 Kennedy Circle
Brooks City-Base, TX 78235-5116

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.

IV. Waiver Considerations.

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 AFMOA	Yes
II	Mitral valve prosthetic (mechanical or biological)	No AFMOA	No
	Mitral valve annuloplasty or repair	Maybe AFMOA	Yes
	Aortic valve (mechanical)	No AFMOA	No
	Aortic valve (biological)	Maybe AFMOA	Yes
	Other procedures or valves	Maybe AFMOA	Yes
III	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

A review of AIMWTS through mid-April 2007 showed seven flyers (six FC II and one FC III) with mitral valve annuloplasty repair for severe MR; all were initially granted waivers, subsequently two were disqualified for an additional medical condition (e.g. atrial tachycardia, ventricular tachycardia). The AIMWTS review also showed six flyers (all FC II) with aortic valve replacement

or repair; four granted waivers and two disqualified (mechanical prosthetic valve). There was one FC I applicant granted a waiver for history of pulmonic stenosis treated with valvuloplasty.

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. Nov 1998; 32(5): 1486-1588.

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WAIVER GUIDE
Updated: Jun 99
By: Major Ice

CONDITION:
Valvular Disorders, Other

I. Overview.

All valvular heart diseases, including those improved by surgery, are disqualifying IAW AFI 48-123. However, not all conditions constitute a disease. Several echocardiographic findings are considered normal variants in the absence of an accompanying murmur and with an otherwise normal valve and thus are not disqualifying. These include trace/mild tricuspid regurgitation and trace/mild pulmonic insufficiency. Any degree of valvular stenosis is considered pathologic.

Tricuspid stenosis, tricuspid regurgitation, pulmonic insufficiency, and pulmonic stenosis may all be asymptomatic and thus found incidentally. It is rare for these conditions to occur in isolation (usually there are other associated conditions, such as mitral or aortic valvular disease). The natural history/ progression of the disease depends on the underlying cause. Causes of tricuspid and pulmonic valvular diseases include rheumatic inflammation, dilation of the valvular rings, bacterial endocarditis, connective tissue disorders, and pulmonary hypertension. Symptomatic cases may present with exertional dyspnea, orthopnea, and paroxysmal nocturnal dyspnea if the condition is associated with significant left-sided heart disease. Right ventricular failure resulting from pulmonic and/ or tricuspid disease can cause dependent edema, and hepatic congestion, particularly when associated with pulmonary hypertension. Atrial fibrillation is said to occur in the majority of patients with more than mild tricuspid regurgitation. Most patients with mild to moderate pulmonary or tricuspid disease lead normal lives as long as they remain asymptomatic. Asymptomatic individuals do not require any treatment other than antibiotics as prophylaxis against subacute bacterial endocarditis when undergoing dental or surgical procedures. Waivers are considered for asymptomatic individuals without significant dysrhythmias or deficit in cardiac function.

II. Aeromedical Concerns.

The major concern is the relationship with disorders of the mitral and aortic valves or other diseases and the severity of the valvular regurgitation or stenosis. Pulmonary valve and tricuspid valve stenosis can both produce fatigue or shortness of breath. Tricuspid insufficiency may be associated with arrhythmias. Other concerns include the risks of thromboembolic events, bacterial endocarditis, disease progression (often asymptomatic), loss of situational awareness due to dysrhythmias, and hemodynamic events in a high Gz environment.

III. Information Required for Waiver Submission.

The Aeromedical Consultation Service (ACS) (ECG library) review of the diagnosing echocardiogram and any other studies performed locally. Waiver consideration would require demonstration of normal cardiac function and no significant hemodynamic effects of the valve lesion as well as normal exercise tolerance and absence of significant arrhythmias. Moderate/severe

stenosis and/or severe regurgitation would likely not be recommended for waiver. Waiver consideration for moderate regurgitation and mild stenosis requires ACS evaluation.

IV. Waiver Considerations.

Review of USAF waiver files and ACS records revealed 35 individuals diagnosed with minimal or greater tricuspid valvular conditions and 29 with pulmonary valvular conditions. Eighty three percent of aviators diagnosed with tricuspid valvular disease have received a waiver; 85% of those with pulmonary valvular disease have received a waiver. The ACS considers trace or mild tricuspid regurgitation and trace or mild pulmonic insufficiency to be normal variants with an otherwise normal valve and no accompanying murmur. The conditions rarely occur in isolation. The majority of fliers disqualified for these diagnoses also had other disqualifying conditions, particularly involving the mitral and aortic valves, or significant dysrhythmias.

V. Reference.

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WAIVER GUIDE
Updated: May 99
By: Col Spence

CONDITION:
Ventricular Tachycardia

I. Overview.

Ventricular tachycardia (VT) is defined as three or more consecutive, ventricular ectopic beats at a heart rate greater than or equal to 100 bpm. Sustained VT is that which lasts greater than 30 seconds or any duration with associated hemodynamic impairment/symptoms. VT may be a marker for serious underlying cardiac disease which must be excluded. The presence of underlying cardiac disease worsens the prognosis and increases the likelihood of associated symptoms. VT may be associated with incapacitating symptoms such as profound weakness, mental impairment, pre-syncope, syncope and sudden cardiac death. VT may be treated with drugs or interventions such as catheter ablation or surgery in selected cases, but treated VT is aeromedically disqualifying. Although VT is a potentially life-threatening dysrhythmia, benign forms do exist in individuals with no underlying cardiac disease.

II. Aeromedical Concerns.

VT may cause hemodynamic impairment and incapacitating symptoms such as lightheadedness and syncope and may lead to sudden cardiac death. Because of this, flying safety and mission completion may be jeopardized. VT may be associated with serious underlying cardiac disease which may itself be aeromedically disqualifying. VT may be exacerbated by increased blood catecholamine levels which may occur in a stressful environment such as a military cockpit.

III. Information Required for Waiver Submission.

Local evaluation should include electrolytes, lipid profile, cardiology/internal medicine consult, treadmill test, echocardiogram and a total of 72 hours of ambulatory (Holter) monitoring. This 72 hours of monitoring may be obtained over any reasonable time period.

IV. Waiver Considerations.

Prior to 1995, 56% of flyers with VT evaluated at the Aeromedical Consultation Service (ACS) were permanently disqualified. Under the new waiver policy, instituted as a result of a 1995 analysis of the ACS experience with VT in aviators, only 12% would have been disqualified. The 12% that would still be disqualified included all aviators who ultimately had a hemodynamic event. Ventricular tachycardia is often associated with an increased risk of hemodynamic events, especially if underlying heart disease is present. Sustained VT or any duration of VT associated with hemodynamic symptoms is permanently disqualifying. However, in the absence of underlying cardiac disease, limited episodes of short duration VT carry a benign prognosis. This more favorable prognosis was confirmed by the 1995 review of the ACS experience with VT in aviators. This review established that limited episodes (≤ 4 per 24 hour ECG monitoring) of short duration (≤ 11 beats) may be considered for waiver (FC II and FC IIA categories exist). ACS and medical

literature experience with non-sustained VT of greater frequency and duration is extremely limited. Therefore, more frequent or longer episodes of nonsustained VT remain disqualifying. Medical literature and the ACS review indicate a less favorable prognosis and increased risk for hemodynamic events for VT associated with underlying coronary artery disease (CAD), cardiomyopathy, or mitral valve prolapse (MVP). Therefore, VT of any degree associated with these conditions is also permanently disqualifying. Other cardiac disorders whose risk are less well established in the medical literature, including right bundle branch block (RBBB), left bundle branch block (LBBB) and sarcoid, can be considered for waiver on a case by case basis. The conditions of aortic insufficiency (AI) and supraventricular tachycardia (SVT) have not been shown to increase risk and can also be considered for waiver on a case by case basis.

Waiver authority for the initial FC II or FC IIA waiver is HQ AFMOA/SGPA. Both waiver categories require annual ACS re-evaluation for 2 years, then every 3 years. For FC III, waiver authority is at base level if AFSC 48A3 is available otherwise MAJCOM/SGPA serves as waiver authority. FC III waiver requires local re-evaluation annually for 2 years, then every 3 years.

V. References.

1. Policy Letter for Military Aviators with Ventricular Tachycardia. AL/AOCI, Brooks City-Base TX, 6 Jan 95.

2. Isselbacher KJ, et.al. *Harrison's Principles of Internal Medicine* , Thirteenth Edition, McGraw-Hill, Inc., New York, 1994; 1029-31.

WAIVER GUIDE
Updated: Apr 07
By: Lt Col Eric Nelson (RAM 07), Lt Col Scott Norris (RAM 07) and Dr Karen Fox

CONDITION:
Vertiginous Disorders, Peripheral (Ménière's disease, benign paroxysmal positional vertigo, vestibular neuronitis [labyrinthitis])

I. Overview.

Pathological vertigo occurs as a result of asymmetry in sensory input from the vestibular system at the level of the labyrinth, vestibular nerve, or central 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 may help characterize a symptom as 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, *all* vertigo is transient, generally lasting no more than several weeks (although the susceptibility to repeat attacks may persist for much longer). 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 reviews of cases 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).[4] 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 multiple sclerosis, cerebrovascular disease, and neoplasms. Features of peripheral nystagmus are horizontal or horizontal-torsional, suppression with visual fixation and does not change direction with gaze. This waiver guide will address only peripheral, not central, causes of vertigo.

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). Migrainous vertigo can have a mixed picture of peripheral and central vertigo. Of all patients presenting with peripheral vertigo, 50% will be found to have BPPV, 25% vestibular neuronitis, 10% Ménière's, and 7-9% migrainous vertigo. Acoustic neuroma and other tumors represent only 1% of cases.

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. 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 (50-70% of cases), although it may also occur as the sequela of other primary causes such as head trauma (7-17%), viral vestibular neuronitis (up to 15%), Ménière's disease (5%), or migraine disorders (<5%).[18] There is evidence that post-traumatic BPPV may be more difficult to treat and more likely to recur than idiopathic BPPV.

BPPV is caused by 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 or (more rarely) the anterior canal. 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, then the other. 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 extract particles from the canal 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. A case series of 108 patients *not* treated with a canalith repositioning procedure demonstrated a mean time to spontaneous resolution of symptoms of 39 days for cases of posterior canal BPPV, and 16 days for horizontal canal BPPV.

BPPV is generally a self-limited condition that will remit spontaneously, although remission may take months. However, 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.[16] 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. 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.

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. Recovery occurs as a result of CNS adaptation to the 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.[24]

Ménière's disease, also known as idiopathic endolymphatic hydrops, is a disorder of the inner ear and is sometimes described as "glaucoma of the ear." Ménière's is classically characterized by a symptom tetrad of: (a) fluctuating or episodic rotational vertigo, lasting more than five minutes per episode and not relieved by absence of movement; (b) fluctuating hearing loss; (c) fluctuating tinnitus; and (d) fluctuating sensation of fullness in the affected ear. 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. There is a slight female predominance (1.3:1), and the peak incidence of disease is in the 40- to 60-year age group.[24] The etiology of Ménière's is not well understood, but genetic, autoimmune, infectious, 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.[24] In one study of 574 Ménière's patients, over half of the cases had between 1-4 attacks/week and 1-10 attacks/day.[20] Two percent to 6% 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.[24] 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: otologic syphilis, delayed endolymphatic hydrops, acoustic neuroma, perilymph fistula, Cogan's syndrome, atypical migraine, 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.[24] 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 treatment is delayed. Vertigo is a prominent complaint, and often the sole complaint in 50% of individuals with IEDS.[24]

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. A separate waiver guide entry exists for headaches (migraine) and should be consulted for further information.

Table 1: Summary of Clinical Features of Common Peripheral Causes of Vertigo[3]

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

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.[5] 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, interfering with communications.

III. Information Required for Waiver Submission.

The following are required for evaluation of vertigo in aviators:

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. Results of Dix-Hallpike testing.

D. Laboratory testing: CBC, ESR, TFTs, lipids, glucose and syphilis serology

E. Audiogram

F. MRI of the head and posterior fossa to rule out tumors such as acoustic neuroma.

G. Electronystagmograph (ENG)

H. Otorhinolaryngologist consult which may also include electrocochleography (ECOG), auditory brain stem response (ABR) and other vestibular function tests

IV. Waiver Considerations.

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, 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 the table below.

Table 2: Recommended Disposition for Vertiginous Syndromes by Flying Class (FC)

Flying Class	Type of Vertigo	Waiver Potential Waiver Authority	Required Studies
FC I/IA	Vestibular neuronitis	Yes[1] AETC	Audiogram, brain + posterior fossa MRI, ENG
	BPPV, Ménière's	No	N/A
FC II	Vestibular neuronitis	Yes[1] MAJCOM	Audiogram, brain + posterior fossa MRI, ENG
	BPPV	Yes[2] AFMOA	None for BPPV if classic findings present; otherwise audiogram, MRI, ENG
	Ménière's	No	N/A
FC III	Vestibular neuronitis, BPPV	Yes[1,2] MAJCOM	None for BPPV if classic findings present; otherwise audiogram, MRI, ENG
	Ménière's	No	N/A

[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.

A review of AIMWTS (ICD 9 Codes 386.0, 386.10, 386.11, 386.12, 386.19, 386.30, "vertigo" and "labyrinthitis") through mid January 2007 showed 59 cases of vertigo for FC I/IA (two), FC II (36) and FC III (21). Of the 59 cases, 28 were disqualified; one FC I/IA, 13 FC II and 14 FC III. The FC I was disqualified for unresolving alternobaric vertigo. Twelve of the 13 disqualified FC II were disqualified due to their vertigo symptoms; Ménière's (3), Ménière's vs. recurrent neuronitis (2), labyrinthitis (2), recurrent vertigo (2), vertiginous migraine (2), traumatic vertigo (1). Thirteen of the 14 FC III were disqualified due to their vertigo symptoms: Ménière's (4), vertigo (2), vertigo with airsickness (1), recurrent neuronitis (2), BPPV (3), vertigo due to cholesterol granuloma (1), and dizziness (1).

Waiver Guide reviewed by the ACS Consultants for Otorhinolaryngology, Lt Col Drew Horlbeck and Lt Col Mark Boston at Wilford Hall Medical Center.

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WAIVER GUIDE
Updated: Feb 07
By: Dr William Kruyer, USAFSAM/FECI

CONDITION:
Wolff-Parkinson-White (WPW) and Other Pre-Excitation Syndromes

I. Overview.

The anomaly of concern is 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. 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 and deterioration to ventricular fibrillation is considered the likely cause of sudden death and some studies have reported atrial fibrillation in up to 40% of WPW subjects. But it is not possible to identify which patients will develop SVT, atrial fibrillation, or sudden death.

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.

II. Aeromedical Concerns.

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.

III. Information Required for Waiver Submission.

ACS review is required for waiver recommendation. Submit an aeromedical summary and originals or good quality copies of available ECGs. Additional local cardiac testing is not routinely required but may be requested in individual cases. Copies of reports and tracings of any other cardiac tests are required for ACS review. ACS evaluation may also be required, depending on the flying class or for specific concerns in an individual case.

IV. Waiver Considerations.

WPW pattern is disqualifying for all classes of flying duties. Waiver is not recommended for FC I/IA unless successful radiofrequency ablation is performed. Please refer to the ablation waiver guide for further guidance on such cases. For FC II/III, unrestricted waiver may be recommended without aeromedical requirement for radiofrequency ablation, after ACS review/evaluation. FC II requires ACS evaluation. FC III may receive a waiver recommendation after ACS review, but without formal ACS evaluation. However, concerns about an individual case may require ACS evaluation. FC II or FC III waiver will generally be valid for three years with ACS reevaluation/review at that time for waiver renewal. The initial waiver recommendation will specify requirements for waiver renewal.

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