U. S. Navy Aeromedical Reference and Waiver Guide

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1.0 AVIATION PHYSICAL STANDARDS

1.1 INTRODUCTION

Aviation physical standards are developed to ensure the most qualified personnel are accepted and retained by Naval Aviation. Standards differ significantly between applicants and designated personnel and among the different classes of flight duties. Applicant standards are the most rigorous to ensure that the Navy is investing in a candidate that is capable of completing training and remaining a designated Naval aviator in a physically demanding environment. Medical attrites adversely affect manning requirements, fiscal resources, and the member's personal and career development. Designated aviators must meet standards to ensure they and their crew remain safe and able to complete their demanding missions.

1.2 GENERAL REQUIREMENTS

Physical standards are published and maintained in the Manual of the Medical Department (MMD) Chapter 15. All applicants must meet general commissioning and/or enlistment standards in addition to aviation standards. If an applicant does not meet these standards, the applicant has a disqualifying defect and a waiver of standards is required. Designated personnel must remain fit for full duty and continue to meet the aviation standards published in the MMD. Any medical defect, disqualifying diagnosis, or chronic medication use requires a waiver of standards.

1.3 PURPOSE OF THIS GUIDE

The purpose of this guide is to offer the flight surgeon, AVT, and aviator an additional resource to quickly and efficiently look up standards. The Aeromedical Reference and Waiver Guide (ARWG) is NOT an inclusive document but only highlights and gives guidance for the most common diagnoses and standards. The MMD is the proper document to reference for disqualifying conditions and physical standards. Flight surgeons and AVTs should be intimately familiar with the MMD Chapter 15 and it is suggested that they have access to a copy when making Aeromedical dispositions.

1.4 CLASSES OF AVIATION PERSONNEL

Applicants, students, and designated aviation personnel are divided into the following three classes:

Class I: Naval Aviators and Student Naval Aviators (SNA). Designated Naval aviators are subdivided into three Medical Service Groups based upon the physical requirements of their specific flight duty assignment

Medical Service Group 1: Aviators qualified for unlimited or unrestricted flight duties

Medical Service Group 2: Aviators restricted from shipboard aircrew duties (include V/STOL) except helicopter

Medical Service Group 3: Aviators restricted to operating aircraft equipped with dual controls and accompanied on all flights by a pilot or copilot of Medical Service Group 1 or 2, qualified in the model of aircraft operated. A separate waiver is required to act as pilot-in-command of multi-piloted aircraft

Class II: Aviation personnel other than designated naval aviators or Student Naval Aviators including Naval Flight Officers (NFO), technical observers, Naval Flight Surgeons (NFS), Aerospace Physiologists (AP), Aerospace Experimental Psychologists (AEP), Naval Aerospace Optometrists, Naval Aircrew (NAC) members, and other persons ordered to duty involving flying.

Class III: Members in aviation related duty not requiring them to personally be airborne including Air Traffic Controllers (ATCs), Unmanned Aerial Vehicle (UAV) operators, flight deck, and flight line personnel.

Certain non-designated personnel, including civilians, may also be assigned to participate in duties involving flight: Such personnel include selected passengers, project specialists, and technical observers. The specific requirements are addressed in the OPNAVINST 3710.7 series (Naval Air Training and Operating Procedures Standardization (NATOPS) General Flight and Operating Instructions) and shall be used to evaluate these personnel.

NOTE: Many squadrons have non-designated personnel that fly as a TFO, intelligence operator, cryptologic technician, or other duty that requires regular flying. If these individuals fly on a regular basis, receive flight pay, and/or have flight-related duties, or mission critical duties, assigned to them while flying, they shall be considered as Class II Naval Aircrew with regard to aeromedical standards and physical submission requirements. Consult with NAMI if their flight status is unclear. However, waiver requirements may be different in these individuals, and will be considered on a case-by-case basis depending on required physical and physiological training and their particular duties, aircraft, and mission.

1.5 CLASS I STANDARDS

Aeronautically Adapted (AA): Designated personnel must remain Aeronautically Adapted. If member is Not Aeronautically Adapted (NAA), the psychiatric block should be checked abnormal with appropriate comments. Refer to MMD 15-67 for disposition of aviators found NAA.

Valsalva: Must demonstrate ability to equalize middle ear pressure.

Self Balance Test (SBT): Must pass.

Dental: Must have no defect which would react adversely to changes in barometric pressure (Type I or II dental examination required).

Laboratory Testing:

Urinalysis: Must have normal values. Specifically must be negative for glucose, albumin/protein, and blood.

Syphilis Serology: Must be negative or have documented curative treatment or other explanation for positive test.

HIV Testing: Must be negative or documented that it was drawn.

Hematocrit: Males 40-52%. Females 37-47%. If values are outside of this range refer to ARWG for proper evaluation and disposition.

Lipid Panel: There are no standards at this time. This does not mean the flight surgeon can ignore these values. Individuals with hyperlipidemia should have documented evaluation, counseling, and treatment in accordance with standard medical guidelines.

Fecal occult blood testing: Required annually at age 50 and older or if personal or family history dictates. Digital rectal exam is not required.

EKG: Disqualifying conditions are:

1. Ventricular tachycardia defined as three consecutive ventricular beats at a rate greater than 99 beats per minute.
2. Wolff-Parkinson-White syndrome or other pre-excitation syndrome predisposing to paroxysmal arrhythmias.
3. All atrioventricular and intraventricular conduction disturbances, regardless of symptoms.
4. Other EKG abnormalities consistent with disease or pathology and not explained by normal variation.

Blood Pressure: Systolic must be less than 140 mm Hg and Diastolic less than 90 mm Hg. If a single measurement is outside of this range, a 3-5 day blood pressure check must be completed. The average of the 3-5 day blood pressure check must fall within the above standards.

Pulse Rate: Shall be determined in conjunction with blood pressure. If the resting pulse is less than 45 or over 100, an electrocardiogram shall be obtained. A pulse rate of less than 45 or

greater than 100 in the absence of a significant cardiac history and medical or electrocardiographic findings shall not in itself be considered disqualifying.

Distant Visual Acuity:

1. Service Group 1, 20/100 or better each eye uncorrected, corrected to 20/20 or better each eye.
2. Service Group 2, 20/200 or better each eye uncorrected, corrected to 20/20 or better each eye.
3. Service Group 3, 20/400 or better each eye uncorrected, corrected to 20/20 or better each eye.

The first time distant visual acuity of less than 20/20 is noted a manifest refraction (not cycloplegic) shall be performed recording the correction required for the aviator to see 20/20 in each eye (all letters correct on the 20/20 line).

Refractive limits: Refractions will be recorded using minus cylinder notation. There are no limits. However, anisometropia may not exceed 3.50 diopters in any meridian.

Near Visual Acuity: Must correct to 20/20 in each eye using either the AFVT or standard 16 Snellen or Sloan notation nearpoint card. Bifocals are approved.

Oculomotor Balance:

1. No uncorrected esophoria more than 6.0 prism diopters.
2. No uncorrected exophoria more than 6.0 prism diopters.
3. No uncorrected hyperphoria more than 1.50 prism diopters.
4. Tropia or Diplopia in any direction of gaze is disqualifying

Field of Vision: Must be full.

Color Vision: Must pass any one of the following two tests:

1. FALANT or Optec 900: 9/9 correct on the first trial or, if any are missed, at least 16.18 correct on the combined second and third trials.
2. PIP color plates (Any red-green screening test with at least 14 diagnostic plates; see manufacturer instructions for scoring information), randomly administered under Macbeth lamp: scoring plates 2-15, at least 12/14 correct.

Depth Perception: Only stereopsis is tested. Must pass any <u>one</u> of the following three tests:

1. AFVT: at least A – D with no misses.
2. Stereo booklet (Titmus Fly or Randot): 40 arc second circles.
3. Verhoeff: 8/8 corrent on the first trial or, if any are missed, 16/16 correct on the combined second and third trials.

Intraocular Pressure: Must be less than or equal to 22 mm Hg. A difference of 5 mm Hg or greater between eyes requires an ophthalmology consult, but if no pathology noted, is not considered disqualifying.

Hearing (ANSI 1969):

Frequency (Hz)	Better Ear (dB)	Worse Ear (dB)
500	35	35
1000	30	50
2000	30	50

1.6 STUDENT NAVAL AVIATOR APPLICANT (SNA) STANDARDS

All applicants for pilot training must meet Class I standards except as follows:

Visual Acuity, Distant and Near: Uncorrected visual acuity must not be less than 20/40 each eye, correctable to 20/20 each eye using a **Goodlite** eye chart. Vision testing procedures shall comply with those outlined on the Aerospace Reference and Waiver Guide Physical Exams section.

Refractive Limits: If uncorrected distant visual acuity is less than 20/20 either eye, a manifest refraction must be recorded for the correction required to attain 20/20. If the candidate's distant visual acuity is 20/20, a manifest refraction is not required. Total myopia may not be greater than -1.50 diopters in any meridian, total hyperopia no greater than +3.00 diopters in any meridian, or astigmatism no greater than -1.00 diopters. The astigmatic correction shall be reported in minus cylinder format.

Cycloplegic Refraction: This is required for all candidates to determine the degree of spherical ametropia. The refraction should be performed to maximum plus correction to obtain best visual acuity. Due to the effect of lens aberrations with pupil dilation, visual acuity or astigmatic correction, which might disqualify the candidate, should be disregarded if the candidate meets the standards for visual acuity and astigmatism with manifest refraction. A cycloplegic refraction should be performed at least 30 minutes after instillation of 2gtts (5 minutes apart) 1% cyclopentolate.

Slit Lamp Examination: Required, and must demonstrate no pathology.

Dilated Fundus Examination: Required, and must demonstrate no pathology.

Hearing (ANSI 1969) :

Frequency (Hz)	Decibel (dB)
500	25
1000	25
2000	25
3000	45
4000	55

Anthropometrics and Height/Weight: Refer to NAVAIRINST 3710.9C and OPNAVINST 3710.37A.

Reading Aloud Test. Required if speech impediment exists or history of speech therapy or facial fracture. See MMD paragraph 15-95 or Physical Exam section of ARWG for text.

1.7 DESIGNATED NAVAL FLIGHT OFFICER (NFO) STANDARDS

Must meet Class I standards, except as follows:

Visual Acuity, Distant and Near: No limit uncorrected. Must correct to 20/20 each eye.

Refraction: No limits.

Oculomotor Balance: No obvious heterotropia or symptomatic heterophoria (NOHOSH).

Depth Perception: Not required.

1.8 APPLICANT NAVAL FLIGHT OFFICER STANDARDS

Must meet Class I standards, except as follows:

Visual Acuity, Distant and Near: No limit uncorrected. Must correct to 20/20 each eye. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Refractive Limits: Manifest refraction must not exceed +/-8.00 diopters in any meridian (sum of sphere and cylinder) with astigmatism no greater than -3.00 diopters. Refraction must be recorded in minus cylinder format. Must have no more than 3.50 diopters of anisometropia.

Oculomotor Balance: NOHOSH.

Depth Perception: Not Required.

Slit Lamp Examination: Required, and must demonstrate no pathology.

Hearing: Same as SNA Applicant.

Anthropometrics and Height/Weight: Refer to NAVAIRINST 3710.9C and OPNAVINST 3710.37A.

Reading Aloud Test: Required if speech impediment exists or history of speech therapy or facial fracture. See MMD paragraph 15-95 or Physical Exam section of ARWG for text.

1.9 DESIGNATED NAVAL FLIGHT SURGEON, NAVAL AEROSPACE PHYSIOLOGIST, NAVAL AEROSPACE EXPERIMENTAL PSYCHOLOGIST, AND NAVAL AEROSPACE OPTOMETRIST STANDARDS

Must meet Class I standards, except as follows:
Visual Acuity, Distant and Near. No limit uncorrected. Must correct to 20/20 each eye. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Refractive Limits. No limits.

Oculomotor Balance. NOHOSH.

Depth Perception. Not Required.

1.10 APPLICANT NAVAL FLIGHT SURGEONS, APPLICANT NAVAL AVIATION PHYSIOLOGISTS, APPLICANT NAVAL AVIATION EXPERIMENTAL PSYCHOLOGISTS, AND APPLICANT NAVAL AEROSPACE OPTOMETRISTS STANDARDS

All applicants must meet SNA Applicant standards except as follows:
Visual Acuity, Distant and Near: No limit uncorrected. Must correct to 20/20 each eye. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Refraction. No limits.

1.11 DESIGNATED AND APPLICANT NAVAL AIRCREW (FIXED WING) STANDARDS

Must meet Class I standards except as follows.

Visual Acuity, Distant and Near: No limit uncorrected. Must correct to 20/20 each eye. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.
Refraction: No limits.
Oculomotor Balance: NOHOSH.
Depth Perception: Not required.
Hearing: Designated must meet Class I standards. Applicants must meet SNA Applicant standards.

1.12 DESIGNATED AND APPLICANT NAVAL AIRCREW (ROTARY WING) STANDARDS

Must meet Class I standards, except as follows:

Visual Acuity, Distant and Near. Must be uncorrected 20/100 or better, each eye corrected to 20/20. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Refraction. No limits.

Oculomotor Balance. NOHOSH.

Hearing. Designated must meet Class I standards. Applicants must meet SNA applicant standards.

1.13 DESIGNATED AND APPLICANT AEROSPACE PHYSIOLOGY TECHNICIAN STANDARDS

Must meet Class I standards except as follows:

Visual Acuity, Distant and Near. No limit uncorrected. Must correct to 20/20 each eye. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Refraction: No limits.

Depth Perception: Not required.

Color Vision: Not required.

Hearing: Designated must meet Class I standards. Applicants must meet SNA applicant standards.

Age: Applicants must be less than 32 years of age.

Sinus X-rays: Applicants must submit sinus films to NAVOPMEDINST Code 342 with initial physical examination.

1.14 CLASS III PERSONNEL NON-DISQUALIFYING CONDITIONS

Class III personnel must meet standards for aviation personnel, but within those limitations, the following conditions are <u>not</u> considered disqualifying:

1. Hematocrit between 38.0 and 39.9 percent in males or between 35.0 and 36.9 percent in females, if asymptomatic.
2. Seasonal allergic rhinitis unless requiring regular use of antihistamines or medications causing drowsiness.
3. Nasal or paranasal polyps
4. Chronic sinus disease, unless symptomatic and requiring frequent treatment.
5. Lack of valsalva or inability to equalize middle ear pressure.
6. Congenital or acquired chest wall deformities, unless expected to interfere with general duties.
7. Mild chronic obstructive pulmonary disease.
8. Pneumothorax once resolved.
9. Surgical resection of lung parenchyma if normal function remains.
10. Paroxysmal supravertricular dysrythmias, after normal cardiology evaluation, unless symptomatic.
11. Cholecystectomy, once resolved.
12. Hyperuricemia.
13. Renal stone once passed or in stable position.
14. Internal derangements of the knee unless restricted from general duty.
15. Recurrently dislocating shoulder.
16. Scoliosis, unless symptomatic or progressive. Must meet general standards.
17. Kyphosis, unless symptomatic or progressive. Must meet general standards.
18. Fracture or dislocation of cervical spine.
19. Cervical fusion.
20. Thoracolumbar fractures.
21. History of craniotomy.
22. History of decompression sickness.
23. Anthropometric standards do not apply.
24. No limits on resting pulse if asymptomatic.

1.15 ATC-MILITARY AND DEPARTMENT OF THE NAVY CIVILIANS, DESIGNATE AND APPLICANT STANDARDS

Military must meet the standards in Chapter 15, Section III (Physical Standards); civilians shall be examined in military MTFs, by a naval flight surgeon, and must meet the general requirements for Civil Service employment as outlined in the Office of Personnel Management, Individual Occupational Requirements for GS-2152: Air Traffic Control Series. Both groups have the following additional requirements:

Phorias: NOHOSH.
Depth Perception: Not required.
Slit Lamp Examination: Required for applicants only. Must demonstrate no pathology.
Intraocular Pressure: Must meet Class I standards.
Color Vision: Must meet Class I standards.
Hearing: Applicants must meet SNA applicant standards. Designated must meet Class I standards.
Reading Aloud Test: The "Banana Oil" test is required for all applicants and other personnel as clinically indicated.
Department of the Navy Civilian ATCs:

1. There are no specific height, weight, or body fat requirements.
2. When a civilian who has been ill in excess of 30 days returns to work, a formal flight surgeon's evaluation shall be performed prior to returning to ATC duties. NAVMED 6410/2 shall be used to communicate clearance for ATC duties to the commanding officer.

1.16 DESIGNATED AND APPLICANT UNMANNED AERIAL VEHICLE OPERATOR STANDARDS (INTERNAL PILOT, EXTERNAL PILOT, PAYLOAD OPERATOR)

Officers who maintain their aviation designators (pilot or NFO) must continue to meet the appropriate standards of their designation. USMC non-aviation designated officers or Navy officers no longer qualified for their previous aviation designator shall meet same standards as external operators. **All unmanned aerial vehicle operators must meet same standards as ATCs, except:**

Phorias: Must meet Class I standards.
Depth Perception: Must meet Class I standards. Those who fail will be restricted to payload operator or internal pilot only.

1.17 CRITICAL FLIGHT DECK PERSONNEL STANDARDS (DIRECTOR, SPOTTER, CHECKER, NON-PILOT LANDING SAFETY OFFICER AND HELICOPTER CONTROL OFFICER, AND ANY OTHER PERSONNEL SPECIFIED BY THE UNIT COMMANDING OFFICER)

Frequency of screening is annual. Waivers of physical standards are determined locally by the senior medical department representative and commanding officer. No BUMED or NAVPERSCOM submission or endorsement is required. **Must meet the standards in Chapter 15, Section III (Physical Standards), except as follows:**

Visual Acuity, Distant and Near: No limits uncorrected. Must correct to 20/20. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Field of Vision: Must have full field of vision.

Depth Perception: Must meet Class I standards.

Color Vision: Must meet Class I standards.

1.18 NON-CRITICAL FLIGHT DECK PERSONNEL STANDARDS

This paragraph includes all personnel not defined as critical. Frequency of screening is annual. Waivers of physical standards are determined locally by the senior medical department representative and commanding officer. No BUMED or NAVPERSCOM submission or endorsement is required. **Must meet the standards in Chapter 15, Section III (Physical Standards) except as follows:**

Visual Acuity, Distant and Near: No limits uncorrected. Must correct to 20/40 or better in one eye, 20/30 or better in the other.

NOTE: Because of the safety concerns inherent in performing duties in the vicinity of turning aircraft, flight line workers should meet the same standards as their flight deck counterparts.

1.19 PERSONNEL WHO MAINTAIN AVIATOR NIGHT VISION SYSTEMS STANDARDS

Personnel, specifically those aircrew survival equipment men (USN PR or USMC MOS 6060) and aviation electrician's mates (USN AE or USMC MOS 64xx), assigned to duty involving maintenance of night vision systems, or selected for training in such maintenance, shall be examined annually to determine visual standards qualifications. Record results in the member's health record. **Waivers are not considered. Standards are as follows:**

Distant Visual Acuity: Must correct to 20/20 or better in each eye and correction must be worn. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Near Visual Acuity: Must correct to 20/20.

Depth Perception: Not required.

Color Vision: Must meet Class I standards.

Oculomotor Balance: NOHOSH.

1.20 SELECTED PASSENGERS, PROJECT SPECIALISTS, AND OTHER PERSONNEL

Refer to OPNAVINST 3710.7. When ordered to duty involving flying for which special requirements have not been prescribed, personnel shall, prior to engaging in such duties, be examined to determine their physical qualification for aerial flights, an entry made in their Health Record, and a NAVMED 6410/2 issued if qualified. The examination shall relate primarily to the circulatory system, musculoskeletal system, equilibrium, neuropsychiatric stability, and patency of the eustachian tubes, with such additional consideration as the individual's specific flying duties may indicate. The examiner shall attempt to determine not only the individual's physical qualification to fly a particular aircraft or mission, but also the physical qualification to undergo all required physical and physiological training associated with flight duty. **No individual shall be found fit to fly unless fit to undergo the training required in OPNAVINST 3710.7 series, for the aircraft and/or mission.**

Visual Acuity, Distant and Near: No limits uncorrected. Must correct to 20/50 or better in one eye.

NOTE: Many squadrons have non-designated personnel that fly as a TFO, intelligence operator, cryptologic technician, or other duty that requires regular flying. If these individuals fly on a regular basis, receive flight pay, and/or have flight-related duties, or mission critical duties, assigned to them while flying, they shall be considered as Class II Naval Aircrew with regard to aeromedical standards and physical submission requirements. Consult with NAMI if their flight status is unclear. However, waiver requirements may be different in these individuals, and will be considered on a case-by-case basis depending on required physical and physiological training and their particular duties, aircraft, and mission.

1.21 NAVAL AVIATION WATER SURVIVAL TRAINING INSTRUCTORS (NAWSTI) AND RESCUE SWIMMER SCHOOL TRAINING PROGRAMS STANDARDS

Applicants, designated and instructor rescue swimmers must meet the general standards outlined in MMD Chapter 15, Section III. In addition, the following standards apply:
Visual Acuity, Distant and Near:

1. **Applicant Surface Rescue Swimmer**. No worse than 20/100 uncorrected in either eye. Must correct to 20/20 each eye.
2. **Designated Surface Rescue Swimmer**. No worse than 20/200 uncorrected in either eye. Must correct to 20/20 each eye.
3. **Naval Aviation Water Survival Training Program Instructor**. No limits uncorrected. Must correct to 20/20 in the better eye, no less than 20/40 in the worse eye.
4. **All categories**. If the AFVT or Goodlite letters are used, a score of 7/10 on the 20/20 line constitutes meeting visual acuity requirements.

Psychiatric: Because of the rigors of the high risk training and duties they will be performing, the psychological fitness of applicants must be carefully appraised by the examining physician. The objective is to elicit evidence of tendencies which militate against assignment to these critical duties. Among these are below average intelligence, lack of motivation, unhealthy motivation, history of personal ineffectiveness, difficulties in interpersonal relations, a history of irrational behavior or irresponsibility, lack of adaptability, or documented personality disorders.

Any examinee diagnosed by a psychiatrist or clinical psychologist as suffering from depression, psychosis, manic-depression, paranoia, severe neurosis, severe borderline personality, or schizophrenia will be recommended for disqualification at the time of initial examination.

Those personnel with minor psychiatric disorders such as acute situational stress reactions must be evaluated by the local medical officer in conjunction with a formal psychiatric evaluation when necessary. Those cases which resolve completely, quickly and without significant psychotherapy can be found fit for continued duty. Those cases in which confusion exists, review by the TYCOM force medical officer for fleet personnel or BUMED, M3F1 for shore-based personnel. Any consideration for return to duty in these cases must address the issue of whether the service member, in the opinion of the medical officer and the member's commanding officer, can successfully return to the specific stresses and environment of surface rescue swimmer duty.

1.22 APPLICANT CHECKLIST

	SNA	SNFO	SNFS/SNAP SNAEP	AC (Rotary Wing)	AC F/W	ATC	APT	UAV
CXR	At accession or <3yr old			<3yr	<3yr	<3yr	<3yr	<3yr
Dental	Type I or II and Class I or 2							
Labs	ALL LABS ARE REQUIRED WITHIN 90 DAYS OF PHYSICAL DATE							
Urine	Occult blood, Protein and Glucose by dipstick, Specific gravity							
Serology	RPR							
Chems	Cholesterol, HDL, LDL, Triglyceride, Fasting Blood Sugar							
Other Labs	HCT, HIV, Sickle Cell, G6PD							
HCT	Males: 40-52 Females: 37-47							
EKG	MUST BE DONE WITHIN 12 MONTHS OF PHYSICAL DATE							
Anthropometrics	Must meet OPNAVINST 3710.37A guidelines							
WEIGHT (See HT-WT charts)	Must meet Navy and Marine Corps weight and body fat standards. Weight cannot be <103 lbs or >245 lbs.					NAVY STD	NAVY STD	NAVY STD
BP (Sitting)	<140/90	<140/90	<140/90	<140/90	<140/90	<140/90	<140/90	<140/90
Pulse (Sitting)	<100, >45	<100, >45	<100, >45	<100, >45	<100, >45	<100, >45	<100, >45	<100, >45
DVA uncorr w/ corr	≤20/40-0 20/20-0	No Limit 20/20	No Limit 20/20	≤20/100 20/20	SEE SPECIAL*	No Limit 20/20	No Limit 20/20	No Limit 20/20
NVA uncorr w/ corr	20/40 20/20	None 20/20	None 20/20	≤20/100 20/20	None 20/20	None 20/20	None 20/20	None 20/20
SLEX	Required							
Field of vision	Full	Full	Full	Full	Full	Full	Full	Full
REFRACTION Total Ref error astigmatism anisometropia	cyclo/manifest +3.00/-1.50 +/-1.00 3.50	manifest +/-8.00 +/-3.00 3.50	No Limit on refractive error. Record on exam					
Phoria	Eso ≤6, Exo ≤6 Hyper ≤1.5	NOHOSH	SAME AS SNA	NOHOSH				SAME AS SNA
Color	PIP MUST PASS 12/14, ISHIHARA MUST PASS 12/14 ON 16 PLATE TEST, OR FALANT MUST PASS9/9 or 16/18						NOT REQUIRED	Required
Depth	AFVT A-D Verhoeff 8/8 RANDOT or Titmus to ≤40 sec of arc	DEPTH PERCEPTION TESTING IS NOT REQUIRED	SAME AS SNA	SAME AS SNA	NOT REQUIRED	NOT REQUIRED	NOT REQUIRED	SAME AS SNA
IOP	≤ 22 mm Hg and must be no more than 4 mm Hg difference between eyes							
Audiogram	ALL APPLICANTS MUST MEET SNA HEARING STANDARDS 500HZ 25db 1000 HZ 25db 2000 HZ 25db 3000 HZ 45db 4000 HZ 55db							
Special	Cycloplegic must show correction to 20/20	Passing 7/10 on 20/20 line is considered 20/20 for Class 2 and Class 3 applicants Enlisted Naval Aircrew (NAC) >20/100 shall be PQ for fixed wing only.				Reading Aloud Test Required	Submit sinus x-rays	
Fleet Accession	Physical exam must be within 12 months							
NFO to Pilot transition	Must meet SNA standards Physical exam must be within 12 months unless specified otherwise in announcement							

1.23 DESIGNATED CHECKLIST

Item	SG1	SG II	SG III	NFO/NFS NAP/NAEP	A/C ROTARY WING USN/USMC	A/C FIXED WING USN/USMC	APT	ATC	UAV
DVA (SEE NOTE)	20/100 OR BETTER CORR TO 20/20-0	20/200 OR BETTER CORR TO 20/20-0	20/400 OR BETTER CORR TO 20/20-0	NO LIMIT CORR TO 20/20	20/100 OR BETTER CORR TO 20/20	NO LIMIT CORR TO 20/20	NO LIMIT CORR TO 20/20	NO LIMIT CORR TO 20/20	NO LIMIT CORR TO 20/20
NVA	NO LIMIT PROVIDED CORRECTABLE TO 20/20. MUST CARRY CORRECTION IF WORSE THAN 20/40.								
REF ERROR	NO LIMIT ON REFRACTION. PERFORM MANIFEST ON DVA >20/20								
PHORIAS	6ESO 6EXO 1.5HYPER			NO OBVIOUS HETEROTROPIA OR SYMPTOMATIC HETEROPHORIA (NOHOSH)					SAME AS SG1
DEPTH PERECPTION	MUST PASS ONE OF: AFVT A-D, VERHOEFF 8/8 OR 16/16, RANDOT AND TITMUS ≤40 SEC OF ARC			NOT REQUIRED	SAME AS SG1	NOT REQUIRED	NOT REQUIRED	NOT REQUIRED	SAME AS SG1
COLOR VISION	PIP 12/14, ISHIHARA 12/14 ON 14 PLATE TEST, FALANT 9/9 OR 16/18						NOT REQUIRED	SAME AS SG1	SAME AS SG1
IOP	Must be ≤ 22mmhg and no more than 4 difference between eyes. Perform on all examinations								
ECG	Required Every 5 years at ages 25, 30, 35, 40 till age 50 then annually on all aviation duty physical exams. SEE SPECIAL ON NASA APPLICANTS								
URINE	EVERY FIVE YEARS: OCCULT BLOOD, PROTEIN, AND GLUCOSE BY DIPSTICK								
BLOOD TESTS	ANNUALLY: HIV EVERY FIVE YEARS: HCT, CHOLESTEROL, HDL, LDL, TRIGLYCERIDES, FASTING BLOOD SUGAR, RPR								
CXR	REQUIRED ONLY WHEN CLINICALLY INDICATED (SEE SPECIAL ON NASA APPLICANTS)								
B/P	SITTING ONLY REQUIRED. MUST BE LESS THAN 140/90								
PULSE	MUST BE <100 AND >45, IF <45 DOCUMENT APPROPRIATE CARDIO RESPONSE TO EXERCISE								
AUDIO	FREQ BETTER EAR WORSE EAR 500HZ 35DB 35DB 1000HZ 30DB 50DB 2000HZ 30DB 50DB								
SPECIAL	Interservice Transfer: Physical exams must be less than one year old, and must be sent to BUMED M3F1 for commissioning endorsement before aviation determination can be made. NFO to Pilot transition program: Refer to SNA standards NASA Applicants: Applicants for Astronaut must meet SG1 standards and have DVA of 20/100 or better. Mission specialist applicants must meet SG1 standards with DVA of 20/200 or better. Long form physical examination is required with all required labs, ECG, CXR, and manifest refraction. Submission of SF 88, SF 93, and JSC 465 (NASA Form) Supplemental Medical Hx, and ECG tracing required. Physical exam must be within timeframe noted by NAVADMIN msg which announces the program.								
NOTE	DVA of 20/20 in Class 1 personnel is 20/20 with zero misses on 20/20 line. DVA of 20/20 in Class 2 and 3 personnel is considered 20/20 with up to 3 misses on 20/20 line (7/10). All aviation personnel must wear their corrective lenses if needed. If uncorrected DVA is worse than 20/100, they must carry an extra pair.								

AEROMEDICAL TECHNICAL BULLETIN

Revised January 2003

Reading Aloud Test

Background:

Administer the reading aloud test (RAT) to aviation training applicants as a standardized assessment of an individual's ability to communicate clearly in the English language, in a manner compatible with safe and effective aviation operations. Current communication systems degrade speech intelligibility. The radio environment separates the speaker and the listener from the benefits of watching lips and body language cues. Those with marginal English skills have problems communicating effectively in the operational aviation environment.

Failure of the screening RAT by applicants with English as their native language may indicate undiagnosed or concealed learning disabilities. Administration of the RAT occasionally reveals immature, indecisive, careless, or excessively introverted personalities, which may indicate a high risk for aviation training failure.

When administered to aviation personnel, to include ATC personnel, the RAT will be used to determine the individual's ability to clearly enunciate, in the English language, in a manner compatible with safe and effective aviation operations.

The RAT appears to be a nonsense story, but was designed as a phonetic exercise. Assessment by the flight surgeon is subjective. Applicants should read the RAT clearly, deliberately, without hesitation, error, or stuttering. The test is scored as "RAT-PASS" or "RAT-FAIL." The examining physician will consult with a local instructor pilot or ATC supervisor in questionable cases.

Procedure:

Have the examinee stand erect, face the examiner across the room and read aloud, as if he/she were confronting a class of students.

If he/she pauses, even momentarily, on any phrase or word, the examiner immediately and sharply says, "What's that?" and requires the examinee to start again with the first sentence of the test. The true stammerer usually will halt again at the same word or phonetic combination and will often reveal serious stammering.

Have the applicant read aloud as follows:

"You wished to know all about my grandfather. Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever. A long flowing beard clings to his chin giving those who observe him a pronounced feeling of the utmost respect. When he speaks, his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon our small organ. Except in winter when the ooze of snow or ice is present, he slowly takes a short walk each day. We have often urged him to walk more and smoke less, but he always answers, "Banana oil!" Grandfather likes to be modern in his language."

2.0 WAIVERS OF PHYSICAL STANDARDS

2.1 INTRODUCTION

Aircrew personnel and applicants who do not meet physical standards may be considered for a waiver of standards. Waivers may be granted on the need of the service, consistent with training, experience, performance, and proven safety of the aircrew personnel. In general, applicants are held to a stricter standard than designates and are less likely to be recommended for a waiver.

2.2 GENERAL REQUIREMENTS

In addition to the criteria mentioned above, waivers are also based upon risk management and how it is applied to the following nine criteria:

1. It must be acceptable for unrestricted general military duty as per the Manual of the Medical Department (MANMED/NAVMED P-117).
2. It cannot jeopardize the successful completion of a mission.
3. The disqualifying defect must not pose a risk of sudden incapacitation.
4. It must not pose any potential risk for subtle incapacitation that might not be detected by the individual but would affect alertness, special senses, or information processing.
5. It must not be subject to aggravation by military service or continued flying.
6. It must be resolved or stable at the time of the waiver (i.e. non-progressive).
7. If the possibility of progression or recurrence exists, the first signs or symptoms must be easily detectable and cannot constitute an undue hazard to the individual or to others.
8. It cannot require uncommonly available tests, regular invasive procedures, non-routine medications or frequent absences to monitor stability or progression especially during deployment or assignment to austere areas.
9. It cannot involve unconventional medical treatments that are outside of standard of care.

2.3 GRANTING AUTHORITY

Waivers are granted by BUPERS, CMC (ASM), or other appropriate waiver granting authority. NAMI Code 342 must review all waiver requests and forward their recommendations to BUPERS or CMC as appropriate. It is important to note that the BUMED endorsement letter recommending a disposition on an aircrew member is not the final action and requires BUPERS or CMC endorsement. In other words, a waiver is not truly granted until BUPERS or CMC acts. Until that time, the waiver is still in a “recommended” status.

2.4 REQUESTING AUTHORITY

Waivers may be requested by the following individuals:

1. The service member initiates the waiver request in most circumstances.
2. The commanding officer of the member may initiate a waiver request.

3. The examining or responsible medical officer may initiate a waiver request.
4. In certain cases the initiative to request or recommend a waiver will be taken by BUMED; the Commanding Officer, Naval Reserve Center; CMC; or NAVPERSCOM. In no case will this initiative be taken without informing the member's local command.
5. All waiver requests shall be either initiated or endorsed by the member's commanding officer.

2.5 ROUTING OF WAIVER REQUESTS

Except in rare cases, the waiver request will begin at the member's command either with the member or the commanding officer. All waiver requests must be routed through the member's commanding officer and contain a statement indicating that the commanding officer is aware of the request for a waiver, the Aeromedical recommendation, and whether the commanding officer concurs with this recommendation. A formal command endorsement typed on command letterhead must accompany all waiver requests for alcohol disorders. After review by the member's commanding officer, all waiver requests shall be forwarded to NAMI Code 342 for review and endorsement. NAMI Code 342 will review all waiver requests and forward their recommendation to the appropriate waiver granting authority (BUPERS or CMC) via formal BUMED letter. Copies of this BUMED letter are also sent to the member's command and the medical treatment facility that examined the member. Copies of the BUMED letter shall be placed in the member's health record along with the waiver request.

2.6 WAIVER SUBMISSION REQUIREMENTS

The submitter should refer to the appropriate section of the Aeromedical Reference and Waiver Guide (ARWG) for specific submission requirements for each defect or disqualifying diagnosis. All waiver submissions require ALL OP REPORTS pertaining to the waiver (as indicated), an Aeromedical Summary (AMS), to include applicants, and the following items:

APPLICANTS:

1. Complete applicant physical exam
2. A detailed history, review of systems, and physical findings associated with the defect shall be recorded on the physical exam
3. All supporting documentation required by the appropriate section of the ARWG (i.e. laboratory, radiology, consultant reports...)
4. Flight Surgeon's recommended disposition

DESIGNATED:

1. The member's most recent flight physical
2. All supporting documentation required by the appropriate section of the ARWG (i.e. laboratory, radiology, consultant reports, etc...)
3. All information required for continuation of previous waivers
4. The AERO website should be reviewed prior to submission to ensure that the member has all prior waivers and physical exams up-to-date
5. Once complete, the waiver request shall be submitted within 10 working days to NAMI Code 342 via the member's commanding officer

2.7 WAIVER CONTINUATION

Waiver continuation requests must be submitted to NAMI Code 342 for review. Refer to the BUMED endorsement letter to determine how frequently submission is required and what information must be submitted. The continuation request must include the member's annual physical exam (long or short form) and all required additional information as specified by BUMED letter and/or the pertinent section of the ARWG.

2.8 AEROMEDICAL CLEARANCE

A "waiver granted" normal duration Aeromedical Clearance Notice (up-chit) may only be issued after a waiver has been granted by BUPERS or CMC. A temporary up-chit may be issued if:

1. NAMI Code 342 has endorsed the waiver request and recommended a waiver of standards be granted
2. A Local Board of Flight Surgeons (LBFS) may issue a temporary up-chit in accordance with MMD Chapter 15-80. See criteria below

A temporary up-chit **may not exceed 90 days in duration.** If the member holds a grounding letter issued by BUPERS or CMC stating that a waiver has previously been denied, a **temporary up-chit shall not be issued.** The member must wait until a waiver is granted by appropriate authority before any up-chit is issued.

2.9 LOCAL BOARD OF FLIGHT SURGEONS

A Local Board of Flight Surgeons (LBFS) provides an expedient way to return a grounded aviator to flight status pending official BUMED endorsement and granting of a waiver by BUPERS or CMC. A LBFS is convened by the member's commanding officer based on the recommendation of the flight surgeon or higher authority. It must consist of at least three medical officers, two of whom shall be flight surgeons. The findings of the LBFS may be recorded as an Aeromedical Summary (AMS).

The senior flight surgeon on the board may issue a temporary, 90 day up-chit if the following criteria are met:

1. The condition is addressed by the ARWG
2. The member has completed all tests and required information as specified by the ARWG
3. The member has met all criteria for a waiver as specified in the ARWG
4. The member has not been previously grounded by BUPERS or CMC

A LBFS shall NOT issue an up-chit to personnel whose condition is not addressed by the ARWG. In those cases a waiver request should be forwarded to NAMI Code 342 with a request for expedited review if required. A LBFS shall NOT issue an up-chit if the member currently has a grounding letter by BUPERS or CMC.

2.10 SPECIAL BOARD OF FLIGHT SURGEONS

This board consists of members appointed by the OIC of NAMI. The board evaluates medical cases, which, due to their complexity or uniqueness, warrant a comprehensive aeromedical evaluation. A Special Board of Flight Surgeons should not be requested merely to challenge a physical standard or disqualification without evidence of special circumstances. Refer to MANMED 15-81 for specific instructions on how to request a Special Board of Flight Surgeons and more details regarding its proceedings.

2.11 SENIOR BOARD OF FLIGHT SURGEONS

This board is the final appeal board to review aeromedical dispositions as requested by NAVPERSCOM, CNO, or CMC. The board consists of a minimum of five members, three of whom must be flight surgeons and one of whom shall be a senior line officer assigned by the CNO or CMC. The presiding officer shall be the Deputy Chief, BUMED, Operations and assisted by the Director, Aerospace Medicine. Refer to MANMED 15-82 for additional information.

2.12 THE AEROMEDICAL SUMMARY

The Aeromedical Summary (AMS) is required for <u>all</u> initial waiver requests (designated, applicant and members currently in aviation training). An AMS allows the Flight Surgeon to write a detailed summary of the member's condition and how it relates to his current flying duty. It should be directed to the member's specific condition and include a detailed history of present illness (HPI), directed physical exam, and include results of all pertinent ancillary studies. The AMS should provide enough detail so that the reviewer can make an appropriate aeromedical decision based solely on this document. As stated earlier, the waiver request shall include the AMS, all ancillary consultant, laboratory, radiological and op reports, and the member's current physical exam. A LBFS may detail its findings and recommendations in an AMS, but not every AMS necessarily serves as a LBFS. At the end of this section is an AMS template. This general format should be followed when submitting an AMS for review. A PRK AMS template and a Hypertension AMS template are also available for download in the forms section of the ARWG as well as their respective medical sections (ophthalmology and cardiology). An AMS MUST BE associated with a physical that is dated the same day or prior.

*AERO requires a UIC for the medical facility and the member's command.

A template and instructions on how to complete an AMS are contained below

2.13 HOW TO SUBMIT A WAIVER REQUEST

Waiver requests shall be submitted to NAMI Code 342 for review and appropriate endorsement.

All physicals and AMSs should be submitted through the web-based program AERO (https://vfso.rucker.amedd.army.mil/).

Fax: (850) 452-3883 or DSN 922-3883. Please use the fax cover sheet available in the forms section of the ARWG

Email: You can email a file of the scanned documents to NOMI-Code342@med.navy.mil. Whenever possible the file type.pdf should be used. If necessary, .tif, or .jpg can also be sent. E-MAIL SHOULD ONLY BE USED WHEN ON A SHIP AND INTERNET PROBLEMS DUE TO DEPLOYMENT.

Mail: Do not send original documents, they should remain in the member's medical record. Make legible copies and send them by one of the following means:

Code 342
Naval Aerospace Medical Institute
220 Hovey Road
Pensacola, FL 32508

2.14 HOW TO CHECK ON THE STATUS OF A WAIVER REQUEST

Log on to AERO website: https://vfso.rucker.amedd.army.mil/. This will give you access to check both the current status of aviation personnel and track your waiver request as it makes its way through the process. Access to this site requires your CAC card and PIN and a user account (http://www.med.navy.mil/sites/navmedmpte/nmotc/nami/arwg/Pages/AeromedicalElectronicResourceOffice.aspx has specific requirements for requesting an account).

2.15 AEROMEDICAL SUMMARY TEMPLATE

Aeromedical Summary (AMS) Template

Date:
Patient Identification:
LT John Doe, 000-00-0000/XXXX(designator), (ensure that member is USN, USNR, USNR-R, USNR-FTS, USMC, USMCR, USCG) is a 24 y/o Caucasian male aviator, with 3000 flying hours in the F14, P3, etc. Current job is flying F14s and he has flown 100 hours in the last six months. Member is stationed at_____. The purpose of this AMS is to request a waiver for_____ (diagnosis).
Member's Organization's name and UIC/RUC:_____.
Medical Treatment Facility name and UIC: _____
Flight Surgeon email point of contact: _____ with phone_____.
Member's designation code is: _____.
Previous Waivers and status: Please give the status of *all* previous waivers and *update required information* (i.e., member has a previous waiver for HTN granted in 2000 and provide labs, EKG, etc… as required for annual submission).
Significant Medical History: Same as History of Present Illness.
Consultant reports: Need dates, consultant diagnosis, prognosis, treatment, and follow-up. Submit copies of the consultant reports along with the AMS
Physical Examination: Include vital signs, and a targeted physical exam that focuses on the waiver(s) requested (i.e., cardiac examination for hypertension waiver).
Lab test: Review lab tests that are pertinent to the evaluation of the disqualifying diagnosis. Either type in the actual results or send copies of the laboratory reports.
Information required: Consult the ARWG for required medical tests and consults for both the waiver requested and any previous waivers. Remember to include any information required for previous waivers.
Diagnosis: (ICD-9:) Use current ICD-9 diagnostic terminology. ICD-9 codes are available in respective sections of the waiver guide.
Aeromedical recommendations: Include appropriate aeromedical justification for each recommendation.
Command endorsement: The member's commanding officer is aware and concurs with this member's diagnosis, prognosis, waiver requirements and waiver recommendation in this Aeromedical Summary. Official command endorsement (typed letter on command letterhead, signed by the CO) is required for alcohol waivers (with SF 88 and 93 as per BUMEDINST 5300.8).

FS signature *** FS signature *** Physician signature***

3.0 CARDIOLOGY

3.1 AORTIC INSUFFICIENCY

AEROMEDICAL CONCERNS: Acute complications from aortic insufficiency are rare. Chronic complications include left ventricular dilation and heart failure. There are theoretical concerns that the regurgitant flow of blood back into the LV may predispose the individual to GLOC, but this has not been confirmed. A secondary concern is that weight training to improve G-tolerance is relatively contraindicated, although such training is highly desirable in the tactical community.

WAIVER: Aortic insufficiency associated with a structural abnormality of the valve is CD, with no waiver for candidates. Designated individuals can receive waiver recommendations limited to non-high performance aircraft. Traditionally, AI has been felt not to occur in normal subjects, but NOMI and the Air Force Aeromedical Consult Service have detected a limited degree of AI in a number of patients without detectable valvular pathology. On echo, these "physiologic" AI cases typically have a very small AI jet that does not extend out of the LVOT. In these cases, the condition is NCD, and as such does not require a waiver.

INFORMATION REQUIRED:
Note: NOMI will often request the actual echo tape for review, so please request a duplicate of the tape for submission with the waiver request.

1. All cases of aortic insufficiency must have a full cardiology evaluation including echocardiography. The echo report must contain a quantitation of the degree of insufficiency according to the following:
    a. Criteria for Grading:
        i. Trivial AI is defined as a regurgitant flow with a pressure half-time of > 600 msec.
        ii. Mild AI is a regurgitant flow with a pressure half time > 500 msec.
        iii. Moderate AI has a pressure half-time greater than 200 but less than 500 msec.
        iv. Severe AI has a pressure half-time < 200 msec.
    b. Alternative Criteria measures the height ratio of the jet to the height of the LVOT in the parasternal long axis view:
        i. A ratio from 0.1 to 0.24 is classified as trivial or mild, and correlates with Hunt's angiographic class 1 AI.
        ii. A ratio of 0.25-0.46 indicates moderate AI, and corresponds to Hunt's class 2.
        iii. A ratio of 0.47-0.64 indicates moderately severe AI and corresponds to Hunt's class 3.
        iv. Severe AI (Hunt's class 4-5) is a ratio >0.65.
        v. The previously expressed caveats regarding interpretation based on color flow appearance also apply.

TREATMENT: There is no treatment for asymptomatic aortic insufficiency. Annual echocardiography is recommended to screen for any signs of cardiac decompensation. If the individual has hypertension, it is advisable to treat it, as it will reduce the gradient for regurgitation. Weight lifting should be discouraged, as it tends to increase the gradient for reflux back into the LV. SBE antibiotic prophylaxis is indicated for all cases of valvular insufficiency associated with an abnormal valve.

DISCUSSION: Physical findings associated with AI are generally a reflection of the reflux of blood back into the LV through the incompetent aortic valve. Corrigan's pulse is the rapidly collapsing pulse that is palpated in the carotids, or in the radials with the arm elevated. Quincke's pulses are the capillary pulsations that can be seen in the nail beds with gentle compression of the nail (the bed will alternately blanch and flush). A widened pulse pressure is characteristic, and aviators with exaggerated pulse pressures should probably have the diagnosis entertained. Diastolic murmurs are generally difficult to appreciate, but AI murmurs can be heard best with the diaphragm of the stethoscope along the left sternal border with the patient sitting up and leaning forward.

BICUSPID AORTIC VALVES: Because congential bicuspid aortic valves can degenerate and progress to aortic stenosis or insufficiency, a bicuspid aortic valve is CD. Waivers will not be considered for applicants. If an incidental finding in designated aircrew, condition may be waiverable with possible restriction on aircraft or flight profile.

ICD-9 CODES:
424.1 Aortic Insufficiency

3.2 AORTIC STENOSIS

AEROMEDICAL CONCERNS: Aortic stenosis (AS) is generally well compensated over long periods of time. The cardinal manifestations of AS are angina, syncope and congestive heart failure. Angina is due either to CAD or the increased myocardial oxygen demands complicated by LVH. Syncope is frequently exercise related, and is generally the result of the inability of the heart to increase cardiac output. The compensatory LVH may also predispose the member to dysrhythmias, and result in syncope or sudden death.

WAIVER: Any degree of aortic stenosis is CD for aviation. Waivers to flight status may be considered only for designated individuals with mild AS (pressure gradient < 25 mm Hg). They are restricted to non-ejection seat aircraft, maritime/helo/ transport only.

INFORMATION REQUIRED:

1. A full cardiology evaluation is necessary, with echocardiogram.
2. The echo report must include quantitation of the degree of stenosis.
   a. Severe AS is generally defined as a valve area less than or equal to (0.7-0.8) cm2/M2 BSA and/or left ventricular outflow tract (LVOT):aorta pressure gradient of greater than or equal to 50 mm Hg.
3. Maximal pressure gradients are a function of both valve area and myocardial performance. Therefore, determination of the degree of AS based solely on gradients may be misleading, and must factor in the state of the myocardium.

DISCUSSION: Aortic stenosis is defined as the reduction in the functional area of the aortic valve. Most commonly it is secondary to a congenitally bicuspid aortic valve. While bicuspid valves generally remain asymptomatic for prolonged periods, the abnormal valve invariably degenerates over time. Aortic stenosis and aortic insufficiency are the general result. Rheumatic heart disease can also affect the aortic valve, but the mitral valve is more often involved in rheumatic heart disease. Abnormal valves are susceptible to bacterial endocarditis, and as such, all patients who have been identified should receive SBE prophylaxis. The course of aortic stenosis is variable. In our experience, presentations range from the asymptomatic 65 year old to the 30 year old with critical aortic stenosis. Beta blockers are contraindicated, as they depress LV function and may precipitate acute decompensation. Diuretics should be used with caution, as hypovolemia may reduce cardiac output through its effects on preload reduction.

ICD-9 CODES:
747.2 Congenital Aortic Stenosis
424.1 Non-rheumatic Aortic Stenosis

3.3 MITRAL REGURGITATION

AEROMEDICAL CONCERNS: Reduced exercise tolerance and sudden attacks of acute pulmonary edema in severe cases.

WAIVER: Waiver can be considered for mild mitral regurgitation provided it is not associated with mitral stenosis or connective tissue disease. Mild MR without abnormalities of the mitral valve, abnormalities of left atrial size or abnormalities of LV size will be NCD. Higher grades of valvular insufficiency, or valvular insufficiencies with structural abnormalities will be considered for waiver recommendation on a case by case basis.

INFORMATION REQUIRED:

1. A complete cardiology evaluation is required to confirm normal exercise tolerance, left ventricular size and function, and absence of arrhythmias or stenosis.
2. A regurgitant jet must be viewed in at least two planes at 90 degrees to each other.
3. In addition, the following criteria should be used to quantify the degree of regurgitation:
   a. Trivial (physiologic) MR with no structural abnormality is NCD.
   b. Mild MR is defined as restriction of the regurgitant jet to less than or equal to 2 cm behind the valve leaflets. Additionally, it should be 4 cm2 or less by planimetry, or < 20% of the total LA area.
   i. Should be reassessed by yearly echocardiography
   c. Moderate MR is defined as extension of the jet to the mid-atrium.
   d. Severe MR is defined as a flow velocity of 1.5 m/s. Severe MR should also show a jet area greater than or equal to 8 cm2, or > 40% of LA size. The flow should extend through more than 2/3 of systole. Prevalvular acceleration of the MR jet implies more significant regurgitation as well.
4. Because numerous variables can affect the apparent size of the jet and the assessment of severity is only semi-quantitative, moderate to severe MR diagnoses should be reviewed by NOMI.

TREATMENT: Antibiotic prophylaxis is necessary for all dental manipulations and potentially septic hazards. Associated left atrial enlargement may be severe enough to warrant anticoagulation.

DISCUSSION: MR is a common finding. Between 35-46% of normal 20-40 year old persons will show MR by echocardiography. MR can also be pathologic. Mitral regurgitation can be tolerated for many years without symptoms provided it is relatively minor. With severe regurgitation, the 5 year survival rate is less than 50%. (In the UK, even minor mitral regurgitation leads to some restriction in flying duties, usually away from high performance aircraft.)

ICD-9 CODES:
424.0 Mitral Regurgitation

3.4 MITRAL STENOSIS

AEROMEDICAL CONCERNS: Mitral stenosis has a varied clinical presentation. Hemoptysis can occur, and ranges from simply blood streaked sputum to frank hemorrhage. Although dramatic, it is rarely life-threatening. Atrial fibrillation is a frequent sequela of MS. Hemodynamic decompensation may result from atrial fibrillation, with or without a rapid ventricular response rate, as ventricular filling is highly dependent on atrial contraction (atrial kick), and/or a long diastolic filling time. MS may also present with chest pain. The dilated left atrium is prone to clot formation, and embolic events are not uncommon.

WAIVER: Any degree of mitral stenosis is CD, with no waiver recommended. Valve replacement surgery is not waivered.

INFORMATION REQUIRED:

1. A full cardiology evaluation is required, with quantitation of the valve area and pressure gradient with echocardiogram or cardiac catheterization.

FOLLOW-UP: N/A

DISCUSSION: MS is usually the sequelae of rheumatic heart disease (RHD). RHD is uncommon in the U.S., but can be seen in older patients who developed rheumatic fever in the pre-antibiotic era. The patient becomes symptomatic 10-20 years after an attack of rheumatic fever, although an aggressive form has been reported in South Africa. Once symptomatic, the patient is usually incapacitated in 5-10 years. RVH is dependent on the RV systolic pressures, and should be suspected if the ECG shows the features of RVH. Pregnancy places an increased load on the heart, and can result in death from pulmonary edema and heart failure in women with significant mitral stenosis. Atrial fibrillation becomes chronic in over 50% of patients with mitral stenosis. Paroxysmal atrial fibrillation will occur in up to 80% of patients with mitral stenosis and of these, 20-30% will form atrial thrombi with subsequent embolization. Between 10 and 20% of patients with mitral stenosis, including those with only mild disease, can throw off emboli with a subsequent mortality rate of 15%. Once patients become symptomatic, survival is 50% at 4-5 years without surgery. After valve replacement, the 50% survival rate is improved to 10 years.

ICD-9 CODES:
394.0 Mitral Stenosis

3.5 MITRAL VALVE PROLAPSE

AEROMEDICAL CONCERNS: MVP syndrome symptoms vary in severity and are manifold in presentation. Arrhythmias are seen in a subset of MVP patients; most commonly premature ventricular beats, paroxysmal supraventricular and ventricular tachycardias. Non anginal chest pain often causes patients to seek medical attention. Palpitations, syncope and light-headedness have been reported, and sudden death is a rare complication. Of those patients who develop ventricular arrhythmias, approximately 50% have a history of syncopal or presyncopal episodes.

WAIVER: Candidates are not recommended for waiver, except for air traffic controllers. Designated personnel with minimal regurgitation, who do not require medication or have a history of significant arrhythmias may be considered for waiver.

INFORMATION REQUIRED:

1. Cardiology consultation is required to include:
   a. Physical exam
   b. Exercise testing
   c. Holter monitoring
   d. Echocardiogram.
2. "Echo only" MVP does not meet Navy criteria for diagnosis of MVP **syndrome** (click, murmur and prolapse in two echo views), but may be sufficient to result in disqualification from flight duties. Because of conflicting interpretations by local clinicians, all cases of suspected MVP will be reviewed by NOMI Internal Medicine.
3. A Local Board of Flight Surgeons is thus inappropriate until NOMI has reviewed the case (not via phone consult).

FOLLOW-UP: Yearly submission with submission of all tests except the stress test every three years, or as directed on waiver endorsement.

TREATMENT: Antibiotic prophylaxis is necessary for all dental procedures and "dirty" surgical procedures. Beta blockers have been used to reduce the subjective sensation of palpitations, but their use is CD, no waiver recommended.

DISCUSSION: There are probably several forms of MVP. Young women tend to have a relatively benign course, whereas older males have a greater tendency to develop dysrhythmias, endocarditis, and embolic events. MVP is a common finding in otherwise healthy young women. Depending on the series, MVP has been reported in 2-21% of healthy young women, and 5-15% in various other populations. The prevalence of MVP in women declines with advancing age. MVP can also be associated with connective tissue diseases like Marfan's syndrome, pseudoxanthoma elasticum and Ehlers-Danlos syndrome. While MVP is disqualifying for aviation, the criteria for diagnosis are strict. "Echo only" MVP may be disqualifying, but if the finding is noted on an echo report, the tape should probably be forwarded to NOMI for review. The Navy requires echocardiographic evidence of MVP in two views, the presence of a murmur and a mid-systolic click for diagnosis of the full syndrome. As significant changes in the diagnostic criteria have occurred within the last 10 years, it may be

worthwhile to restudy your patients who have carried the diagnosis for many years as they may no longer meet criteria for diagnosis.

ICD-9 CODES:
424.0 Mitral Valve Prolapse

3.6 VALVULAR CONDITIONS (OTHER)

AEROMEDICAL CONCERNS: The major concern is the relationship with mitral and aortic valve pathology. Pulmonic or tricuspid stenosis can both produce fatigue or shortness of breath. Tricuspid insufficiency is associated with arrhythmias.

WAIVER: Asymptomatic cases with mild functional abnormalities of the tricuspid or pulmonary valves may be considered for waiver in the absence of other pathology.

INFORMATION REQUIRED:

1. Cardiology consultation to demonstrate normal function, exercise tolerance and absence of arrhythmias.
2. NOMI evaluation and estimation of cardiac hemodynamics may be necessary. Usually, no further evaluation is required.

TREATMENT: Antibiotic prophylaxis for dental treatment and other septic risks.

DISCUSSION:

Tricuspid or pulmonic stenosis: These are uncommon conditions and are usually associated with congenital cardiac abnormalities. If detected, and if they are associated with other anomalies, they are CD, with no waiver recommended. Isolated pulmonic stenosis without detectable anomalies will be considered for waiver recommendation on a case-by-case basis.

Tricuspid regurgitation: TR is frequently encountered (40-70% of 20-40 year old normals). "Physiologic" TR is generally classified as a regurgitant flow with velocities of 0.20-0.26 M/s. Alternatively, the ratio of the jet to RV area as measured by planimetry can be performed. Mild TR is less than or equal to 20%, moderate TR is 20-34%, and severe TR is >35%. In the absence of RAE or RVH, mild to moderate TR is NCD.

Pulmonic Insufficiency: PI is also a common valvular abnormality, with a detected incidence of 50% in normal patients. If no other structural abnormalities are present, regurgitant jets extending 1-2 cm proximal to the valve will be NCD. Severe PI, with evidence of RAE or RVH is CD, with no waiver recommended.

ICD-9 CODES:
Valvular Diseases Not Otherwise Specified:
424.0 Mitral Valve
424.1 Aortic Valve
424.2 Tricuspid Valve (Stenosis and Insufficiency)
424.3 Pulmonic Valve (Stenosis and Insufficiency)

3.7 ARRHYTHMIAS (PAC/PVC/OTHER)

AEROMEDICAL CONCERNS: The concerns usually relate to presence of underlying heart disease. There is also a risk of progression to the development of symptoms or yet more severe arrhythmias which could be disabling in flight.

WAIVER: A waiver is not recommended for ventricular fibrillation or flutter. Most other conditions that have not been specifically addressed are waiverable provided there is no evidence of underlying heart disease. Some conditions require the flier to be grounded while undergoing evaluation while others allow a continuation of flying status. When in doubt, discuss the case with NAMI before making any decisions.

INFORMATION REQUIRED:

1. Patients with sinus pause (>2.5 sec), single or paired premature atrial contractions (PAC), single or paired junctional premature beats, supraventricular premature beat, idioventricular rhythm, uniform ventricular premature contraction (PVC), multiform PVC, or fused PVC should have a Holter monitor while remaining on flying status.
   a. If this is normal, no further evaluation is necessary.
2. Patients with sinus bradycardia (<40 bpm) should have a rhythm strip performed during exercise if it cannot be accounted for by a vigorous exercise program.
   a. If the individual cannot achieve 100 bpm or double the heart rate, a Holter monitor and treadmill test should be carried out while the aviator is grounded.
3. Patients with paired PVC's or PVC with R on T phenomenon require Holter monitor, treadmill test and echocardiogram while grounded.
   a. If paired or frequent ectopic beats are seen on Holter monitoring (comprising >1% of all beats or >25% of all beats in any hour, or more than 5 per minute, or if multifocal), an echocardiogram and treadmill test should be performed.
4. In cases where ectopic beats comprise 10% or more of all beats or >25% in any hour or more than 10 pairs of ectopic beats are seen in 24 hours, the individual should be grounded and undergo NOMI evaluation.

TREATMENT: Drug therapy or pacing is not compatible with flying status.

DISCUSSION: On routine ECG, 1-5% of healthy adults exhibits some form of ventricular ectopy; this increases to 20-30% in a maximal exercise test and to 40-60% during 24-hour Holter monitoring. The incidence of ventricular ectopy and its rate increase exponentially with age. Between 5-10% will show complex ventricular ectopy (multiform PVCs, pairing or more of PVCs or R on T). In these cases, coronary artery disease, MVP, ventricular hypertrophy and cardiomyopathy need to be excluded. Although complex ectopy has been reported to be associated with an increased risk of sudden death, there has been no demonstration of prognostic importance in young, healthy runners, asymptomatic subjects during near-maximal exercise or in persons without clinical evidence of heart disease.

ICD-9 CODES:
427.61 Pre-mature Atrial Contractions
427.69 Pre-mature Ventricular Contractions

3.8 ATRIAL FIBRILLATION (AFIB)

AEROMEDICAL CONCERNS: See atrial flutter.

WAIVER: The condition is CD. No waivers are recommended in recurrent cases or in candidates, but a return to full flight status is possible 6 months following a single episode of atrial fibrillation with a documented precipitating factor (e.g. Holiday Heart). No medications are waiverable. Waivers are not recommended for candidates.

INFORMATION REQUIRED:

1. Complete cardiology consultation is required, to include:
   a. Exercise treadmill testing
   b. Echocardiography
   c. Three Holter monitor studies at monthly intervals.
2. Exclusion of secondary causes is mandatory, including an exact detailed history of the event(s)(i.e. alcohol use, thyroid, stimulant use, sleep, stress, etc).

DISCUSSION: The condition is a result of chaotic atrial activity (P waves not discernible) at a rate generally between 350-600, with an irregularly irregular ventricular response (rate 120-160) except in patients on digoxin, beta blockers, high vagal tone, or intrinsic AV nodal disease. Causes are many: rheumatic heart disease (RHD), atrial septal defects (ASD), pulmonary emboli (PE), coronary artery disease (CAD), cardiomyopathies, postoperative heart surgery, hypertension, and pericarditis. A single episode of AFIB may occur without underlying heart disease, and can be associated with high caffeine intake, smoking, and excessive ETOH intake. In 50% of cases of atrial fibrillation, the cause is underlying disease such as left ventricular failure, mitral valve disease, pericardial disease, chronic obstructive lung disease, sinus node disease or hyperthyroidism. There is a 17-fold increase in stroke in patients with atrial fibrillation caused by mitral valve disease compared to a 5-fold increase in risk in patients where the fibrillation arises from all other causes. Cardioversion is 90%successful in restoring rhythm in flutter but there is a relatively high relapse rate (50%) in fibrillation. Patients with idiopathic, paroxysmal atrial fibrillation have no increased mortality compared to normals.

ICD-9 CODE:
427.31 Atrial Fibrillation

3.9 ATRIAL FLUTTER (AF)

AEROMEDICAL CONCERNS: Acute atrial flutter may result in a runaway ventricular response rate. AF may be associated with chest pain, syncope or near syncope. There is a significantly increased incidence of embolic phenomena.

WAIVER: The condition is CD. Waivers are not recommended for recurrent atrial flutter or atrial fib/flutter in the absence of precipitating factors. A return to full flight status has been recommended for some cases of isolated atrial flutter with documented precipitating factors. Waivers are not recommended for candidates.

INFORMATION REQUIRED:

1. Complete cardiology consultation is required to include:
   a. Exercise testing
   b. Echocardiography
   c. Three Holter monitors at monthly intervals
2. Individuals are grounded for six months pending evaluation.
3. No medications are waiverable.
4. Other secondary causes for atrial flutter must also be excluded (alcohol intoxication, hyperthyroidism).

DISCUSSION: An atrial rate (P wave) of 250-350 and varying degrees of AV block is the most common presentation, with 2:1 block the most common. Characteristic "saw-tooth" waves (flutter waves) may be seen in the inferior leads.

ICD-9 CODE:
427.32 Atrial Flutter

3.10 ATRIAL SEPTAL DEFECT (ASD)/PATENT FORAMEN OVALE

AEROMEDICAL CONCERNS: Physiologically, it is difficult to differentiate between patent foramen ovale (no murmur, no change in S2) and atrial septal defects (murmur, fixed split in S2). For the purposes of this discussion, the two conditions will be both considered "atrial septal defects". Atrial septal defects predispose individuals to several conditions. The known frequency of the condition in our age group and the relative lack of demonstrated pathology however argue against any significant effect. It has been postulated that ASD predisposes to decompression sickness (DCS). Valvular dysfunction can occur and pulmonary hypertension may develop.

WAIVER: Personnel found to have a Patent Foramen Ovale or hemodynamically stable ASD are PQ for aviation duty. Hemodynamically stable is defined as: (1) asymptomatic, (2) no right ventricular enlargement on echocardiogram, (3) no fixed splitting of S2, (4) normal EKG and (5) normal CXR. Designated aviators with surgically corrected ASD may be considered for waiver. Waivers are not recommended for candidates

INFORMATION REQUIRED:

1. Cardiological consultation to include contrast echocardiography is required.
2. NOMI evaluation may be required.
3. There is a risk of atrial dysrhythmias following surgical repair of an ASD.
    a. Waiver recommendations for this group must include:
        i. Serial Holter monitors (monthly over three months)
        ii. Repeat contrast echocardiogram to document closure of the defect.

TREATMENT: Waiver is possible after surgical closure of ASD. The requirement for permanent pacing is disqualifying. SBE prophylaxis is not indicated for uncomplicated ASD. This is in contrast to VSD, where SBE prophylaxis is indicated for all potentially "dirty" procedures.

DISCUSSION: Atrial septal defects are extremely common. Autopsy series document "probe patent" foramen ovale in about 30% of cases in the 20-30 year old age group. The incidence decreases as age advances, falling to less than 1% in the 80+ year old population. As mentioned previously, pressure gradients determine flow across ASDs. Elevations in right sided pressures such as those caused either by positive pressure breathing or Valsalva maneuvers can raise the right atrial pressures over the left atrial pressures and flow across the septum can occur.

NOMI has studied over 50 cases of altitude DCS with contrast echocardiography, and we have been unable to demonstrate an increased prevalence of ASD in affected individuals. Roughly 30% of the DCS cases had an ASD, corresponding closely to the expected prevalence in this age group. Paradoxical embolism (from right to left) has been well documented in hospitalized patients, and theoretically gas bubbles can cross as well, leading to arterial gas emboli (AGE). The diving community is concerned about this possibility, and continues to exclude known ASD [PFO] cases from diving duty. They do not, however, pursue cases with anything remotely approaching zeal. Patients who have had repair of ASD may be more prone to arrhythmias. The

role of previously undiscovered ASD in the etiology of CNS decompression sickness is still controversial.

ICD-9 CODES:
P35.71 ASD Repair
745.4 Ventricular Septal Defect
745.5 Atrial Septal Defect/Patent Foramen Ovale

3.11 ATRIOVENTRICULAR CONDUCTION DISTURBANCES

AEROMEDICAL CONCERNS: There is a risk of bradycardia with decreased +Gz tolerance, syncope or sudden death in some conduction disturbances.

WAIVER: First degree atrioventricular (A-V) block and Mobitz Type I second degree A-V block (i.e. "Wenckebach block") are NCD, no waiver required, provided complete cardiology evaluation reveals no underlying disease. Patients with Mobitz Type II second degree A-V block and third degree A-V block are CD, no waiver.

INFORMATION REQUIRED:

1. First degree A-V block:
   a. Local evaluation should include a rhythm strip performed during exercise, which may be calisthenics. The heart rate may need to be increased over 80-100 bpm.
      i. If the PR interval shortens (it does not have to be normal) with increased heart rate no further evaluation is necessary.
      ii. If P-R interval remains prolonged despite increased heart rate, a complete cardiology consultation including treadmill testing, echocardiography, and Holter monitor is required. Up to this stage, the aviator may remain on flying status during evaluation. If the tests are normal, no further evaluation is needed.
2. Second degree A-V block (Mobitz Type I) requires:
   a. Cardiology evaluation, including treadmill and Holter monitor.

TREATMENT: Pacing is incompatible with flying status.

DISCUSSION: Most cases of first degree and Mobitz type I second degree heart block are related to increased vagal tone. Exercise reduces vagal tone and often reverses the block. Recent evidence suggests that in patients with Mobitz type I block refractory to exercise or atropine, syncope is common and the prognosis is similar to that for patients with Mobitz type II block. Syncope (the classic Adams-Stokes attack caused by transient asystole or ventricular fibrillation) occurs without warning. When the rhythm disturbance is short lived, some patients experience "near-syncope" or a feeling of dizziness.

ICD-9 CODES:
426.11 First degree AV Block
426.12 Second degree AV Block, Mobitz I
426.13 Second degree AV Block, Mobitz II
426.0 Third degree AV Block

3.12 CORONARY ARTERY DISEASE (CAD)

DIAGNOSES: The presence of atherosclerotic coronary artery disease (CAD) is nearly universal in adults in modern cultures when unselected populations are studied carefully. CAD remains the leading cause of death in the United States and the leading cause of permanent disqualification for aviation duty. The manifestations (and associated terminology) for CAD are numerous.

See MANMED P-117, Section 15-43 for basic standards and Section 15-107 and 15-109 for special duty standards (not aviation).

Disqualifying conditions include:

1. Current or history of coronary heart disease
2. History or clinical diagnosis of:
   a. myocardial infarction
   b. angina pectoris
   c. coronary insufficiency
   d. coronary thrombosis
3. Atherosclerotic heart disease associated with:
   a. congestive heart failure
   b. repeated angina attacks
   c. evidence of myocardial infarction

AEROMEDICAL CONCERNS: The major concern is the risk of sudden death or incapacitation in flight – acute coronary syndromes are unpredictable and often catastrophic at initial presentation. Characterization of two hazards is important in minimizing this risk – the presence of hemodynamically significant stenosis (coronary artery narrowing) and the total burden of disease or plaque (most commonly atherosclerosis). Prevention (either primary or secondary) of excess hazards depends upon adequate identification of aviators at risk followed by treatment of modifiable factors. The risk control measures for CAD are revascularization of any significant lesions and aggressive risk factor modification. Advances in screening, diagnostic modalities, and treatment of CAD increase the likelihood that aviators with asymptomatic CAD (not strictly disqualified by the above standards) will present for aeromedical disposition. Advances in the treatment of symptomatic CAD also open the potential for recommending aviators to return to aviation duty when both the lesion and underlying disease process can be controlled to acceptable levels of risk.

Effective treatment requires long term medications. Medications used have potential adverse effects or toxicities. Effects of the aviation environment on medication toxicity are generally unknown. Monitoring of treatment may require periodic testing not commonly available in operational settings.

WAIVER: Individuals with CAD are NPQ for all flying duties. Waiver recommendations may be made only after cardiovascular evaluation and careful consideration of aeromedical risk. Risk assessment will be based on but not exclusively the following:

1. The presence or absence of significant lesions or plaque burden.
2. History of acute coronary syndrome (ACS).
3. Effective risk factor modification.

Local board of flight surgeons: NO provisional clearances for any class.
Initial waivers at NAMI:
Applicants: WNR
Designated: All classes, considered

INFORMATION REQUIRED: Cardiology consultation. The primary goal of cardiology evaluation is to obtain an assessment of atherosclerotic 'disease burden,' along with cardiovascular functional capacity including assessment for active ischemia. The consultation should include recommendations on optimal management of modifiable risk factors. The 'state of the art' in evaluating the components required in order for waiver to be considered continues to evolve; therefore specific tests may/will be selected by the consultant. Submit copies of any reports, to include anatomic assessment or "scoring", functional test, and blood chemistries. NAMI may request additional studies. Address waiver requirements for medication.

1. Maximal exercise stress testing to include imaging modality.
2. Laboratory results to include Lipid profile, Liver profile, Fasting glucose, Electrolytes, Creatine kinase, high sensitivity C-Reactive protein
3. History and physical examination studies documenting full achievement of risk factor control. Document compliance with standard medical regimen per ACC/AHA guidelines; lipid management according to NCEP guidelines, blood pressure control per JNC guidelines, BMI <=27, and normal Fasting glucose.
4. Statement from member documenting tobacco cessation (see example) if applicable and/or compliance with aerobic exercise program as prescribed by ACC/AHA guidelines (see example)
5. AMS documenting compliance with medications along with optimization of blood pressure and body composition (BMI < 27). BMI goal should be attained within 12 months of diagnosis.

Waiver termination:
1. BMI > baseline or not at target
2. Noncompliance with medications
3. Unwillingness to comply with exercise program or tobacco cessation
4. Failure to promptly report recurrence of symptoms

Waiver continuation: Submit physical examination annually with Cardiology consultation, unless waiver recommendation states otherwise.

Note: The risk of cardiac events in aviators has been characterized in careful studies by the USAF. Their guidelines for quantifying disease burden of CAD are utilized at NAMI when considering waiver applications.

ICD-9 CODE:
414.9 CAD
P36.10 CABG within one year of exam
P36.01 PTCA within one year of exam

3.13 HYPERLIPIDEMIA

AEROMEDICAL CONCERNS: Risk of ischemic heart disease with increased plasma cholesterol and with increased low density lipoprotein (LDL).

WAIVER: Although there is little doubt that elevated cholesterol, or an unfavorable HDL-total cholesterol ratio is a risk factor for cardiovascular disease, hyperlipidemia/hypercholesterolemia is currently NCD for aviation, regardless of the lipid levels involved. **Waivers are not required for cholestyramine (Questran) or colestipol (Colestid), HMG Co-A reductase inhibitors (statins as a class: lovastatin, pravastatin, simvastatin and fluvastatin). The fibric acids, fenofibrate (Tricor) and gemfibrozil (Lopid) require a waiver, but recommendations are universally made for all Service Groups.** Fenofibrate use should be considered before using gemfibrozil due to a more favorable side-effect profile. Caution is necessary when using any fibric acid in combination therapies (i.e. statin and fibrate therapy) due to potential serious side effects such as rhabdomyolysis and liver damage. Patients requiring drug therapy should be grounded for a period of 14 days to assess response and observe for side effects.

INFORMATION REQUIRED:

1. Before any therapy is initiated, exclude all causes of secondary hyperlipidemia such as hypothyroidism, diabetes, cholestasis, alcohol abuse, gout, renal failure, nephrotic syndrome, myeloma and systemic lupus erythematosus.
2. Treatment with fibric acids require:
   a. Lipid panel, liver function testing (ALT/AST/ALK PHOS), CBC, fasting blood sugar, and CPK at baseline, 3 months, 6 months, and then annually if stable.
   b. Report of all lab reports is to be submitted with the annual physical report.
   c. 14-day ground trial of the medication.
3. Treatment with HMG Co-A reductase inhibitors (statins) require:
   a. Lipid panel, liver function testing (ALT/AST/ALK PHOS) with CBC, CPK at baseline, at 3 and 6 months; annually thereafter if stable.
   b. Liver enzyme elevations above three times normal is considered disqualifying.
   c. Notify NAMI Code 342 by flight physical or Aeromedical Summary (information only) to allow entry into the aviation database.

TREATMENT: The first line treatment for mild cases is Therapeutic Lifestyle Changes (TLC) including dietary control, weight loss, and increasing aerobic exercise. Medication usage should be determined using the current standards of care as proposed by the Adult Treatment Panel III (ATP III) of the National Cholesterol Education Program (NCEP). Statins are generally the first drug of choice and then adding ezetimibe (Zetia) if required. Fibric acid use is generally reserved for cases with significant hypertriglyceridemia.
(http://www.aafp.org/afp/20070501/1365.pdf)

DISCUSSION: The incidence of heterozygous familial hypercholesterolemia in the USA is 1 in 500; in South Africans of Dutch descent it is 1 in 80. Of male heterozygotes, 50% will have ischemic heart disease by the time they are 50 years old. In familial hypertriglyceridemia, there is a risk of acute pancreatitis when the triglyceride level is >1000 mg/dl, and in severe cases, a

rare incidence of peripheral neuropathy and dementia. The treatment of severe hypercholesterolemia has been shown to reduce the incidence of a first myocardial infarct. The treatment of mild/moderate cases is more controversial with some studies showing an increase in non-cardiovascular deaths in patients undergoing treatment with lipid lowering agents.

ICD-9 CODE:
272.4 Hypercholesterolemia requiring medication for control

3.14 HYPERTENSION

AEROMEDICAL CONCERNS: Untreated hypertension is associated with long term changes in the cardiovascular system that in toto have the effect of significantly reducing life span. Untreated hypertension also predisposes individuals to cerebrovascular accident, myocardial infarction, ophthalmologic disease and renal failure. The magnitude of the blood pressure elevation is directly proportional to the risk of developing complications and is increased by other risk factors such as hyperlipidemia or cigarette smoking. **White Coat Hypertension is not an acceptable diagnosis**. If the blood pressure exceeds standards at the time of exam, three day blood pressure checks (at two different times each day) are indicated. Previously high readings which are then normal on three day follow-up DOES NOT relieve the examining flight surgeon from re-evaluation if the blood pressure is high during subsequent physical exams (or sick-call visits).

WAIVER: Any blood pressure exceeding 139 mmHg systolic or 89 mmHg diastolic is disqualifying and waiver will not be recommended. **Applicants requiring medication for control of blood pressure will not be recommended for a waiver**. The rational medical approach is to attempt non-pharmacological therapy first. If the systolic pressure is 150 mm or less and/or the diastolic 100 mm or less, member may continue to fly for a maximum of three months with Flight Surgeon's approval if asymptomatic and no evidence of end organ damage (see required information below). This allows for a trial of weight reduction, diet modification, exercise, etc... Clearance Notice should clearly state the three month limitation and the reason (pending blood pressure reduction measures). At the end of three months, if member is within aviation standards (<140/90), they are PQ. If not within standards, member is NPQ, and grounded for any remaining work-up and the initiation of therapy. **Blood pressure out of standards will not be waivered**; the medications used to control it are as outlined below. Unrestricted waivers are possible if adequate control of blood pressure is achieved (BP<140/90), there is no evidence of end-organ damage, and there are no significant medication side effects.

INFORMATION REQUIRED:

1. Documentation of good blood pressure control
2. Documentation of an absence of end organ damage
3. **Initial** evaluation should include:
   a. CBC
   b. CHEM 7 (serum electrolytes, glucose, urea nitrogen and creatinine)
   c. TSH
   d. Fundoscopic examination
   e. Urinalysis
   f. ECG
   g. An echocardiogram may be required if there is any suggestion of ventricular hypertrophy by exam or ECG
   h. Any pathology detected will require specialist evaluation
   i. The Hypertension AMS template may simplify satisfying all submission requirements
4. **Follow Up (ANNUAL SUBMISSION REQUIRED)** should include:
   a. CHEM 7

b. ECG
c. Urinalysis
d. Blood pressure measurements documenting control within aviation standards with an absence of side effects

LIFESTYLE MODIFICATION: The cornerstone of blood pressure management begins with lifestyle modification. Proper diet and adequate aerobic exercise will improve cardiovascular fitness and decrease the effects that hypertension can cause. Hypertension controlled by diet and exercise alone does not require a waiver. If patient has previously required medication for control, waiver will remain in effect, even if medications are subsequently no longer required. This will permit long-term tracking of aviation personnel with a history of hypertension. When lifestyle modifications alone are insufficient to control a patient's blood pressure, medical therapy will need to be initiated. Diet and exercise remain important adjuncts to therapy and should be encouraged at a level appropriate to the patient's age, current level of conditioning, and stage of hypertension. Medication recommendations for the aviation community differ from the general population and should not be used as a guide for treating non-aviation personnel.

MEDICAL THERAPY: After appropriate evaluation of an aviator with HTN (and a trial of diet and exercise therapy if blood pressure is less than 150/100) the use of **Angiotensin Converting Enzyme (ACE) Inhibitors** and **Hydrochlorothiazide (HCTZ)** can be used as **first line** agents for treatment of HTN in aviation personnel. ACE inhibitors are preferred as they have a low incidence of aeromedically significant side effects and are generally well tolerated. There are no dose restrictions on these medications as long as manufacturer recommended maximum doses are not exceeded. Use of **Angiotensin Converting Enzyme II Inhibitor (ACE-II)** medications can be used if aviators are intolerant to ACE inhibitors secondary to cough.

Amlodipine, a calcium channel antagonist, may be considered as a **second line** therapy either alone or in combination with ACE inhibitors, ACE-II or HCTZ. All **second line therapy waivers** are restricted to **SG III, Class 2 non-tactical aircraft and all Class 3.**

Beta blockers are not compatible with waivers for Service Groups I or II. Senior officers (LCDR and above) may be waivered to SG3 or Class II flying duties in non-tactical aircraft. Air controllers are usually waivered. All SGI or SGII or tactical NFOs are NPQ, no waiver. We don't want them pulling more than 2.5 Gs so requests should state "transport/maritime/helo aircraft only." If beta blockers are used, we prefer the use of the more cardioselective agents.

All personnel requesting a waiver should have their blood pressure adequately controlled (<140 systolic and <90 diastolic), be free of side effects, and have no complications from their hypertension. All waiver requests outside these guidelines should consult NAMI Internal Medicine.

SECONDARY HYPERTENSION: Secondary hypertension that has been surgically or medically corrected may also be considered for a waiver. There should be no complications or side effects from the treatment, no permanent sequelae from the hypertension and the patient should be normotensive prior to a waiver being requested.

DISCUSSION: In the Framingham study, the mortality of individuals with hypertension was more than double that of the normotensive population, with most of the deaths occurring suddenly. The risk of cardiovascular events increases with age, tobacco use, male gender, positive family history, excess alcohol intake and high blood lipid levels; the presence of one or more of these risk factors will be considered in the final aviation disposition of the case. Several studies have demonstrated a reduction in mortality and morbidity resulting from the treatment of hypertensive patients. Beta blockers may cause sedation, affect Gz tolerance and have other side effects. One study has demonstrated a reduction in G tolerance in normotensive individuals given captopril. Our experience has not suggested that this is a significant problem in the population in whom its use is indicated.

ICD-9 CODES:
401.9 Primary Hypertension
401.91 HTN controlled with medication

3.15 HYPERTROPHIC CARDIOMYOPATHY

AEROMEDICAL CONCERNS: These patients have significant risk of developing dysrhythmias. Angina may also be a complicating factor, and can be due either to superimposed coronary artery disease or ischemia from extrinsic compression of the penetrating branches of the major epicardial vessels. If the hypertrophic changes involve the LV outflow tract, a functional outflow tract obstruction can result, with the attendant reduction in cardiac output and exercise tolerance. There is an annual mortality of 3.4% without surgery. Surgery for obstructive myopathy (myotomy, myectomy) has a mortality of 5-10% and the long term gain is uncertain.

WAIVER: True primary hypertrophic cardiomyopathy (e.g., IHSS) is rare, and is not usually discovered until post-mortem. This condition is disqualifying for general duty, and no waivers are recommended either for accession to general duty or special duty. Waiver will only be considered in the very mildest of cases with no hemodynamic and minimal echocardiographic abnormalities and after the exclusion of underlying pathology. If the myopathy is secondary to other pathology, that condition is the basis of disqualification. If the hypertrophic changes are documented to have resolved after treatment, a waiver recommendation may be considered. The majority of patients with idiopathic cardiomyopathy are disqualified from military flying. If a waiver is requested, refer to NOMI for evaluation.

INFORMATION REQUIRED:

1. Cardiology consultation is required, which should include:
    a. Echocardiography and cardiac catheterization if indicated
    b. Exclusion of underlying secondary causes for hypertrophic cardiomyopathy such as hypertension, pulmonary hypertension, valvular disorders, and hyperthyroidism

TREATMENT: Treatment, either medical or surgical, is CD, no waiver.

DISCUSSION: True hypertrophic cardiomyopathy is uncommon in the aviation population. Frequent referrals to NOMI Internal Medicine are made because of an ECG implication of LVH, but they are rarely substantiated by echo. Please refer to the section on LVH for guidelines to the diagnostic criteria we recommend for LVH. Echo remains the gold standard, and any questions can usually be resolved by a quick referral. Unfortunately, accurate standards for the diagnosis of pathologic LVH do not exist for our population, so we generally take several factors into account in deciding how much myocardium is too much. A "physiologic" form of LVH can be seen in some athletes, particularly those who engage in weight training. Runners and swimmers generally do not manifest significant LVH, even at Olympic levels of training. We are frequently asked to make decisions on LVH in athletic, but not world class, individuals. These hypertrophic changes can be usually be distinguished from primary forms in that they are concentric, and diastolic function is well preserved. The end diastolic dimension of the ventricle is either normal or increased in size. In pathologic LVH the ventricular cavity is obliterated at end systole, and diastolic dysfunction is the rule.

Hypertrophic cardiomyopathy also presents most frequently in the 20's. In a military population it is important to exclude athletic heart syndrome. The level of hypertrophy and the severity of the hemodynamic changes do not help to determine the prognosis. Poor prognosticators are a family history of sudden death, diagnosis in childhood and a history of blackouts.

ICD-9 CODE:
425.4 Hypertrophic Cardiomyopathy

3.16 INTRAVENTRICULAR CONDUCTION ABNORMALITIES

AEROMEDICAL CONCERNS: Left bundle branch block (LBBB) is usually associated with coronary artery disease. Right bundle branch block (RBBB), especially as a new finding, may also be associated with heart disease, particularly atrial septal defects.

WAIVER:

1. **RBBB, LAHB, LPHB** are NCD if a non invasive workup (Holter monitor, treadmill and echocardiogram) is normal.
2. **LBBB** is CD. No waiver recommended for non-designated personnel. A waiver is possible for designated aviators with LBBB in the documented absence of coronary artery disease and if asymptomatic.
3. **Bifascicular blocks (LAHB or LPHB with RBBB)** are CD, no waiver recommended.
4. **Trifascicular blocks** (1st degree AVB with RBBB and either LAHB or LPHB) are CD, no waivers.
5. **Incomplete RBBB** is NCD, with no workup required. Please refrain from using the term "Non specific intraventricular conduction delay".

INFORMATION REQUIRED:

1. Complete cardiology evaluation is necessary for LBBB, RBBB, left posterior hemiblock and left anterior hemiblock (LAH) if this last ECG is a sudden change from previous ECGs.
2. If LAH is found:
   a. If younger than 35 years and no previous recordings are available, an echocardiogram should be performed to rule out congenital heart disease.
   b. If older than 35 with no previous ECGs available, a treadmill test as well as an echocardiogram should be performed.
   c. Pending these evaluations, persons with LAH may remain on flying status.
   d. If the studies are normal, no further evaluation is required.
   e. If LAH develops slowly over some years as a result of progressive left axis deviation, no further evaluation is required .
   f. A standard treadmill in any patient with any conduction defect may be unreliable. Stress echocardiography or thallium stress test is preferred.

TREATMENT: N/A.

DISCUSSION: RBBB occurs on up to 2 per 1000 ECGs. It is often congenital (check earlier ECGs) or develops at high heart rates. If it has been present for years, is not associated with symptoms, and is accompanied by an otherwise normal cardiac examination, RBBB carries no known adverse risk or prognostic significance. One report states that the risk of RBBB progressing to complete block is "a few percent a year." The risk increased when RBBB is associated with left posterior fascicular block or when RBBB and LBBB alternate. In the absence of heart disease, acquired RBBB carries the same risk for death or syncope as the general population. Similarly, isolated left anterior fascicular block carries no known increased risk; not enough is known about isolated left posterior fascicular block to prognosticate with

certainty. In the absence of demonstrable pathology there is no justification for disqualification. Persons with known, recently acquired LBBB have a 10-fold increase in mortality compared to normals. Approximately 10-20% of patients with asymptomatic LBBB have coronary artery disease on catheterization.

ICD-9 CODES:
426.4 Right BBB
426.3 Left BBB
426.2 Left BBB (hemiblock)

3.17 LEFT VENTRICULAR HYPERTROPHY

AEROMEDICAL CONCERNS: An increase in left ventricular mass has been shown in several series to be associated with dysrhythmias, angina or sudden death. Idiopathic or secondary cardiomyopathies are discussed separately.

WAIVER: In our population, LVH based on ECG criteria is usually a false positive. Current criteria, based on the general population, are not valid for our young, athletic population. The electrocardiograph criteria established by the U.S. Air Force School of Aviation Medicine for diagnosis of LVH by voltage will be used to screen naval flight personnel.

LVH by Voltage:
For all aviators- A diagnosis of LVH by voltage is considered NCD provided the echocardiogram is normal. It is not required that the aviator be grounded pending echocardiogram interpretation.

USAFSAM LVH by voltage criteria:

1. S in V1 or V2 plus R in V5 or V6:
   >55mm if age 35 or younger
   >45mm if older than 35
2. No ST/T changes

True LVH:
Applicants- True LVH in applicants is CD and waivers are not recommended (WNR).
Designated Aviators- True LVH in designated aviators CD, with waiver recommended if the aviator is normotensive (with or without antihypertensive medication) and has a normal ejection fraction. Please submit the information required below with an Aeromedical Summary.

INFORMATION REQUIRED:

Initial Evaluation:

1. Echocardiography
2. Internal Medicine or Cardiology evaluation to include exercise history, CAD risk factors.
3. Serial Blood Pressures

Follow-up Evaluation:

1. EKG- comparison with previous EKG
2. Flight Surgeon evaluation of exercise history and CAD risk factors compared to Initial IM or Cardiology evaluation.
3. Serial Blood Pressures
4. If there are any changes in the above data (1-3) from the original evaluation, an echocardiogram should be obtained.

DISCUSSION: In young individuals, the precordial voltages tend to be higher than in older individuals. If voltage criteria alone are used to diagnose LVH, many false positives will result. The training limitations for aviators and flight candidates, as well as the burden on the aeromedical system, makes a overly sensitive criteria operationally intolerable. In historical

studies of the U.S. Air Force, true left ventricular hypertrophy occurred in only 5 of 122,043 aviators (0.04/1000). By using a more specific screening criteria we are able to diagnose true LVH and decrease the probability of in-flight incapacitation. If left ventricular hypertrophy is present, an Echocardiogram will exclude aortic stenosis and hypertrophic cardiomyopathy as causes. Serial blood pressure measurements will further exclude hypertension. In differentiating the normal athletic heart from cardiomyopathy, exercise abstinence can be useful. A normal "athletic heart" ventricular wall rarely exceeds 14 mm, and will normally decrease within four weeks of an exercise restriction.

ICD-9 CODES:
429.38 LVH
402.90 LVH if secondary to hypertension

3.18 PERICARDITIS

AEROMEDICAL CONCERNS: Pericardial effusion can lead to acute cardiovascular compromise secondary to cardiac tamponade. Less severe cases can produce pain and shortness of breath that can be distracting in flight.

WAIVER: The flier should be grounded during the acute illness. Idiopathic pericarditis can be considered for waiver after the acute episode resolves provided there has been no recurrence or sequelae. The disposition of cases secondary to underlying disease will depend on the disease concerned. Any pericardial effusions must be resolved by echocardiography before waiver recommendations will be made.

INFORMATION REQUIRED:

1. Cardiac consultation is necessary to exclude connective tissue disorder, myocardial infarction, neoplasm or other disease processes. The workup should include:
   a. Echocardiography to rule out sequelae such as pericardial effusion or constrictive pericarditis.

TREATMENT: Idiopathic pericarditis is usually self limiting. Rest and aspirin or nonsteroidal anti-inflammatory agents are all that are required for treatment. If maintenance medication is required, then a waiver will not be considered. Waiver recommendations for secondary pericarditis will be based on the underlying disease process.

DISCUSSION: 50% of the cases of acute idiopathic pericarditis are viral in origin, usually Coxsackie B. A small minority of cases may progress to pericardial constriction or tamponade. On initial presentation, more than 90% of the patients will have symmetrical ST elevation of most or all ECG leads, which become inverted over the next 2-3 weeks before reverting to normal. Some patients will be left with minor, nonspecific ECG abnormalities.

ICD-9 CODES:
420.9 Acute Idiopathic Pericarditis

3.19 PRE-EXCITATION SYNDROMES (4 April 2008)

AEROMEDICAL CONCERNS: Pre-excitation syndromes include Wolff Parkinson White (WPW) and Lown-Ganong-Lavine (LGL). WPW patterns with adverse symptoms and/or inducible to a dysrhythmia using electrophysiologic studies (EPS) are associated with increased risks of tachyarrhythmias, hemodynamic compromise (palpitations, lightheadedness, syncope), and sudden death. Ablation is recommended in symptomatic individuals and/or those with EPS-induced dysrhythmias.

Short PR with symptomatic palpitations and/or dysrhythmias, known as Lown-Ganong-Lavine (LGL), is associated with risks of tachyarrhythmias and hemodynamic compromise, and EPS is recommended.

Very short PR (< 0.1) without Delta wave, symptoms or dysrhythmia is associated with slightly elevated risks of dysrhythmia, and non-invasive studies are recommended for aviation personnel.

Short PR (> or = 0.1) without symptoms or dysrhythmias is not considered disqualifying (NCD) and requires no further evaluation. Individuals with short PR and no symptoms have the same risk of adverse cardiac events as the general population.

Pre-excitation syndromes are associated with other types of heart disease, such as hypertrophic cardiomyopathy or Ebstein's malformation. Uninvestigated and/or untreated pre-excitation syndromes are not compatible with flight safety or current care standards.

WAIVER REQUESTS and INFORMATION REQUIRED:

Class I: Applicants or Designated

1. Asymptomatic WPW pattern requires a cardiology evaluation, echocardiogram and EPS.

    a. WPW pattern alone with a normal echocardiogram and non-inducible EPS is considered disqualifying (CD), but a waiver is recommended (WR).

    b. If a dysrhythmia is induced by EPS and ablated, the patient must be retested with EPS immediately after the ablation during that same procedure to ensure dysrhythmias are no longer inducible.
        (1) Designated members are CD/WR and waiverable to SG3 during the six-month post-ablation period. Waiver requests to SG 1 or SG 2 may be submitted six months post-ablation with documentation indicating they had no recurrence of dysrhythmias or symptoms.
        (2) Applicants are CD/WR. Waivers are considered six months post-ablation, with documentation indicating no recurrence of dysrhythmias or symptoms.

2. WPW syndrome (WPW pattern with symptoms) or LGL (short PR with palpitations) are CD, and require a cardiology evaluation and echocardiogram. Ablation is required for

waiver eligibility. Waiver recommendation is on a case-by-case basis, and local board of flight surgeons (LBFS) action is prohibited.

3. Very short PR (< 0.1) without Delta wave, symptoms or dysrhythmia requires a non-invasive cardiology evaluation (24 hour Holter, echocardiogram, stress test). If all tests are negative/normal, then the condition is not considered disqualifying (NCD). If any of the tests are positive/abnormal, then the condition is CD, requires a cardiology evaluation, and may require EPS and/or ablation. Waivers are considered on a case-by-case basis.

4. Short PR (> or = 0.1) without symptoms or dysrhythmia is NCD, and requires no further evaluation, treatment, or waiver.

Class II and III: Applicant or Designated

1. Asymptomatic WPW pattern requires cardiology consultation, echocardiogram, 24-hour Holter monitor, and exercise stress testing.

   a. WPW pattern alone with normal studies is CD/WR.

   b. If cardiology studies determine EPS is indicated, and EPS does NOT cause inducible dysrhythmias, the individual is CD/WR.

   c. If cardiology studies determine that EPS is indicated and the EPS causes inducible dysrhythmias, then ablation is required. During ablation procedure, retesting is required to demonstrate that the dysrythmia is non-inducible. The condition is CD/WR. Waiver requests are considered immediately; Class II and III do not have a six-month post-ablation waiting period.

2. WPW syndrome (WPW pattern with symptoms) and LGL (short PR with palpitations) are both CD. Waiver requirements are the same as for Class I personnel with symptomatic dysrhythmias (See Class I Paragraph 2).

3. Very short PR (< 0.1) without Delta wave, symptoms or dysrhythmia requires a non-invasive cardiology evaluation (24 hour Holter, echocardiogram, stress test). If all tests are negative/normal, then the individual is NCD. If any of the tests are positive/abnormal, then the individual is CD, requires a cardiology evaluation, and may require EPS and/or ablation. Waivers are considered on a case-by-case basis.

4. Short PR (> or = 0.1) without symptoms or dysrhythmias is NCD, and requires no further evaluation, treatment, or waiver.

Follow-Up Reports Required for Waivered Personnel (All Classes):

1. Notation on report of annual flight physical examination indicating no signs or symptoms of dysrhythmia recurrences.

2. An electrocardiogram will be completed and compared to prior studies. In some cases, a Holter monitor may be substituted.

3. If dysrhythmias or symptoms recur, personnel are NPQ and waivers are terminated.

TREATMENT: Radio Frequency Ablation (RFA) is currently the definitive treatment (95-99% immediate success rate), with few complications (0.006-6.9%, but very low in young, healthy patients), and a low risk of recurrence (1-5%, most within 6 months post-RFA). Cryoablation is also acceptable for waiver requests, but is not used as commonly as RFA.

DISCUSSION: Pre-Excitation Syndromes (WPW and LGL) occur in 0.1-0.3% of the population. The lowest incidence of dysrhythmia is in young adults without histories of signs or symptoms. However, 20-35% of asymptomatic individuals with WPW pattern that are inducible via EPS will develop SVT within 10 years, and 1-6% of those will experience sudden death. It is not possible to predict which EPS-inducible patients will develop SVT with or without catastrophic rapid ventricular responses. EPS immediately after RFA is a valid indicator of RFA success and is the current standard of care; EPS weeks, months or years after the RFA is not medically indicated and entails unneeded risks and costs.

ICD-9 CODES:
426.7 Pre-Excitation Syndromes
426.81 Lown-Ganong-Lavine
G 702 Wolff-Parkinson-White
P3734 Catheter Ablation of Heart Lesion (Specify as Ablation of Accessory Bypass Tract)

3.20 SINUS BRADYCARDIA

AEROMEDICAL CONCERNS: Extreme sinus bradycardia may be a reflection of an underlying conduction system abnormality. There may be an inability to increase the heart rate in response to increased demand.

WAIVER: If the heart rate increases with exercise, the bradycardia is NCD, and no waiver is required.

REQUIRED INFORMATION:

1. Supply an EKG that demonstrates a HR >45 bpm.

TREATMENT: No treatment is indicated if the rate increases with exercise; the condition is NCD.

DISCUSSION: A resting HR <45bpm in our population is almost invariably caused by excellent physical conditioning, with high resting vagal tone.

ICD-9 CODES:
427.80 Sinus Bradycardia
427.81 Sinus Bradycardia requiring follow-up

3.21 SINUS TACHYCARDIA

AEROMEDICAL CONCERNS: Sinus tachycardia may be a reflection of a significant metabolic abnormality. In candidates, consider anxiety as the root problem. Other causes include fever, hyperthyroidism, dehydration, anemia, hypoxia, pulmonary emboli, and pain.

WAIVER: The waiver recommendation will stem from the reason for the tachycardia. If the heart rate is persistently >100 bpm and no cause has been identified, both candidates and designated personnel are CD, no waiver.

INFORMATION REQUIRED:

1. Documentation of a search for secondary causes

DISCUSSION: Persistent sinus tachycardia is unusual, and its etiology must be determined. Holter monitoring to determine average heart rate and sleeping rate is extremely helpful.

ICD-9 CODES:

785.0 Sinus Tachycardia

3.22 SUPRAVENTRICULAR TACHYCARDIA

Note: NOMI's definition of supraventricular tachycardia is 3 or more consecutive nonventricular ectopic beats at a heart rate of greater than 99 BPM. Excluded are atrial fibrillation/flutter and multifocal atrial tachycardia. Recurrent is defined as occurring more than once in any test or during any evaluation. Sustained tachycardia is defined as lasting more than 10 minutes.

AEROMEDICAL CONCERNS: The major concern in supraventricular tachycardia (SVT) is hemodynamic decompensation in flight leading to lightheadedness, dizziness, presyncope and loss of consciousness.

WAIVER: Only asymptomatic (with the exclusion of the sensation of palpitations as a symptom) cases will be considered for waiver as symptoms are an indication of hemodynamic compromise. **Service Group I waiver recommendations** can be considered for those with the following: episodes of single or recurrent, non-sustained SVT including those with coexisting mitral valve prolapse (MVP), left or right bundle branch block (LBBB or RBBB), mitral regurgitation (MR) and sarcoidosis; a single episode of sustained SVT including those with coexisting MVP, L/RBBB, MR or sarcoidosis. No evidence of CAD can be present if a waiver is requested. 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. Waivers are not recommended for students or candidates. No waivers are recommended for Multifocal Atrial Tachycardia (MAT). Note: In the absence of P-waves, distinguishing between SVT with BBB vs. VT is difficult.

INFORMATION REQUIRED:

1. Complete cardiology consultation looking for secondary causes is required to include:
   a. Echocardiogram
   b. Stress test
   c. Three Holters during a 6 month grounding period
2. Patients with MAT should be grounded and referred to NOMI for evaluation.
3. For cases of a single, asymptomatic, 3-10 beat run of SVT, only local evaluation is required. This should include:
   a. Thyroid function testing
   b. Echocardiogram
   c. Standard treadmill test
   d. Three, 24-hour Holters at monthly intervals to identify cardiovascular risk factors
   e. These studies will be forwarded to NOMI with the waiver request for review. If there is any abnormality, further cardiology evaluation will be required.
4. Note: If LBBB or RBBB is present, a standard treadmill EST is almost impossible to interpret. Preferred studies are stress echocardiogram, thallium stress test or Sestamibi.

TREATMENT: N/A.

DISCUSSION: Supraventricular tachycardia is characterized by a narrow complex rhythm (except with aberrant conduction in which the QRS will be wide), and P waves are usually hidden. Seventy percent are related to an AV reentry mechanism, 20% involve an accessory conduction pathway (WPW), and 10% are SA nodal in origin. Non reentry SVTs are due to ectopic pacemakers, paroxysmal atrial tachycardia (PAT) with block (think digoxin toxicity although unlikely), or MAT as in COPD patients. In MAT, P waves precede each QRS but have at least 3 different P wave morphologies. An irregularly irregular rhythm and a narrow QRS complex are seen. MAT is often clinically significant and heart disease has to be excluded. The U.S. Air Force has reviewed 430 individuals with SVT. Of these, 42 (10%) had symptoms of hemodynamic compromise with syncope, presyncope, lightheadedness, chest discomfort, dyspnea or visual changes. There were also 21 (5%) with recurrent, sustained, asymptomatic SVT. Of those with hemodynamic compromise, 90% had their symptoms on their initial presentation with the remainder developing their symptoms after they were diagnosed as having SVT. Three of these individuals were initially found to have recurrent, sustained SVT and the fourth had a single, sustained SVT. The only cofactor that was associated with either hemodynamic compromise or recurrent, sustained SVT was pre-excitation syndrome (WPW or Lown-Ganong-Levine syndrome).

ICD-9 CODES:
427.0 Supraventricular Tachycardia

3.23 VENOUS THROMBOSIS/PULMONARY EMBOLISM

AEROMEDICAL CONCERNS: Pain and swelling secondary to deep venous thrombosis (DVT) can be distracting in flight. The major risk is a pulmonary embolism producing chest pain, shortness of breath, hypoxia, cardiac arrhythmias or sudden death. Dyspnea occurs in nearly 90% of patients with symptomatic pulmonary emboli with syncope occurring occasionally.

WAIVER: Waivers will be considered for acute, non-recurrent DVT's after cessation of anticoagulant therapy and in the absence of predisposing factors, such as malignancy or coagulopathies. The development of pulmonary hypertension, the need for continued anticoagulation, or surgical procedures such as plication of the vena cava or insertion of filter devices is CD, no waiver. Superficial thrombophlebitis is NCD.

INFORMATION REQUIRED:

1. Confirmation of normal exercise tolerance and pulmonary function is necessary.
2. In cases of pulmonary embolism, internal medicine consultation may be necessary to exclude underlying malignancy or other hypercoagulable states.

TREATMENT: The aviator should be grounded for the full duration of anticoagulant therapy.

DISCUSSION: 2-5% of the population will suffer from venous thrombosis at some time. Risk factors related to hypercoagulability (e.g. the risk of developing DVT after open prostatectomy has been quoted as 35%) and stasis (e.g. being strapped into an aircraft seat for long sorties) should be considered. In 50% of cases of DVT of the leg there are no signs or symptoms relating to the lower limbs. Untreated, acute iliofemoral venous thrombosis has a 50% chance of causing pulmonary embolus. Up to 30% of such patients have malignant disease. It is estimated that only 20-30% of pulmonary emboli cause symptoms. The vast majority of patients who survive pulmonary embolism will recover to normal or nearly normal cardiac and pulmonary function within 2-8 weeks.

ICD-9 CODES:
453.8 DVT
415.1 Pulmonary Embolus
451.9 Phlebitis and Thrombophlebitis, site unspecified

3.24 VENTRICULAR TACHYCARDIA

Note: NOMI's definition of ventricular tachycardia is 3 or more consecutive, ventricular, ectopic beats at a heart rate greater than 99 bpm. Recurrence is defined as occurring more than once in any Holter monitor or period of workup, or more than once in any subsequent evaluation.

AEROMEDICAL CONCERNS: Hemodynamic changes can result in a fall in blood pressure and a reduction in cerebral blood flow. The condition is often associated with underlying heart disease. There is also a risk of sudden death associated with the condition, usually from ventricular fibrillation.

WAIVER: Non-Designated and Designated Personnel: CD all DIF, no waiver for either sustained or non-sustained VT.

INFORMATION REQUIRED:

1. Complete cardiology evaluation is required to include:
    a. Echo treadmill test with thallium or Sestamibi
    b. Echocardiogram
    c. Three monthly Holter monitors
    d. Cardiac catheterization must be performed if there is any evidence of ischemia.
    e. Electrophysiologic studies may be required if there is uncertainty regarding the origin of the tachycardia (VT vs. SVT with aberrant conduction).
        i. A high quality signal-averaged EKG should be performed prior to EPS.

TREATMENT: Anti-arrhythmic drugs impair cardiac function and are incompatible with flying duties. Pacing is also incompatible with flying status.

DISCUSSION: In one study, 35% of patients with ventricular tachycardia had a recent myocardial infarct. The symptoms of ventricular tachycardia are incompatible with duty involving flying.

ICD-9 CODES:
427.1 Ventricular Tachycardia

3.25 RAYNAUD'S PHENOMENON

AEROMEDICAL CONCERNS: Raynaud's Phenomenon is an episodic, reversible spasm of the vasculature in the extremities. Typically the hands are primarily effected. During an episode skin changes that occur include:

1. Pallor-caused by lack of oxygenated blood
2. Cyanosis-caused by pooling of poorly oxygenated blood
3. Rubor-occurs as the vasospasm ends

During a severe episode the vascular changes and associated pain can effect hand usage in the cockpit (see discussion).

WAIVER: Civilian applicants with Raynaud's Phenomenon are CD, no waiver, per the Manual of the Medical Department (MANMED), Article 15-57. Designated aviators with primary Raynaud's Phenomenon will be considered for waiver. Underlying pathology must be excluded and symptoms must be manageable in the performance of flight duties. Designated aviators diagnosed with secondary Raynaud's Phenomenon are CD, no waiver, but may be considered on an individual basis.

INFORMATION REQUIRED:

1. The following information is used to help rule out secondary underlying causes and must be included:
   a. Full history
   b. CBC with differential
   c. ESR
   d. Antinuclear antibodies (ANA)
   e. Hand radiography
   f. Though not required, nailfold capillary morphology studies may be included.
2. An internal medicine/rheumatology consult must be included to differentiate between primary and secondary Raynaud's Phenomenon.
3. A flight surgeon's analysis of the aviator's ability to perform normal and emergency duties must be included with the waiver submission request.
4. Class I aviators must have their waiver package reviewed by NOMI internal medicine prior to being allowed to return to the cockpit.
5. As more advanced tests become available, please include them with the waiver request.

TREATMENT: Drug therapy is discouraged because of the side effects of the drugs in common use. If drug therapy is prescribed to an aviator waived for primary Raynaud's phenomenon, the waiver request must be resubmitted. Behavioral adaptations such as stopping tobacco usage, cold avoidance, and layered clothing are acceptable. Thoracic sympathectomy is not waiverable.

DISCUSSION: Vasospasm of the extremities can occur as an isolated symptom without underlying disease (primary Raynaud's Phenomenon) or in association with another disorder or condition (secondary Raynaud's Phenomenon). Ninety-eight percent of secondary Raynaud's Phenomenon disorders are connective tissue diseases with systemic sclerosis being the most

common. Raynaud's Phenomenon affects four times more women than men. In women, onset typically occurs between 15 and 40 years; in men the onset is typically later. Despite over a century of investigation, the pathophysiology of Raynaud's Phenomenon remains an enigma. Recent meta-analysis has shown that of the individuals with primary Raynaud's Phenomenon, 13% will develop a secondary disorder within 10 years. Primary Raynaud's Phenomenon will often present with a variety of clinical and serological abnormalities; however, over a lifetime less than one-third will develop a connective tissue disorder.

ICD-9 CODE:
V12.5 K Raynaud's Phenomenom

4.1 ACNE

AEROMEDICAL CONCERNS: The lesions on the face may interfere with mask seal and helmet wear. Those over the shoulders may cause discomfort when wearing safety restraints or parachute harnesses. Patients with severe cystic acne may also have psychological problems relevant to military aviation duties.

WAIVER: Normally, unrestricted waiver can be considered although severe cystic acne may dictate service group/aircraft limitation to avoid routine use of either helmet or mask. Candidates with severe cystic acne are CD, no waiver.

INFORMATION REQUIRED:

1. Detailed full-body skin exam
2. Details of current therapy
3. Documentation of the ability to achieve mask seal (if applicable)

TREATMENT: Treatment with oral erythromycin, doxycycline, or tetracycline is NCD following a period of grounding to screen for side effects. Minocycline is not acceptable because of the risk of CNS side effects such as light-headedness, dizziness and vertigo. Accutane is CD, no waiver. Accutane use requires grounding for the duration of therapy, plus 3 months after drug cessation. Slit lamp exam and triglyceride levels three months post therapy must be normal. LFT abnormalities while on Accutane must be resolved prior to requesting a waiver.

DISCUSSION: Antibiotics as described above, taken while avoiding large quantities of oral milk, alkali or iron, will produce good or excellent results in 90% of patients in 3 months. The incidence of dizziness in patients taking minocycline has reported to be as high as 17%, however the risk of side effects is dose related and is quoted as 5% in the dose required to control acne.

ICD-9 CODES:
706.1 Acne
706.17 Acne with any use of Accutane

4.2 DERMATITIS

AEROMEDICAL CONCERNS: Depending on the location of lesions, there can be interference with the wearing of flight gear. The symptoms, particularly itching, can be distracting in flight. Patients with atopic dermatitis are more susceptible to contact dermatitis due to irritants found in a military environment.

WAIVER: Symptom severity and the requirement for therapy will determine the aeromedical disposition. Patients controlled on topical therapy over small areas and patients who are asymptomatic on stable doses of loratadine (Claritin) **OR** fexofenadine (Allegra) may be considered for waiver. An initial seven day grounding period is required for loratadine and fexofenadine to document no adverse effects. A one time separate waiver submission is required for loratadine or fexofenadine.

INFORMATION REQUIRED:

1. Allergy/immunology consultation to rule out asthma or hay fever
2. Dermatology consult (when clinically indicated)
3. Detailed full-body skin exam
4. Details of current treatment
5. Documentation of the ability to wear flight gear and achieve mask seal (if applicable)

TREATMENT: Intermittent use of topical steroids over a limited area is compatible with waiver. The use of other medications besides loratadine or fexofenadine is CD, no waiver.

DISCUSSION: Atopic dermatitis affects 1-3% of the population, 20% of whom will have the onset delayed into adult life. Between 30-50% of patients will also exhibit allergic respiratory disease such as asthma or hay fever.

ICD-9 CODES:
691 Atopic Dermatitis
692 Contact Dermatitis
708.0 Allergic Urticaria

4.3 DERMATOPHYTOSIS OF THE NAIL

AEROMEDICAL CONCERNS: The disease process does not interfere with aviation duties and is only a cosmetic concern. Treatment is potentially toxic, expensive, has high relapse rates and often requires adjuvant therapy.

WAIVER: Not required for the disease. Treatment with terbinafine is NCD provided the following guidelines.

INFORMATION REQUIRED:

1. Documentation of baseline liver function tests.
2. Monthly liver function tests for duration of treatment.

TREATMENT: Terbinafine is the only approved medication for use in aviators. A three day grounding period is required when initiating therapy with terbinafine. Ketaconazole is not recommended for waiver. A positive culture is required prior to the initiation of treatment following the standard of care.

DISCUSSION: Clinically, microscopic diagnosis is sufficient to guide therapy in most cases. Susceptibility to onychomycosis appears to be genetically determined. Susceptible individuals have frequent recurrences and a less than optimal response to treatment.

ICD-9 CODE:
110.1 Dermatophytosis of Nail

4.4 PSORIASIS

AEROMEDICAL CONCERNS: The relapsing nature of the condition together with the requirement for therapy makes it difficult for the military aviator to satisfy operational responsibilities. Some cases are exacerbated by physically and emotionally strenuous work. Some of the forms of treatment have side effects incompatible with flying.

WAIVER: Waiver may be considered for mild cases, including those needing occasional topical steroids. More severe cases will be found NPQ, with no waiver recommended. A history of psoriasis is disqualifying for entry into aviation.

INFORMATION REQUIRED:

1. Dermatology consultation(must include treatment recommendations and response to therapy)

TREATMENT: Topical steroids in mild cases will control the condition in one third of cases within 2 weeks, even when the steroid is withdrawn. A second third will respond to continued applications of steroid 1-2 times weekly. The remainder of cases do not respond. Other topical applications such as tar products and dithranol are unacceptable in aviation. Anti-mitotic drugs such as methotrexate (side effects including ataxia, hallucinations) and retinoic acid (liver toxicity, dry mouth, sore lips, conjunctivitis) are also unacceptable within aviation. Phototherapy (PUVA) can help in 75% of cases, but the requirement for maintenance therapy interferes with operational requirements.

DISCUSSION: The condition has a peak onset in young adults, with 2% of the adult population from NW Europe affected. It is less common in sunny climates and in those with darker skins. Psoriasis is a fluctuating condition of spontaneous remissions and relapses; up to one third of cases go into remission each year. Up to 7% of cases have been reported to have psoriatic arthritis. Conversely, 4% of patients with inflammatory polyarthritis have psoriasis.

ICD-9 CODE:
696.1 Psoriasis

5.0 ENDOCRINOLOGY

5.1 DIABETES MELLITUS

AEROMEDICAL CONCERNS: The primary concern in a diabetic patient, acutely, is the possibility of unexpected hypoglycemia and associated risk of sudden loss of consciousness. This risk is greatest among those with Type 1 diabetes mellitus, but may also occur in diabetics controlled with oral anti-diabetic medications. The long-term complications of diabetes include renal, cardiovascular, neurological and visual problems. Deployment frequently decreases control secondary to uncontrolled diet, long work hours and environmental stressors. Both Type 1 and Type 2 diabetes mellitus is disqualifying for all aviation duties.

WAIVERS:
Type 1 Diabetes mellitus:
Waiver **will not** be considered.

Type 2 Diabetes mellitus:
Candidate or student status in:

NA/NFO waiver **will not** be considered.
Aeromedical officers, Air Traffic Controller, or Naval Aircrew, waiver is generally **not** recommended.

Designated aviation personnel:
Controlled without medication (diet and weight control):

All classes, waiver will be considered.
Life style modifications must result in a normal fasting blood sugar (< 110 mg/dl), a glycosylated hemoglobin (Hgb A1C) < 7.0%, and no medical sequelae.

Controlled with approved medication (Metformin or Thiazolidinediones (TZDs)*:

Service group 1 or 2, waiver **will not** be considered.
Service group 3, waiver will be considered on a case by case basis but will generally **not** be recommended.
Class 2 or 3, waiver is generally recommended.

*****Metformin is the oral agent of choice in aviation personnel. However, TZDs (Rosiglitazone, Pioglitazone, etc...) may be used as either a single agent for those patients who cannot tolerate metformin or may be used in combination with metformin for patients requiring a second drug for control.

Controlled with insulin or other medications (other than Metformin or TZDs):

Waiver **will not** be considered.

Impaired Glucose Tolerance (IGT), Impaired Fasting Glucose, or Gestational DM:

Not considered disqualifying in uncomplicated, completely resolved, and asymptomatic cases with Hgb A1C < 7.0%. **However,** weight and Hgb A1C shall be submitted annually with physical exam for monitoring of disease progression.

INFORMATION REQUIRED:
Initial waiver:

1. Internal Medicine/Family Practice or Endocrinology consultation
2. Ophthalmology/Optometry consult for dilated diabetic eye exam (establishment of baseline)
3. Neurological exam with attention to peripheral neuropathies (may be done by Flight Surgeon)
4. EKG
5. Blood pressure (goal < 135/80)
6. Average FBG < 120 mg/dl
7. Labs
   a. Hgb A1C < 7.0% after controlled
   b. Chem 7 (lytes, BUN, creatinine, glucose)
   c. Lipid profile (goal LDL < 100)
   d. LFT (for TZDs q 2 months x 1 yr & then q 6-12 months)
   e. UA
   f. Urine micro albumin/creatinine ratio
   g. Anti-glutamic acid decarboxylase (anti-GAD, a marker for Type 1 diabetes)
8. Weight and height for baseline body mass index (BMI)
9. Testing confirming the diagnosis (See below)

Category	**Normal**	**Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG)**	**Diabetes Mellitus (DM)**	**Gestational DM**
Fasting Blood Sugar (FBS)*	**< 110**	**110 < IFG <126**	**> 126**	**> 105**
2-hours Glucose Tolerance Test (GTT) (after 75gm glucose load)	**< 140**	**140 < IGT < 200**	**> 200**	**> 165**
Random Blood Glucose **	**> 200 (plus symptoms)*** **			

* FBS is defined as no caloric intake for at least 8 hours.
** Random blood glucose is defined as at any time of day without regard to time since last caloric intake.
*** Polyuria, polydipsia, unexplained weight loss (sometimes polyphagia), and/or blurred vision

Follow up/Resubmission (annually):

1. Internal medicine/Family Practice or Endocrinology consultation
2. Ophthalmology/Optometry consult for dilated diabetic eye exam
3. EKG and Blood pressure (goal < 135/80)
4. Maintenance average FBG < 120 mg/dlHgb A1C < 7.0%
5. Labs
   a. Hgb A1C < 7.0%
   b. Chem 7 (lytes, BUN, creatinine, glucose)
   c. Lipid profile (goal LDL < 100)
   d. LFT (for TZDs q 2 months x 1 yr & then q 6-12 months)
   e. UA
   f. Urine micro albumin/creatinine ratio.
6. BMI at baseline or below
7. Documentation by Flight Surgeon to include:
   a. Level of control (summary of before meal Accuhecks, blood sugars between visits, changes in weight)
   b. Follow-up visits
   c. Neurological exam

Waiver terminated if:

1. Lack of understanding of disease process
2. Non-compliant with medications
3. Unwilling to perform Accuchecks
4. Hgb-A1C is > 7.0 (on two occasions 3 months apart)
5. BMI is greater than the baseline BMI

Special Note:

Metformin and thiazolidinedione waivers are meant for Type 2 diabetics who require additional assistance in controlling serum glucose. Waivers are not meant for the individual who is extremely hard to control, or who is non-compliant with medical recommendations. Waivers should only be recommended for those individuals that demonstrate the motivation to learn about their disease process and participate in their care.

TREATMENT:

Diabetes Mellitus:

For aviation personnel, the following are approved methods of treatment:

1. Diet
2. Weight reduction
3. A limited number of oral anti-diabetic medications as listed above

Impaired Glucose Tolerance:

Diet, exercise, and weight reduction are primary therapies. These individuals need aggressive cardiac risk factors modification.

DISCUSSION:

The major concern for most oral anti-diabetic medications is the precipitation of hypoglycemia. Metformin and Thiazolidinediones (TZDs) (Rosiglitazone, Pioglitazone, etc...) do not stimulate the release of insulin. Due to their mechanisms of action, the risk of hypoglycemia is present but extremely rare. Therefore, they are the most suitable oral anti-diabetic agents available for controlling type 2 diabetics in the aviation environment. They were chosen as the only oral anti-hyperglycemic agents allowed for use in the aviation community due to their well-established efficacy and safety profile. The unique mechanism of action minimizes the risk of hypoglycemia except under the most extreme circumstances (ex. starvation).

Compared to healthy aviators, poorly controlled diabetics are twice as likely to have a stroke, 2 to 10 times more likely to suffer a myocardial infarction, and 5 to 10 times more likely to suffer peripheral vascular disease. The Diabetes Control and Complications Trial (DCCT 1993) demonstrated the importance of tight control in preventing end-organ damage. The American Diabetes Association (ADA) lowered the fasting blood glucose for the diagnosis of diabetes to > 126 mg/dl in 1995. **NAMI emphasizes tight control of blood sugar over the entire aviation career.**

Screening FBG is strongly recommended annually for all individuals at higher risk for developing diabetes. These include: (1) Individuals with a parent, sibling, or child with DM; (2) A history of gestational DM or impaired glucose tolerance; (3) A history of previous abnormality of glucose tolerance associated with the metabolic stresses, obesity, trauma, surgery, infection, or alcohol intoxication; (4) A history of hypertension; (5) Cholesterol abnormalities with HDL < 35 mg/dl and or triglyceride level > 250 mg/dl, and (6) member of high risk ethnic population (See references).

REFERENCES:

American Diabetes Association, Report of the Expert Committee on the Diagnosis and Classification of Diabetes Melliuts, Diabetes 25 (S1) 5-20, January 2002.
American Diabetes Association: http://www.diabetes.org/
Katheleen L. Wyne, The Need for Reappraisal of Type 2 Diabetes Mellitus Managent, A Special Report, Postgraduate Medicine, 5-14, May 2003.
Silvio E. Inzucchi, Oral Antihyperglycemic Therapy for Type 2 Diabetes, Scientific Review, JAMA 287(3) 360-372.

ICD-9 CODES:
250.03 Diabetes Mellitus 1
250.02 Diabetes Mellitus 2
250.0d Diabetes Mellitus – Diet controlled

5.2 GOUT

AEROMEDICAL CONCERNS: Gout may present as an acute severe arthritis without warning. It may be associated with atherosclerosis, diabetes, hypertension, and renal disease.

WAIVER: Both gout and the medications used for treatment are CD. Waivers are recommended to SG3, Class II, and Class III. Waivers to SG1 will be considered after 3 months if member remains asymptomatic and on a stable dose of medication (if required).

INFORMATION REQUIRED:

1. Chem 7
2. Serum Uric Acid (with at least one value obtained on current treatment regimen, if prescribed)
3. Medical treatment and dosage (if prophylactic medications are prescribed)
4. Confirmation of absence of renal stones within the collecting system (plain film KUB is adequate)
5. Parenchymal renolithiasis is CD as well but may considered for waiver (See chapter on renal stones).

TREATMENT: The first episode of presumed gout is usually treated with a non-steroidal anti-inflammatory agent. Should the patient have a reoccurrence, a joint aspiration should be considered to confirm the diagnosis. Allopurinol or Probenecid may be necessary to control the symptoms.

DISCUSSION: The incidence of concomitant uric acid renal stones is up to 25% although some series have reported an incidence of up to 40%. Starting treatment with Probenecid can precipitate stone formation in the kidney and the maintenance of an alkali diuresis at the start of treatment is recommended. Those patients who are asymptomatic with a serum uric acid greater than 10 mg/dl have a 90% chance of an attack of gout. Of relevance to aircrew is the association of gout with increased alcohol consumption.

ICD-9 CODE:
274.9 Gout

5.3 HYPERTHYROIDISM

AEROMEDICAL CONCERNS: An atypical presentation, with cardiac or psychiatric symptoms, is common in men. Patients with thyroid ophthalmopathy frequently have difficulty in upward gaze. Corneal damage and optic neuropathy can also occur.

WAIVER: Waiver may be considered once the patient is euthyroid on a stable dose of replacement medication if required. Patients with ophthalmopathy will need to be grounded while undergoing treatment and may need to be disqualified permanently if treatment is unsuccessful. Waivers are **not granted for the use of propylthiouracil.**

INFORMATION REQUIRED:

1. Endocrinology consult
2. Laboratory studies as indicated or ordered by endocrinologist
3. Treatment summary (to include method of ablation if performed)
4. Ophthalmology consultation is also required if exophthalmos or other eye conditions are suspected
5. Annual confirmation of clinical and chemical euthyroid status is needed for waiver renewal

TREATMENT: There are three primary forms of therapy: medical treatment with methimazole or similar drugs; radioactive iodine; and surgery. Methimazole may cause side effects including vertigo and drowsiness, as well as agranulocytosis. Surgery is declining in popularity but may be the treatment of choice in females of childbearing age. A small number of cases will require eye surgery.

DISCUSSION: Muscle pain, weakness and stiffness are the presenting symptoms in 25% of patients. Bulbar involvement can occur. With drug treatment, there is a 50% relapse rate, with some cases relapsing early. With I131, 10 to 15% of cases will be hypothyroid within 2 years, and 50 to 60% will be hypothyroid within 20 years. A third of patients undergoing surgery will be hypothyroid within 10 years. The complete remission rate after radioactive iodine is 86% with 60% developing myxedema after 10 years and a further 2-3% a year developing myxedema after that. Only 5% of patients with Graves' disease will have ophthalmopathy. More than 50% of cases of exophthalmos will spontaneously remit within 5 years with no other treatment than that of the underlying condition. Only 5% of patients will require ocular surgical intervention.

ICD-9 CODES:
242.03 Hyperthyroidism
241.0 Thyroid Nodule
241.1 Multinodular Goiter, non-toxic
240.9 Goiter, unspecified
242.9 Thyrotoxicosis without mention of goiter or other cause

5.4 HYPOTHYROIDISM

AEROMEDICAL CONCERNS: The insidious onset of many signs and symptoms of hypothyroidism reduces the aviator's ability to recognize abnormalities. It can foster complacency or an unwillingness to seek medical advice until performance is significantly degraded. Fatigue, lethargy, muscle weakness, decreased cognitive function, motor weakness, delayed reflexes, bradycardia, first degree heart block, cardiomegaly, pericardial effusion, depression, sensorineural hearing loss and anemia are all complications relevant to aviation. The flight surgeon must know and observe their aviators for the subtle onset of any of these signs and symptoms.

WAIVER: A history of hypothyroidism is CD for all DIF. Applicants for SNA and SNFO are CD, no waiver recommended. All other categories of applicants will be considered on a case-by-case basis. A waiver for designated personnel may be recommended for uncomplicated hypothyroidism when the patient is clinically and chemically euthyroid on a stable dose of replacement levothyroxine (at least 6 weeks), with the TSH stable and in normal range.

INFORMATION REQUIRED:

1. Endocrine or Internal Medicine/Family Practice consultation
2. Serum TSH, T4 and/or free T4 values indicating euthyroidism
3. Annual evaluation of member's thyroid status with thyroid function studies (TSH at a minimum)
4. Any deviation from euthyroid status shall be submitted to NAMI Code 42

TREATMENT: Synthroid (levothyroxine) use is waiverable in designated personnel.

DISCUSSION: The most common cause of primary hypothyroidism is chronic autoimmune thyroiditis (Hashimoto's thyroiditis). Other causes include radioactive iodine thyroid gland ablation, surgical removal of the thyroid gland, and external irradiation. Full dose replacement with levothyroxine can be instituted immediately in most patients, the exceptions being geriatric or cardiac patients. The ratio of female to male patients is approximately 5:1.

ICD-9 CODES:
244.8 Acquired hypothyroidism (iatrogenic)
245.0 Acute thyroiditis
245.1 Subacute thyroiditis
245.2 Hashimoto's thyroiditis
245.9 Thyroiditis, unspecified

6.0 EAR NOSE AND THROAT

6.1 ALLERGIC/VASOMOTOR RHINITIS

AEROMEDICAL CONCERNS: Symptoms that include airway compromise discomfort, and ear and sinus barotraumas, along with the use of medications with unacceptable side effects, have the potential for in-flight incapacitation, and prolonged periods of grounding.

WAIVER: *Uncomplicated* perennial and seasonal allergic rhinitis [PAR and SAR] are **NCD!** *Vasomotor* rhinitis may be CD if symptoms interfere with aviation, although this is a rare occurrence. For more information on VR, see the Discussion section below. In evaluating a member with a history of allergic rhinitis, the following conditions must **all** apply before determining that he or she is PQ:

1. Symptoms, if present or expected to recur, must be controllable with any combination of topical nasal steroid sprays, approved antihistamines, montelukast (Singulair), or nasal cromolyn.
2. A Waters' view x-ray of the sinuses must show no evidence of acute or chronic mucosal disease (mucus retention cysts are the exception)
3. A nasal examination using a hand-held magnifying otoscope with large speculum must show no evidence of mucosal disease such as polyp(s) or purulent drainage. If in doubt, seek ENT consultation. Your nasal examination is best done several minutes after spraying both nasal cavities with a decongestant nasal spray.
4. There has been no use of allergy immunotherapy (AIT) within the past 12 months.

(Note: AR and SAR do not automatically become CD if the only additional treatment is an antihistamine and/or nasal steroid. It is the severity of the condition that requires the waiver, not the medication. See more in the TREATMENT section below)

INFORMATION REQUIRED:

1. Documentation of diagnosis on SF 88/93
2. Nasal speculum exam
3. Waters' view x-ray (only x-ray report needs to be submitted, not actual films)

If the conditions outlined above conditions aren't met, then the allergic rhinitis is presumably more complicated and the member is NPQ. Depending on the reason for disqualification, a waiver may or may not be considered. In these cases, the following information is also required for waiver consideration:

1. ENT and/or Allergy consultation
2. Results of any further tests that have been performed, such as sinus CT

Vasomotor rhinitis, which causes significant disability, will require the same documentation as for allergic rhinitis. If the member is felt to be NPQ, then the **Allergic Rhinitis Worksheet** (see below) may be helpful in assuring that all useful information is collected for waiver consideration.

TREATMENT: The non-sedating antihistamines (Claritin, Clarinex, and Allegra) and the leukotriene receptor antagonist montelukast (Singulair) are approved for use in all aviation personnel, **with no waiver required providing the above conditions are met**. If the Flight Surgeon chooses to start a member on one of these medications, a seven-day grounding period is mandatory in order to observe for any untoward effects. This period does not need to be repeated with subsequent use of that drug. However, If the member switches to another antihistamine, another grounding period is then necessary as two of the three approved medications are chemically dissimilar from the third. Note **that only the plain forms of these antihistamines are approved and not the ones containing decongestants**. Singulair is not generally considered first line therapy. It is generally used as a medication that provides benefit in conjunction with topical nasal steroids or antihistamines. Inhaled nasal steroids and cromolyn do not require a waiver. Allergy immune therapy (AIT) in stable, effective doses is CD but will be considered for waiver. AIT is difficult to administer (12 hour grounding after shot, refrigeration required, loss of serum potency, and difficulty obtaining refills) and should not be undertaken if topical sprays or non-sedating antihistamines are effective. Applicants on a stable dose of AIT may be considered for waiver. There has been success with an accelerated method of reaching maintenance (Rush technique), and, if available, this should be considered when grounding time must be minimized.

DISCUSSION: PAR and SAR are manifested by any or all of the following symptoms: rhinorrhea, sneezing, lacrimation, pruritus (nasal, ocular, and palatal) and congestion. Etiology is inhaled allergens (and on rare occasions, food in PAR). SAR tends to be seasonal or multi-seasonal, whereas PAR may be year round. AIT is used in the treatment of PAR/SAR following allergy testing, though, as noted above, AIT is not without problems. Nasal inhaled steroids and cromolyn have minimal side effects and are approved for use in aviation personnel, as are three non-sedating antihistamines (Claritin, Clarinex, and Allegra). Allergic rhinitis may be mimicked by Vasomotor Rhinitis, which may consist of rhinorrhea, sneezing, and congestion. The congestion is often seen as alternating, sometimes severe, nasal obstruction. Inciting factors include temperature and humidity changes, odors, irritants, recumbency, and emotion. Treatment of vasomotor rhinitis with inhaled nasal steroids can be effective, and, if symptoms aren't disabling, no waiver is required. The potential for VR to cause barotrauma is nil.

ICD-9 CODES:
477.9 Allergic/Vasomotor Rhinitis
477.98 Allergic Rhinitis, treated with steroids
477.0 Allergic Rhinitis, due to pollen
477.8 Allergic Rhinitis, due to other allergens
P22.60 Functional Endoscopic Sinus Surgery (FESS)

ALLERGIC RHINITIS WORKSHEET

EXAMINING FACILITY:	FACILITY UIC:
TODAY'S DATE:	EXAMINER'S PHONE #:
REQUESTING WAIVER?	REQUESTING TO ELIMINATE WAIVER?

HISTORY

SYMPTOMS		**FREQUENCY**		**TREATMENT**		**PRIOR PROBLEMS**	
	RHINORRHEA		SPRING		None		EAR BAROTRAUMA
	CLEAR		SUMMER		OTC Med		SINUS BAROTRAUMA
	CLOUDY		FALL		Steroid Spray		SINUSITIS; CHRONIC? RECURRENT? ACUTE?
	LACRIMATION		WINTER		Rx. Med*	OTHER:	
	SNEEZING		PERENNIAL		AIT**		
	CONGESTION						
	ITCHING						

How many years of sx.?	Typical duration of sx:

CURRENT SYMPTOMS (if no sx. at present, when was pt. last symptomatic?):

CURRENT THERAPY, IF ANY: *(LIST MEDS) PAST EFFECTIVE THERAPY:

**IF HX. OF ALLERGY IMMUNOTHERAPY, DATE BEGUN:	DATE COMPLETED:

PHYSICAL EXAMINATION

RIGHT EAR:	VALSALVA?
LEFT EAR:	VALSALVA?

NOSE:

MOUTH:

OROPHARYNX:

SINUS FILMS RESULTS: (Include actual films if abnormal / **submit all films on APT applicants**)

ENT EVALUATION: **(ONLY IF REQUIRED PER WAIVER GUIDE)**

ALLERGY EVALUATION**: (ONLY IF REQUIRED PER WAIVER GUIDE)**

IMPRESSION:

FLIGHT SURGEON'S RECOMMENDED DISPOSITION

	NPQ, WAIVER RECOMMENDED		PQ, DISCONTINUE WAIVER
	NPQ, WAIVER NOT RECOMMENDED		

FLIGHT SURGEON SIGNATURE/ STAMP

PATIENT'S SIGNATURE:	DATE:

PT'S NAME: LAST/ FIRST/ MIDDLE/RANK/RATE

DATE OF BIRTH:	AGE:	SSN:

6.2 CHRONIC SINUSITIS/SINUS SURGERY

AEROMEDICAL CONCERNS: This is of particular concern because sinus barotrauma has the potential for in-flight incapacitation, prolonged periods of grounding, and other symptoms affecting performance.

WAIVER: Civilian applicants with a history of chronic sinusitis are NPQ. A waiver shouldn't be requested unless he or she is free of disease, as indicated by a recent ENT consultation and (in most cases) a sinus CT. If surgery has been done, enclose any pre- and postoperative notes as well as the operation report. In addition, some evidence of the applicant's ability to handle pressure changes should be documented. Low pressure chambers are not generally accessible to civilians, so look for a history of recent successful SCUBA diving or aerobatic flying. If the applicant is military, make every attempt to have him or her perform a barofunction run in a low pressure chamber. Students and designated aviation personnel who are diagnosed with chronic sinusitis while on active duty are also NPQ, and a waiver will only be considered after the disease has been successfully treated. If surgery (usually FESS, or Functional Endoscopic Sinus Surgery) is performed, the patient must be healed and free of active disease. The surgeon should state that the patient is cleared for evaluation in a low-pressure chamber before the flight surgeon schedules a chamber run. If the patient successfully completes the run without pain or significant facial pressure, a waiver is generally recommended and usually granted. A common waiver stipulation is that the patient must have an ENT consultation for the first 3 years after surgery before waiver continuation can be recommended.

INFORMATION REQUIRED:

1. Detailed information on the events that led to the diagnosis
2. Physical examination findings
3. X-ray studies (including CT scan if performed)
4. Details on the operation performed
5. Surgeon's postoperative findings and recommendations
6. Copies of the pre- and post-op notes and dictated operation report (if available)
7. Post-op CT report (if performed)
8. Documentation of a successful post-surgical barofunction run in a low pressure chamber

In many cases it is appropriate for a Local Board of Flight Surgeons to return the member to a flying status while awaiting the waiver, but it is best to consult with the NAMI Otolaryngology Department before doing so.

TREATMENT: Chronic sinusitis can be relatively asymptomatic, and may only come to the attention of the flight surgeon because the member suffers an episode of sinus barotrauma. On the other hand there may be persistent cough, purulent postnasal drainage, facial pressure, nasal congestion, and low-grade malaise for many months without history of barotraumas before the flight surgeon is consulted. The symptoms may date back to a particularly severe upper respiratory infection, or even to an episode of acute sinusitis. The symptoms may be dismissed as allergic (although sneezing, clear rhinorrhea, and lacrimation are usually absent) and the

patient may have been treated for allergies on multiple occasions, usually with little or no relief. By definition, chronic sinusitis is a condition that is present for more than three months, although in reality most patients have a considerably longer history of waxing and waning symptoms that often are mistakenly treated as multiple episodes of acute sinusitis. Broad spectrum antibiotic therapy with activity against anaerobes is recommended for three weeks. Decongestants, mucolytics, nasal saline, and topical steroid sprays are often prescribed, but there is no consensus as to their effectiveness in shortening the course of chronic sinusitis. If antibiotics fail to eliminate the symptoms and the x-rays don't improve, surgery is often the next step. Surgery may be done sooner in aircrew than in others because flying personnel are unable to do their jobs until the disease is eliminated.

DISCUSSION: Although early surgery may seem a bit extreme, it is quite effective in eliminating disease and returning aircrew to flying. Not all ENT surgeons are comfortable with doing early surgery, especially if the patient is asymptomatic and the CT shows only minimally diseased mucosa, but when the "minimal" disease is in the area of the osteomeatal complex, it can have a profound effect on the sinuses ability to ventilate. The Air Force studied 50 pilots and navigators who were found to have chronic sinusitis during an evaluation following an episode of sinus barotrauma. They all underwent FESS, and 47 returned to flying without further problems. The other three, because of barotrauma in the chamber post-op, needed a minor revision of the original surgery. They eventually returned to flying too. The post-op chamber run is invaluable in proving that the member will do well upon returning to flying. Although it seems obvious that the chamber run is necessary in someone who had suffered barotrauma previously, it is also necessary in post-op patients who never had barotraumas since it is possible for the surgery itself to cause scarring that can compromise sinus ventilation. An uneventful chamber run puts those concerns to rest. Chronic sinusitis can recur in spite of successful treatment in the past, so the flight surgeon should have a relatively low threshold for treatment or for referral back to ENT if typical symptoms (or barotrauma) should resurface. There is one circumstance in which neither a waiver nor a chamber run would be necessary for an aircrew who has undergone FESS. Occasionally this surgery is done to open a maxillary sinus in order to decompress a mucus retention cyst. In such a case there is no chronic sinusitis, and the surgery itself has little chance of leading to barotraumas, but virtually all other patients who undergo FESS will need a waiver.

ICD-9 CODES:
473 Chronic Sinusitis
P22.60 Endoscopic Sinus Surgery

6.3 NASAL POLYPS

AEROMEDICAL CONCERNS: Sinus barotraumas, which has the potential for in-flight incapacitation, and prolonged periods of grounding.

WAIVER: Civilian applicants with nasal polyps present at the time of examination are CD, no waiver. They may be considered for waiver if the polyps were surgically removed more than three years earlier, have required no subsequent surgical treatment, and have not recurred. For military, if surgery is done (see the exception to surgery in the treatment section below), waivers are considered if the condition is controlled postoperatively and a barofunction run in a low pressure chamber is completed successfully. Control may require long term usage of topical nasal steroids and/or cromolyn. Some polyp patients have a past history of treatment with systemic steroids. If systemic steroid treatment has been used as primary therapy and/or has been necessary to control polyp recurrences, this patient will probably not receive a waiver. Use of topical nasal steroids is approved, and is encouraged as needed to control polyp recurrences. As a general rule, if polyps are diagnosed and treated, a post-treatment barofunction run in the chamber will be necessary. If in doubt as to the need for a chamber run, call NAMI ENT.

INFORMATION REQUIRED:

1. ENT evaluation
2. All surgical reports
3. Sinus Films (to rule out sinusitis)
4. Results of post-op barofunction chamber flight(s)

If polyps are currently present, the following additional information is also required:

1. Sinus CT (to look for the sinus disease that often accompanies polyps)

TREATMENT: Resection of nasal polyps is advisable in most cases. This is a must if a waiver is to be considered with one exception. If polyps are very small and in no way blocking the middle meatus according to the ENT consultant, then a waiver may be recommended even without surgery. Topical nasal steroids may be needed to keep these from enlarging.

DISCUSSION: Nasal polyps have a poorly understood etiology and tend to be recurrent. Allergic polyps are relatively uncommon considering the large number of allergic rhinitis patients on active duty. Inflammatory nasal polyps may be more common in our population, and are frequently the result of chronic sinusitis. They are usually found in and near the middle meatus, which is why even a small polyp may lead to sinus barotrauma. Polypoid middle turbinates are somewhat more common, and don't cause barotraumas frequently. They often can be reduced dramatically in size by topical nasal steroid sprays, and rarely require surgery. If there is no history of barotrauma or chronic sinusitis, the presence of polypoid turbinates alone is NCD. As opposed to nasal polyps, sinus polyps are NCD, but the underlying diseases which led to their formation may be CD. However, sinus mucus retention cysts are often mistakenly called "polyps", and these cysts are NCD. X-rays revealing a very large cyst may be sent to NAMI

ENT for a decision as to the need for drainage. Since radiologists often cannot differentiate between a sinus cyst and polyp, it is fair to call them cysts unless there is obvious evidence of mucosal thickening elsewhere, in which case the diagnosis is more likely chronic sinusitis. This is CD and needs treatment as in section 6.2.

ICD-9 CODES:
471 Nasal Polyps
P21.31 Nasal Polypectomy within last 12 months
471.0 Polyp of Nasal Cavity
471.8 Polyp of Sinus Cavity
471.9 Nasal Polyp, site unspecified

6.4 DISORDERS OF THE SALIVARY GLANDS

AEROMEDICAL CONCERNS: Pain or discomfort will usually result from retained salivary stones, especially after eating or drinking. Tumors may interfere with oxygen mask fit.

WAIVER: Following successful treatment of salivary stones or tumors, a waiver may be granted provided there is no facial deformity or nerve damage that would interfere with flight duties.

INFORMATION REQUIRED:

1. Copies of all pertinent consultations
2. CT/MRI reports (and films, if available)
3. Operative report (if applicable)
4. Pathology reports (if applicable)

If pathology reports indicate a malignant process, the following information is also required:

1. Oncology evaluation

TREATMENT: Stone or gland excision (partial or total) is compatible with waiver, as are most cases of benign tumor removal; extensive surgery for malignancy may not be, so each case of malignancy will be considered in detail by NAMI ENT before a recommendation can be made.

DISCUSSION: Mixed tumors (pleomorphic adenomas) comprise 65% of all salivary gland tumors; only a small number of these (5-6%) are malignant. The great majority of salivary tumors (85%) occur in the parotid gland, and 60% of these are the benign mixed type. Another benign tumor, the Warthin's tumor, accounts for 7% of parotid neoplasms, while malignant tumors (in descending order of frequency: mucoepidermoid carcinoma; malignant mixed tumor; acinous cell, adenoid cystic, and squamous cell carcinomas), and other rare lesions account for the remaining 33%. Benign mixed tumors have a recurrence rate of approximately 2%, usually due to incomplete removal, or seeding at the time of removal. Malignant tumors have a much higher rate of recurrence. With adenoid cystic carcinoma, 40% have metastasized by the time of diagnosis; 5-year survival is 45-82%, depending on the study, falling to as low as 13% at 20 years. The corresponding figure for adenocarcinoma is 49-75% at 5 years, with a drop to 41-60% at 10 years. The 20-year survival figures are not readily available. Fortunately, salivary gland disorders of any kind are rare in our population, so this section does not go into great detail. When questions arise that aren't answered here, please consult with NAMI ENT.

ICD-9 CODES:
527 Disorders of the Salivary Glands
527.2 Sialoadenitis
527.5 Sialolithiasis
527.9 Disease of Salivary Gland, unspecified
142.9 Malignant neoplasm of Salivary Gland
210.2 Benign Neoplasm of Salivary Gland

6.5 HEARING LOSS / STAPEDECTOMY

AEROMEDICAL CONCERNS: The inability to clearly hear cockpit radio transmissions and warning tones can have a significant impact on flight safety.

WAIVER: Waivers will be considered depending on the degree of hearing loss, and the member's functional capability. Waivers following surgical treatment of conductive hearing loss may or may not be necessary, depending on the final hearing result and the nature of the surgery. For instance, repair of a traumatic eardrum perforation resulting in full correction and normal hearing would not require a waiver. However, a stapedectomy done to treat otosclerosis is CD and requires a waiver. Designated aviators are grounded for three months following stapedectomy, before waiver being recommended to SG1. For NFO and other Class II personnel, a waiver is also considered for duty involving flying after three months. Waiver criteria include:

1. Asymptomatic
2. Passes a current flight physical
3. Prosthesis used was not a wire loop/gelfoam (a piston prosthesis and tissue graft is preferred versus a blood seal)

No waiver will be recommended if there are signs of vestibular dysfunction, spontaneous nystagmus, or sudden/progressive neurosensory hearing loss is present. Bilateral stapedectomy is not waived. Applicants with a history of stapedectomy are CD, no waiver.

INFORMATION REQUIRED:

1. ENT consult
2. Audiology consult (must include speech reception thresholds and speech discrimination scores)
3. Surgical report (if applicable)

Wearers of hearing aids will also require:

1. Cockpit/in-flight hearing evaluation (to demonstrate the ability of the subject to communicate adequately in that noisy environment)

Testing in a <u>multiplace</u> aircraft will suffice for testing of aviators normally assigned to single seat aircraft, provided ambient noise levels are similar. Newer aids that sit entirely within the ear canal are comfortable enough to be compatible with in-flight use, although they may not improve one's ability to hear in that environment and may actually be detrimental. Therefore an in-flight hearing test should be performed both with and without the aid(s). In the past, use of the US Air Force in-flight hearing test was advised, but it proved to be difficult to administer. Instead, it would seem most practical to have the member repeat a list of common aviation phrases, such as checklist items and responses, air traffic control commands, air-to-air communications, etc. The list of phrases can be tailored to the aircraft and its mission. Admittedly, there would be no data on how well a normal-hearing individual would do on such a test, but at least you and the

member will have an idea of where you stand. A third party with normal hearing can take the test at the same time so that there will be some means of comparison. Such testing should not be necessary unless the member fails to meet SG1 hearing standards and/or is interested in trying a hearing aid in flight. Testing should also be considered in the rare instance of an aircrew member who is having communication difficulties in the aircraft in spite of an audiogram that shows pure tone thresholds to be above standards.

TREATMENT: Conductive hearing loss may well be improved with amplification (hearing aid) if surgical treatment is not a reasonable alternative. Benefits from amplification for neurosensory losses are variable, but often beneficial. The use of hearing aids in flight, however, is not necessarily advantageous due to possible interference with wearing of the helmet and the perceived lack of benefit in the noisy cockpit environment. Hearing aid users will often do well without the aids in the cockpit as long as they have a properly fitting helmet, wear noise attenuating plugs, and carefully adjust their radio volumes. Hence the in-flight hearing test gives the most information if performed both with and without the aid(s). In some aircraft it is possible to utilize active noise reduction headsets (e.g. those made by Bose and David Clark) which will further enhance speech intelligibility, although at some financial cost.

DISCUSSION: Persons with conductive hearing losses usually hear relatively well in noisy backgrounds, while those with sensorineural loss are more often handicapped when there is significant background noise such as in the cockpit. Therefore, aeromedical decisions should be based on evaluation of hearing on the ground **and** in the cockpit, especially if the loss is severe enough to warrant use of a hearing aid or aids on the ground. Unilateral hearing losses present few operational problems, but new or progressive unilateral losses can have significant medical implications and ENT consultation is necessary to rule out such conditions as acoustic neuroma or atypical Meniere's.

A stapedectomy may present problems because the operation creates an opening into the labyrinth, and involves the placement of a prosthesis in most cases. There is a risk of postoperative perilymph fistula, as well as subsequent shifting of the prosthesis, both of which can result in sudden attacks of vertigo. The post-op waiting period allows for healing, which reduces the chances that barotrauma (or an over enthusiastic Valsalva maneuver) will cause a perilymph leak.

ICD-9 CODES:
389.0 Conductive Hearing Loss/Stapedectomy
389.1 Sensorineural Hearing Loss
387 Otosclerosis
P19.1 Stapedectomy

6.6 MENIERE'S DISEASE / VERTIGO

AEROMEDICAL CONCERNS: Incapacitating vertigo may occur suddenly in flight, which is obviously a potentially catastrophic occurrence. Attacks may be precipitated by stress and fatigue. A fluctuating hearing loss usually accompanies the labyrinthine symptoms, and may progress over a period of time to a significant and permanent impairment.

WAIVER: Due to the unpredictable and sudden nature of the vertigo episodes in many patients, and the tendency for the condition to become bilateral, waivers are very rarely granted for a diagnosis of Meniere's Disease. Other causes of vertigo may be waiverable, hence the importance of gathering as much diagnostic information as possible.

INFORMATION REQUIRED:

1. ENT evaluation
2. Audiology evaluation

Not all vertigo is Meniere's, and causes which are self-limiting and non-recurrent may well be waiverable once symptoms have abated. A neurology consultation can be of great help in making or ruling out specific diagnoses, and should be included with waiver submission if performed.

TREATMENT: Treatment with low sodium diet, thiazide diuretics, stress management, and vestibular sedatives such as diazepam may diminish symptoms, but the underlying condition persists and is very unlikely to be waiverable. Surgery (labyrinthectomy, endolymphatic sac drainage or decompression, and vestibular nerve section) is of variable effectiveness. Surgery may diminish or even abolish some of the more severe symptoms, but the patient may be left with some vestibular dysfunction so waiver remains highly individualized. Transtympanic middle-ear gentamicin therapy via microcatheter is being done at a few centers, but the number of patients is still small, and the relief of vertigo is variable, so this treatment has not yet been considered for waiver. At present, very few aviators have received waivers. The two most recent aviators who received a waiver received SG3 waivers only after undergoing vestibular nerve section followed by a one-year period of observation and balance testing. Vestibular nerve section is not an operation to be taken lightly, and there is no guarantee that a waiver will be granted if surgery is done.

DISCUSSION: The cause of symptoms in Meniere's Disease is an increase in pressure of the endolymph within the labyrinth. The reason for this increase is not known, although multiple theories abound. The average age of onset is in the forties, with a range between 20 and 60, which includes virtually all military aviation personnel. The disease is progressive in approximately 10% of patients, with a relentless worsening of the vertigo episodes and hearing loss. Medical treatment is usually of no help, and surgery is often the only option. The other 90% can expect some symptomatic relief from medical therapy, and on occasion may show spontaneous long-term remission, although the underlying pathology is not actually altered by medical therapy. One should therefore be reluctant to say that a case of Meniere's is cured or "burned out", even in the face of a prolonged symptom-free interval. Even when Meniere's has

been successfully treated, there is approximately a 20% incidence of the disease later striking the other ear, hence the reluctance to waiver to SG1 no matter what the result of treatment has been.

Other vertigo-producing labyrinthine disorders, such as vestibular neuronitis and Benign Paroxysmal Positional Vertigo (BPPV) are not nearly as likely as Meniere's Disease to be recurrent, and recovery is usually complete, so a waiver for these conditions is far more likely. A precise diagnosis is not always possible in cases of vertigo, but if a waiver is sought, the more specific a diagnosis one has, the easier it is to determine waiverability.

ICD-9 CODES:
386.0 Meniere's Disease / Vertigo
780.48 Vertigo, not otherwise specified
386.12 Vestibular neuronitis
386.11 Benign paroxysmal positional vertigo

6.7 CHOLESTEOTOMA

AEROMEDICAL CONCERNS: This is a concern in aviation personnel due to hearing loss and risk of recurrence, with the possibility of labyrinthine involvement, and even intracranial extension in the more advanced cases.

WAIVER: A history of cholesteatoma is CD. It must be surgically removed before a waiver can be considered. Since the recurrence rate is approximately 35%, initial waivers are for one year only; an ENT consultation must be submitted before the waiver will be continued. Persistence of cholesteatoma would be cause for waiver withdrawal, pending the outcome of further surgery.

INFORMATION REQUIRED:

1. Current ENT evaluation
2. Current audiology evaluation
3. Operative report

Since cholesteatoma surgery usually involves the mastoid, there is risk to hearing, balance, and facial nerve function. Any impairment in these areas should be addressed in the waiver request. Post-op hearing that is below standards will also require a waiver (see section on Hearing Loss).

TREATMENT: Surgical removal.

DISCUSSION: Given the relatively high recurrence rate, it is important that every attempt is made to assure that there is no residual disease. Recurrent or continuous drainage following surgery may indicate the presence of persistent cholesteatoma, and is not waiverable until adequately treated. Occasionally, the surgeon will plan (or advise) a re-exploration of the ear at a specific time in the future, usually 12-18 months. Every attempt should be made to have this done, as the surgeon most likely feels that the chance of there being persistent disease is fairly good. **If re-exploration uncovers residual disease, the waiver process must be repeated.** As a rule, each time residual cholesteatoma is found, the surgeon will recommend re-exploration at yet a later date until no further cholesteatoma is found. There is no policy stating the maximum number of repeat surgeries that are allowed before a waiver is permanently revoked, but **Code 42 and ENT need to be advised each time a surgery is performed for recurrent cholesteatoma**.

ICD-9 CODES:
385.3 Cholesteatoma
P18.29 Excision of cholesteatoma

6.8 ACOUSTIC NEUROMA

AEROMEDICAL CONCERNS: Progressive hearing loss, tinnitus, trigeminal hyperesthesia, imbalance, and occasionally true vertigo have all been attributed to acoustic neuromas. Following operation, total hearing loss, labyrinthine dysfunction, and facial nerve weakness or paralysis can be present on the side of surgery.

WAIVER: One year following successful excision of a unilateral tumor, a waiver may be considered if there are no serious sequelae. Vertigo, ataxia, and facial paralysis are examples of unacceptable complications. Unilateral hearing loss, even total loss, may well be waiverable provided adequate hearing remains in the other ear and the hearing loss is compatible with the member's mission.

INFORMATION REQUIRED:

1. ENT consult
2. Audiology consult
3. MRI
4. Neurology consult
5. Neurosurgery consult
6. Surgical report
7. Pathology report

Untoward postoperative symptoms, as well as complications, need to be especially well documented in the Aeromedical Summary and waiver request.

TREATMENT: Surgical excision.

DISCUSSION: Acoustic neuromas have a peak incidence between 40 and 50 years. The majority are Schwannomas arising from the superior vestibular division of the eighth nerve, usually extending from the internal auditory canal into the cerebellopontine angle as they enlarge. In patients with neurofibromatosis, neuromas can occasionally be bilateral. Acoustic neuromas are virtually always benign. Operative morbidity is related to the size of the tumor, and hearing is often affected. Up to 50% of patients will have no useful hearing in the involved ear after surgery. Other cranial nerves also may be damaged during surgery (i.e. trigeminal and facial). Facial paralysis may make wearing of an oxygen mask difficult, may result in speech problems, and can cause eye symptoms due to inability to close the eyelids.

ICD-9 CODE:
225.1 Acoustic Neuroma

6.9 OVAL/ROUND WINDOW FISTULA

AEROMEDICAL CONCERNS: A perilymph fistula can result in either the sudden onset of sensorineural hearing loss or a rapidly progressive and/or fluctuating loss, with or without episodic vertigo. It may mimic Meniere's Disease.

WAIVER: A history of fistula is CD, no waiver, for all applicants. For a unilateral healed fistula in DNA, ground for six months, SG3 for six months, then SG1. For NFO's and all Class II personnel, ground for six months, then up. Call NAMI ENT in the rare case of bilateral fistulae.

INFORMATION REQUIRED:

1. Copies of all records involving the initial clinical presentation
2. All ENT consults, notes, tests, operation reports, etc.
3. Audiology report
4. Vestibular test results

TREATMENT: Initial treatment is conservative, with avoidance of lifting and straining or exposure to significant barometric pressure changes, especially ones that might require a Valsalva maneuver. If hearing and vestibular symptoms don't improve, and certainly if they worsen, exploratory tympanotomy is indicated. If a fistula is present, it can be surgically sealed.

DISCUSSION: While fistulae may occur spontaneously, most are associated with head injury or barotrauma, especially in the active duty population. They may also occur as a result of Q-tip misadventure or improper cerumen irrigation technique. As surgery does not always seal the fistula, and recurrence is possible, various waiting periods are prescribed for different classes of personnel. The longest period is for DNA's, as there is a considerable safety issue should acute vertigo occur during flight.

ICD-9 CODE:
386.4 Oval/Round Window Fistula

6.10 SURGICAL PROCEDURES THAT DO NOT REQUIRE A WAIVER

Assuming that recovery is uncomplicated and there are no other significant factors, the following surgical procedures do not require a waiver, If there is any question regarding suitability for aviation duties following one of these procedures, please communicate with NAMI ENT at 850-452-3256/3251 (commercial) or 922-3256/3251 (DSN).

NASAL SURGERY: If any of the following procedures are done in conjunction with sinus surgery (endoscopic or otherwise), then the patient will require a waiver.
Septoplasty: Cautery or submucous resection of the inferior turbinates (or any other means of reducing the size of the inferior turbinates, such as coblation, cryotherapy, radiofrequency ablation, etc.).

Septorhinoplasty: For all these procedures there will be a degree of tenderness involved and it seems as though the nose becomes a target for elbows and other random blows once it has undergone surgery. When the tenderness has resolved so that the nose can be manipulated without discomfort (this can take up to 4-6 weeks for some folks) the patient can return to flight duties. There can also be a risk of bleeding that can last up to three weeks or so. For this reason, putting anyone back in the cockpit any sooner than three weeks following one of these operations is not recommended.

EAR SURGERY:

Otoplasty: This procedure will frequently involve placing sutures to hold the ear in a certain position until it can scar in place and retain that position. The patient should not be manipulating the ears (as would occur when putting on and taking off a helmet) until cleared by the surgeon, which again may take up to six weeks.

Uncomplicated tympanoplasty for an otherwise uncomplicated tympanic membrane perforation. If it is the second (or subsequent) attempt to repair a perforation, or if there is a history of chronic drainage or cholesteatoma, a waiver will be required. If the history is in some way complicated by duration or symptoms, then a waiver will probably be required. An example of the type of surgery that would not require a waiver is the simple repair of a simple traumatic perforation, such as one caused by a slap injury. When in doubt, call NAMI ENT at the above number.

THROAT SURGERY:

Tonsillectomy

Adenoidectomy

Uvulopalatopharyngoplasty (UPPP) for primary snoring. [If the patient has obstructive sleep apnea and undergoes a UPPP, a waiver will be required. See the neurology section of the waiver guide for OSA waiver requirements]

Palatal stiffening procedures for treatment of primary snoring (Restore© palatal implants, coblation, radiofrequency ablation, etc.). Primary snoring refers to the individual who snores, but does not have any evidence of obstructive sleep apnea. This is considered a "cosmetic" problem and may be a nuisance, but does not require a waiver. The surgical procedures to correct it do not require waivers unless there is some sort of complication that has an impact on aviation capabilities.

NECK PROCEDURES:

Removal of submandibular salivary gland as long as there is no malignancy. The marginal mandibular branch of the facial nerve is sometimes injured during this procedure. If it results in no difficulties eating or using a mask, this is not disqualifying.

Parotidectomy, as long as there is no evidence of malignancy. Again, the facial nerve can be injured in this procedure with potentially significant functional deficits. If this has occurred, it will probably require a waiver and may be permanently disqualifying.

Removal of a branchial cleft cyst as long as there is no debilitating nerve injury or other complication.

Removal of other embryologic remnants such as a thyroglossal duct cysts

MISCELLANEOUS CONDITIONS:

Nasal Fractures typically do not interfere with sinus function and even if the fracture is not reduced, the patient usually retains an adequate airway. As soon as the patient can wear a mask without pain or distraction from tenderness, he/she may return to flight duties. This can take 4-6 weeks.

Isolated fracture of the anterior wall of the maxillary sinus (softball to the face is a fairly common cause). These fractures do not require a waiver as long as the upper medial wall of the maxillary sinus, where the drainage pathway is located, is uninvolved. Again, it may take 4-6 weeks for tenderness to resolve to the point of being able to tolerate a mask or other safety equipment.

Peritonsillar abscess. If the patient chooses not to have an interval tonsillectomy (often done ~ six weeks after drainage of the abscess) he/she may return to aviation duties when free of pain and off medications, typically 2-3 weeks.

Face lift, or other cosmetic procedures (facial nerve injuries can also occur with this procedure and if so, must not interfere with function of masks or other equipment).

ICD-9 CODE:
P21.89 Repair and plastic operations on the nose, other
P21.88 Septoplasty, other
P21.87 Rhinoplasty, other

P18.79 Plastic repair of external ear, other
P19.5 Tympanoplasty, other
P28.2 Tonsillectomy without adenoidectomy
P28.3 Tonsillectomy with adenoidectomy
P28.6 Adenoidectomy without tonsillectomy
P27.69 Plastic repair of palate, other
P26.29 Excision of salivary gland lesion, other
P29.2 Excision of branchial cleft cyst or vestige
P06.7 Excision of thyrologlossal duct of tract
802.0 Closed fracture of nasal bones
802.4 Closed fracture of molar and maxillary bones
475 Peritonsillar abscess

7.0 GASTROENTEROLOGY

7.1 CIRRHOSIS

AEROMEDICAL CONCERNS: Symptoms relevant to aviation include gastrointestinal hemorrhage, malaise and lethargy, symptoms arising from encephalopathy, peripheral neuropathy, abdominal pain, and Dupuytren's contracture. Osteomalacia arising in cases of primary biliary cirrhosis could theoretically give problems on ejection. Other concerns exist if the cirrhosis is secondary to alcohol use.

WAIVER: Waiver is will be considered only in asymptomatic, stable cases that do not require treatment and do not exhibit any evidence of esophageal varices. The requirements for waiver for alcoholic cirrhosis are found in the section on alcohol abuse.

INFORMATION REQUIRED:

1. Internal medicine or gastroenterology consultation (liver biopsy may be required, and the results submitted with any waiver request if performed)

TREATMENT: The need for therapy is disqualifying.

DISCUSSION: Cirrhosis resulting from Wilson's disease, hemochromatosis, or chronic active hepatitis tends to present in the teens and 20s, while patients with other etiological factors present after the age of 40. The male to female ratio for alcoholic cirrhosis ranges from 2-10:1, in contrast to that for primary biliary cirrhosis where it is 1:9. Alcoholic cirrhosis occurs in 15% of heavy drinkers. In clinically compensated cases, the 5 year survival for those who stop drinking alcohol is 90% compared with 70% for those who continue drinking; for cases who are not clinically compensated, the corresponding figures are 60% and 30%. The incidence of symptoms in cirrhosis is malaise (found in 30-80% of cases), abdominal pain (up to 30%), gastrointestinal hemorrhage (up to 25%), neurological features (<10%), and Dupuytren's contracture (10-30%). Survival rates in progressive cases are reported as >50% at 1 year falling to 10% at 6 years. In primary biliary cirrhosis, pruritus occurs as the first symptom in 80% of cases and jaundice in the remainder. The incidence of collagen diseases in association with primary biliary cirrhosis is 70-80% with joint involvement in over 40%. Bacteriuria is found in 35% 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.

ICD-9 CODES:
571.2 Alcoholic cirrhosis of the liver
571.6 Biliary Cirrhosis
571.8 Other chronic non-alcoholic liver disease

7.2 CROHN'S DISEASE

AEROMEDICAL CONCERNS: Frequent bowel movements are an inconvenience in flight, particularly when protective clothing is worn. Abdominal pain or hemorrhage can both cause incapacitation in flight. Disqualifying anemia is a common complication. Surgical intervention may be necessary on an emergent basis for obstruction or hemorrhage.

WAIVER: Crohn's Disease is CD, no waiver for all DIF. NOMI does not recommend waivers for Crohn's disease.

INFORMATION REQUIRED: These patients should be referred to medical board (PEB) for disposition.

TREATMENT: The treatment of Crohn's disease is extremely difficult in the operational setting. Bowel rest with hyperalimentation is not an option. High dose steroids with or without antibiotics cannot be undertaken in the majority of deployed situations. Emergent surgical intervention may be required, and the nature of the condition is that it is unpredictably recurrent.

DISCUSSION: The disease is most common in young adults, with a positive family history in 6-15%. There is an association with smoking. Patients present with diarrhea (70-90%), abdominal pain (45-60%), weight loss (65-75%), fever (30-40%), and rectal bleeding (50%). Extraintestinal manifestations include gallstones (13-34%), sacroiliitis (15-18%), aphthous ulceration of the mouth (20%), erythema nodosum (5-10%), and acute arthropathy (6-12%). The risk of carcinoma of the colon is reported to be 3-5%. After the initial episode, there is a 70% chance of relapse in the following 5 years, with most occurring in the first 2 years. Between 70-80% of patients will need at least 1 operation (for failure of medical therapy in 33%, fistula formation in 24%, and intestinal obstruction in 22%). After resection, the risk of recurrence in the following 5 years is 30-70% and 50-85% in the next 10 years. Without operation, the annualized risk for recurrence is 1.6% in those with single site involvement and 4% in those with multiple site disease. The overall mortality is 10-15%.

ICD-9 CODE:
555.9 Crohn's Disease

7.3 DIVERTICULAR DISEASE

AEROMEDICAL CONCERNS: There is a slight risk of in-flight incapacitation, but the symptoms of altered bowel habit, pain, nausea, and flatulence could affect crew performance.

WAIVER: Waivers can be considered for aircrew with diverticulae provided symptoms are minimal and that medication is not required. Surgical intervention may be required to control symptoms, but colectomy for incidentally noted asymptomatic diverticulae should not be undertaken.

INFORMATION REQUIRED:

1. Surgical consultation to exclude malignancy.

TREATMENT: A high fiber diet is compatible with flying.

DISCUSSION: Diverticulosis is rare before the age of 30 but affects 30% of the population by the sixth decade. It is more frequent in the 20s and 30s in patients with Marfan's syndrome. Some 20-25% of patients require surgery on their initial admission to hospital. The 5-year survival is 70%; of the 70% who survive, 40% will do so without symptoms. The disease is one of frequent recurrence. Aeromedical disposition will usually be based on individual assessment of the risk of recurrence and complications.

ICD-9 CODES:
562 Diverticular Disease
562.10 Diverticulosis of Colon
562.11 Diverticulitis of Colon

7.4 GALLSTONES

AEROMEDICAL CONCERNS: There is risk of incapacitation secondary to biliary colic.

WAIVER: Waivers are recommended for aviators and applicants with incidentally noted asymptomatic stones. Aviators with symptoms should be grounded until the stones are removed. Aviators who have undergone extracorporeal shock wave lithotripsy (ESWL) may apply for a waiver after a 6-month period free of biliary colic. **A history of cholecystectomy, either open or laparoscopic, is NCD in all aviation personnel.** No evidence of cholecystitis on ultrasound examination should be present. A nuclear medicine study may be necessary to assure proper function of the gall bladder.

INFORMATION REQUIRED:

1. Confirmation that the patient is symptom-free
2. All radiology and/or nuclear medicine studies
3. GI consult (if applicable)
4. Documentation that bile duct stones are absent

TREATMENT: Patients who have undergone conventional cholecystectomy can normally return to flying duties within 3 months provided that an absence of bile duct stones is demonstrated. Return to flying after endoscopic cholecystectomy may be sooner provided the same criteria can be met. Those who have undergone ESWL may return to unrestricted flying after clearance of all the stone fragments. This may take up to 2 years, although restricted waiver can be recommended sooner. Chemical dissolution of the stones is not recommended for aviators.

DISCUSSION: Gallstones affect between 10 and 20% of the world's population. Cholesterol stones account for 70% of those found in the USA. The prevalence of asymptomatic cholelithiasis in USAF aircrew has been estimated as 2%; this is less than in the general population because of age and gender factors. An annual rate of 1-4% for developing severe medical symptoms requiring eventual cholecystectomy can be anticipated in this group. Overall, it may be appropriate to offer treatment to younger patients with asymptomatic gallstones who, because of their potential for a longer disease course, run a greater risk of developing complications than older patients. However, the total incidence of acute cholecystitis would not be affected by cholecystectomy being carried out on incidentally found, asymptomatic gallstones. While 60% of patients with cholesterol stones and a functioning gall bladder will have a successful chemical dissolution of their stones, the risk of recurrence in the first year after treatment is 10-30%. Chemical dissolution is not therefore recommended. The clearance rate in ESWL for those with 1 stone <20mm diameter at 2/4/8/18/24 months is reported as 45/69/78/95/100%; the corresponding figures for a single stone <30mm diameter are 18/29/51/81/100 and for 2-3 stones 13/17/29/40/67%. About 35% of all patients undergoing

ESWL have 1 or more episodes of biliary colic before the clearance of all stone fragments. About 10-15% of patients with gallstones will also have stones in the common bile duct.

ICD-9 CODES:
574.2 Gallstones
574.0 Gallstones with acute cholecystitis
574.2 Gallstones without cholecystitis
575.0 Acute Cholecystitis
575.11 Chronic Cholecystitis
P51.22 Cholecystectomy

7.5 GASTRITIS/DUODENITIS

AEROMEDICAL CONCERNS: Chronic gastritis may occur in conjunction with other conditions which themselves may be disqualifying for flying duties. The condition can be asymptomatic, or associated with severe pain. Exsanguinating hemorrhage can be a consequence in both symptomatic and asymptomatic patients. Protracted or severe retching may cause Mallory-Weiss tears that can cause severe pain or hemorrhage.

WAIVER: If symptoms are mild and controlled with antacids, waiver recommendation is possible. If the condition is completely healed and the inciting factors have been eliminated, no waiver is required.

INFORMATION REQUIRED:

1. Internal medicine consultation (to exclude pernicious anemia, thyrotoxicosis, diabetes, and iron deficiency anemia)
2. Endoscopy (to exclude ulceration, hiatal hernia, and malignancy)

TREATMENT: Antacids, Carafate, or sucralfate and life style changes such as reduction in smoking and alcohol intake are compatible with flying duties. In many cases, non-steroidal anti-inflammatory agents are associated with subclinical gastritis.

DISCUSSION: Up to 25% of clinically significant upper gastrointestinal bleeding is caused by acute gastritis/duodenitis. Less than 5% require surgery to control the hemorrhage. The test for the presence of parietal cell canaliculi antibodies is positive in 93% of cases of pernicious anemia in patients under 60 years old. Chronic atrophic gastritis increases the risk of pernicious anemia 3-fold in the normal population and the risk of adenocarcinoma of the stomach 20-fold.

ICD-9 CODES:
535.50 Gastritis/Duodenitis
535.3 Acute Gastritis
535.6 Acute Duodenitis

7.6 GILBERT'S SYNDROME

AEROMEDICAL CONCERNS: Symptoms may include abdominal pain, weakness, and malaise, but many cases are asymptomatic.

WAIVER: Waiver is not required for Gilbert's disease provided the patient is asymptomatic.

INFORMATION REQUIRED:

1. Internal medicine consultation (to confirm the diagnosis)

Liver biopsy is not indicated unless there is doubt about the diagnosis.

TREATMENT: N/A.

DISCUSSION: The incidence of Gilbert's syndrome is 1-7% of the population. Up to 50% of cases have a slightly reduced red cell survival time compared to normal. The condition is totally benign and there is no known association with more serious conditions. The condition may result in slower liver detoxification of some therapeutic agents, such as acetaminophen.

ICD-9 CODE:
277.4 Gilbert's Syndrome

7.7 HEPATITIS

AEROMEDICAL CONCERNS: The symptoms of acute and chronic hepatitis relevant to aviation are mainly fatigue, malaise, and nausea; other symptoms may occur which could be distracting in flight. Cases may progress to cirrhosis, which has its own aeromedical significance. Care should be taken to identify whether or not alcohol has contributed to the disease. Public health concerns of hepatitis A transmission should be paramount in the flight surgeon's thought process.

WAIVER: Hepatitis A and Hepatitis E are both enterically transmitted and self-limited. Serologic evidence of prior hepatitis A infection (anti-HAV IgG) is NCD. Acute hepatitis A (positive anti-HAV IgM, symptomatic, elevated liver enzymes - AST, ALT) is grounding. When hepatitis A has resolved (positive anti-HAV IgG, asymptomatic, normal liver enzymes), the member can be cleared to fly. Acute hepatitis E (positive anti-HEV, symptomatic, elevated liver enzymes- AST, ALT) is grounding. When hepatitis E has resolved (asymptomatic, normal liver enzymes), the member can be cleared to fly.

Hepatitis B, Hepatitis C, and Hepatitis D are transmitted parenterally, sexually, and perinatally. They can result in chronic infections and progress to cirrhosis or hepatocellular carcinoma.

Acute hepatitis B (anti-HBcore IgM and/or HBsAg) infection is grounding. Resolved acute hepatitis B (positive anti-HbsAg, normal liver enzymes, asymptomatic) is NCD, and member can be returned to flying without requiring a waiver. Chronic hepatitis B infection with persistent HBsAg and anti-HBcore IgG (asymptomatic carrier state, chronic persistent hepatitis, or chronic active hepatitis) is disqualifying. Waivers are not considered for applicants. Waivers can be recommended for designated members with chronic hepatitis B provided liver enzymes are less than 100 or 2.5 times upper limits of normal, liver biopsy shows only mild inflammation and no evidence of fibrosis, and member is asymptomatic. NAMI evaluation for these individuals is strongly encouraged. Waiver recommendation will be tempered by the possibility of infecting others in uncontrolled situations. Any chronic hepatitis B infection that produces symptomatic relapses (abdominal pain, jaundice) is disqualifying, and members should be referred to PEB for disposition.

Hepatitis D appears only in the presence of HBsAg in acute or chronic hepatitis B. Acute co-infection with hepatitis B and hepatitis D (anti-HDV) is grounding. Resolved acute co-infection (positive anti-HbsAg, normal liver enzymes, asymptomatic) is NCD, and member can be returned to flying without requiring a waiver. Chronic co-infection or superinfection with hepatitis B and hepatitis D is disqualifying with no waiver recommended because of the more frequent and severe symptomatology and greater risk of progression.

Chronic Hepatitis C infection (anti-HCV by EIA and Western blot) is disqualifying. Waivers are not considered for applicants. Waivers can be recommended for designated members with chronic hepatitis C provided liver enzymes are less than 100 mIU or 2.5 times upper limits of normal, liver biopsy shows only mild inflammation and no evidence of fibrosis, qualitative HCV

PCR is negative, and member is asymptomatic. Cases should be referred to NAMI for evaluation.

INFORMATION REQUIRED:

1. Internal medicine or GI consultation
2. Liver function tests
3. Full hepatitis serology
4. Liver biopsy (if chronic hepatitis B or C is present)
5. Ultrasound of right upper quadrant to rule out hepatocellular carcinoma

Waiver continuations for chronic hepatitis B infections require annual submission including:

1. Liver enzymes (ALT, AST)
2. Serum alpha-fetoprotein
3. HbsAg, and anti-HBsAg
4. GI consultation

Waiver continuations for chronic hepatitis C infections require annual submission including:

1. Liver enzymes (ALT, AST)
2. Serum alpha-fetoprotein
3. HCV PCR
4. GI consultation

TREATMENT: Drug therapy is not compatible with continuation on flying duties. However, waivers may be considered if treatment of hepatitis B with interferon-alfa and lamivudine leads to improvement of HBV infection, resolution of HbsAg and/or HBeAg, appearance of anti-HbsAg and/or anti-HbeAg, reduction in liver enzymes, and providing the member remains asymptomatic. Also, waivers may be considered if treatment of hepatitis C with interferon-alfa and ribavirin leads to improvement of HCV infection, negative HCV RNA by PCR, reduction in liver enzymes, and providing the member remains asymptomatic.

DISCUSSION: The majority of those with chronic persistent hepatitis following acute hepatitis do not progress to cirrhosis. In autoimmune chronic active hepatitis, 70% have established cirrhosis at the time of the first biopsy; 75% of the cases are female with the peak incidence at 10-25 and 50-65 years. Up to 50% will have evidence of other autoimmune disorders such as arthritis or thyroiditis. In those who are untreated, there is a 10-year survival rate of 27%; the mortality is highest in the first 2 years, with most patients then progressing to inactive macronodular cirrhosis. Treatment with steroids with or without azathioprine increases the 10 year survival to 63%. Treatment is often withdrawn at 2 years, but there is a 60-70% relapse rate in the following year. For those patients whose hepatitis is a result of infection with hepatitis B virus as an adult, 10% progress to chronic disease; cases arising in childhood progress to chronicity more frequently. Spontaneous recovery after 1 year is rare. Chronic hepatitis B

predisposes to the development of hepatoma, and annual ultrasound evaluation with alpha-fetoprotein levels is necessary for follow up. Hepatitis C infection is recognized with greater frequency since the advent of an appropriate antibody assay. Transmission is parenteral, like hepatitis B. An enteral form of non-A/non-b hepatitis distinct from HCV is also seen. Chronic hepatitis C is not uncommon. Treatment with interferon alfa has not lived up to its earliest billing. Most patients will experience a transient normalization of their liver enzymes, but these values return to abnormal when the treatment is stopped. **Interferon treatment is disqualifying for the duration of the therapy.**

Between 20-50% of cases of hepatitis C progress to chronic disease. Approximately 40% of all patients with acute alcoholic hepatitis will have developed cirrhosis by 5 years; abstinence in the interim does not guarantee protection from developing the condition. Perplexing cases of hepatitis that do not fit typical clinical scenarios may in fact represent occult alcoholic hepatitis.

ICD-9 CODES:
070 Hepatitis
070.1 Hepatitis A
070.3 Hepatitis B
070.35 Chronic Hepatitis B
070.5 Other Viral Hepatitis (including NANB, C)
571.1 Acute Alcoholic Hepatitis
571.4 Chronic Hepatitis

7.8 IRRITABLE BOWEL SYNDROME

AEROMEDICAL CONCERNS: The urgency and frequency of defecation, together with the discomfort felt by many patients, can be distracting in flight and can be inconvenient when living in field conditions. There is a tendency for the syndrome to be associated with depression and anxiety.

WAIVER: In the absence of pathology and psychological factors that would otherwise be disqualifying, the condition may be NCD. Dietary manipulation is the only therapeutic intervention permitted, and the individual must be asymptomatic on diet alone. If other factors are present, waiver can be recommended for the condition provided the symptoms could be controlled.

INFORMATION REQUIRED:

1. Internal medicine or gastroenterology consultation (to exclude bowel pathology)
2. Psychiatry evaluation (when indicated)

TREATMENT: Advice and dietary management are compatible with flying status. Caffeine restriction may be particularly useful.

DISCUSSION: Over 50% of patients are under 35 years old, with the female to male ratio being reported as 2:1. The criteria for making the diagnosis can be met by 6-15% of normal young people.

ICD-9 CODE:
564.1 Irritable Bowel Syndrome

7.9 PEPTIC ULCER DISEASE

AEROMEDICAL CONCERNS: The major concern is the risk of acute hemorrhage or perforation in flight. Chronic blood loss can cause iron deficiency anemia, which can then lead to cardiorespiratory compromise in flight.

WAIVER: Waivers may be recommended for single, uncomplicated ulcers once healed for 4-6 weeks. Waivers for recurrent ulcers are considered on a case-by-case basis. Healing should be documented by endoscopy. Waiver recommendations are readily made, but are particularly appropriate when the condition was in response to a known precipitant such as aspirin or other nonsteroidal anti-inflammatory drug. Maintenance medication, limited to H2 blockers or Carafate QHS, is waiverable.

INFORMATION REQUIRED:

1. Gastroenterology or internal medicine consult
2. Endoscopy report
3. Pathology report (if applicable)

TREATMENT: Treatment with full antiulcer doses of H2 receptor blockers requires grounding because of the risk of mild sedation and drowsiness. Maintenance therapy is CD, waiver possible for QHS doses only. Successful surgical treatment may lead to unrestricted waiver, provided there is no evidence of post-surgical complications.

DISCUSSION: In one study, gastric ulcers and ulcers of the small bowel were found in 21.7% and 8.4% respectively of users of nonsteroidal anti-inflammatory drugs. Between 3 and 5% of gastric ulcers are a result of malignancy. The death rate from acute hemorrhage from duodenal ulcer is 6-10% and is up to 22% in all cases of acute upper gastrointestinal hemorrhage. Mortality is closely tied to age, with increasing mortality with increasing age. The age at which patients present with acute hemorrhage is increasing, and in Europe more than half are over 60 years of age. Bleeding stops spontaneously in 85% of those cases presenting with acute gastrointestinal hemorrhage. Of those who perforate, 10% will do so with no previous history or symptoms. Simple closure of the perforation is associated with a 37% recurrence within 3 years, although rates as disparate as 14 and 70% have been reported. The use of H2 receptor blockers such as cimetidine or ranitidine is associated with response rates of 80-90% within 2-3 months, although healing can be delayed in smokers. Subsequent relapse rates while on maintenance therapy are also higher in smokers than nonsmokers. Without maintenance medication, the relapse rate has been reported to be 50-100% at one year, with 30% of the relapses being asymptomatic. The risk of hemorrhage has been reported as 2.5-2.7% per year in patients not on maintenance medication. The rate increased to 5%/year if there was a history of previous ulcer complications. The annual risk of perforation in similar patients ranges from 0.8-2% in males. There is no evidence that painless ulcers are less likely to bleed or perforate, although one bleed is predictive of others. With surgery, 5-15% of duodenal ulcers will recur after highly selective

vagotomy and 3% will relapse after partial gastrectomy. Recurrence rates are less if the patient abstains from tobacco products and alcohol.

The role of *Helicobacter pylori* in the pathogenesis of peptic ulcer disease is becoming clearer. The bacterium is strongly associated with gastritis, ulcer disease, and recently has been linked to the development of gastric carcinoma. Eradication of the organism is difficult and time consuming, and reinfection is the rule

ICD-9 CODES:
531.9 Gastric Ulcer
532.9 Duodenal Ulcer

7.10 Gastroesophageal Reflux Disease (GERD) & Hiatal Hernia

AEROMEDICAL CONCERNS: Retrosternal pain associated with either condition can be distracting in flight. Exposure to -Gz may exacerbate the symptoms of both esophagitis and hiatus hernia.

WAIVER:

Applicants:

1. Symptomatic GERD currently requiring medication is CD.
2. Waiver may be requested if symptoms controlled on stable dose of medication.
3. Mild symptoms in the past that were controlled with H-2 blockers or proton pump inhibitors (PPI's) but are currently asymptomatic with lifestyle changes alone or only intermittent over the counter (OTC) antacids may be recommended for a waiver. Waiver packages will be considered on an individual basis with proper documentation of prior treatment.
4. If any of the below **'five warning symptoms of complicated disease'** are present, a waiver is not recommended.
5. Asymptomatic hiatal hernia that does not require therapy is NCD.
6. Symptomatic hiatal hernia is CD, waiver not recommended.

Designated:

1. Individuals with mild GERD (**none of the below criteria of complicated disease listed below**) whose symptoms are controlled with lifestyle modifications or intermittent antacids are PQ.
2. GERD controlled with H-2 Blockers or PPI's is CD and requires a waiver.
3. Individuals who have any of the five warning symptoms of GERD should be grounded and worked up as indicated below.
4. Asymptomatic hiatal hernia that does not require therapy is NCD.
5. Symptomatic hiatal hernia is CD, waiver may be considered after successful surgical repair.

INFORMATION REQUIRED:

1. Documentation regarding the presence or absence of the following five warning symptoms:

<u>Warning Symptoms of Complicated GERD</u>

1. Dysphagia or odynophagia
2. Symptoms which are persistent or progressive on therapy
3. Bleeding or iron deficiency
4. Unexplained weight loss
5. Extra-esophageal symptoms (cough, choking, chest pain, asthma, etc.)

Work-up/treatment: (Designated)

1. Evaluation and treatment per the attached algorithm.
2. Individuals should be grounded and not recommended for a waiver until asymptomatic.
3. Individuals with uncomplicated GERD (typical heartburn) or who have mild intermittent dyspepsia may be given a trial of therapy without endoscopic evaluation
4. Surgical repair of hiatal hernia is CD, waiver considered once asymptomatic, 30 days post-op and cleared to full duty by operating surgeon
5. If any of the five warning symptoms mentioned above are present then waiver package must include:
    a. Endoscopy results
    b. Gastroenterology consult
    c. Documentation of symptom relief on therapy

Follow-up endoscopy is generally unnecessary and is restricted to the patient whose symptoms fail to respond to therapy.

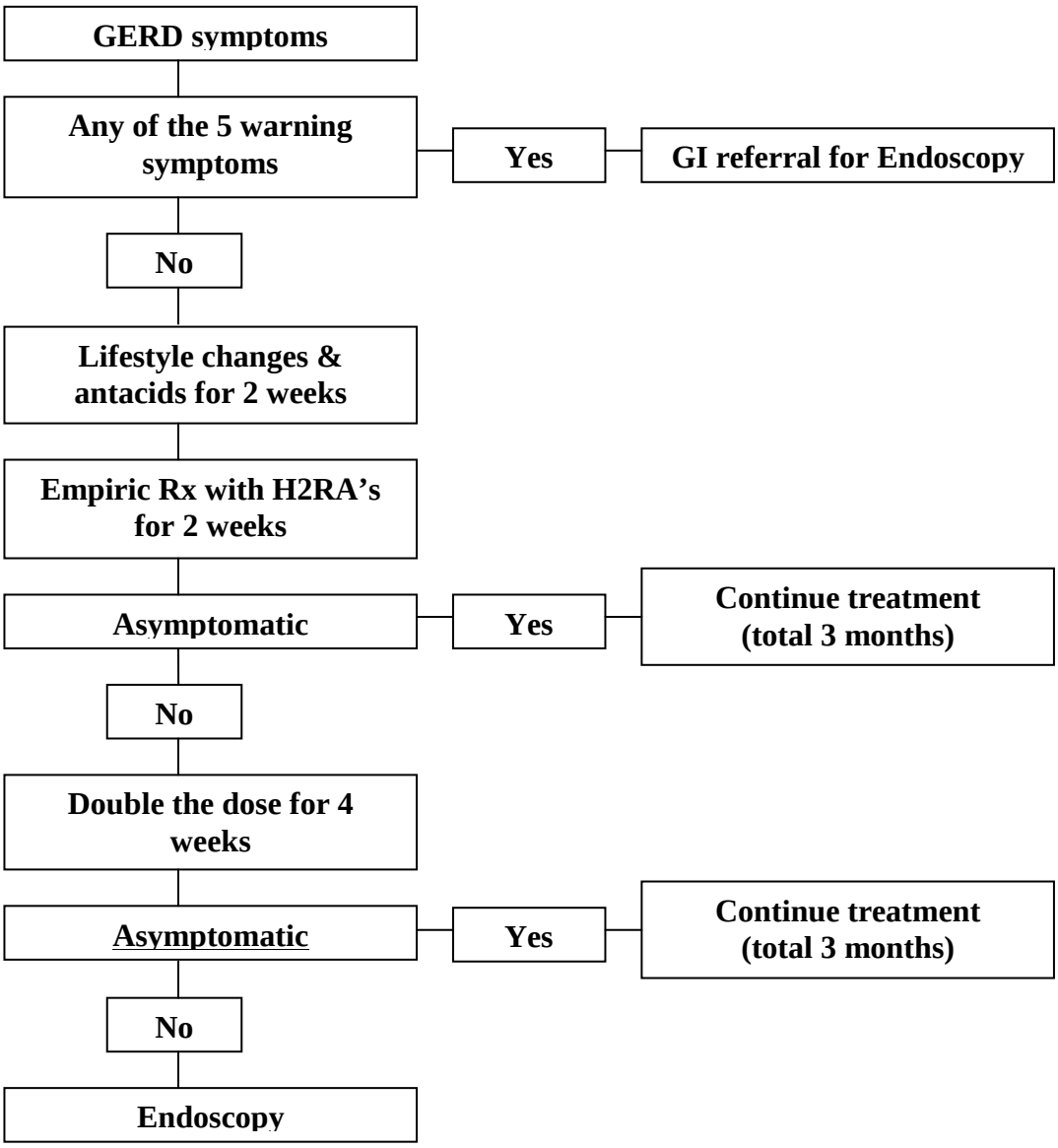
H-2 blockers and PPI's are CD; waiver may be recommended if patient remains asymptomatic on medication.

DISCUSSION: About 18% of the adult U.S. population has heartburn at least once a week and 6% have weekly episodes of acid regurgitation. Heartburn, the primary symptom of GERD, is classically defined as retrosternal burning discomfort which commonly radiates to the pharynx is accentuated by reclining and relieved by food or antacids. As mentioned previously, patients with symptoms of uncomplicated GERD may undergo an initial trial of empirical therapy without endoscopic evaluation. Patients in whom empirical therapy is unsuccessful or who have symptoms suggesting complicated disease should have further diagnostic testing.

Complications of GERD: Barrett's esophagitis and esophageal stricture are CD. Waiver may be recommended on a case by case basis after EGD evidence of improvement, favorable GI consult, and the aviator being asymptomatic.

Lifestyle modification and antacids provide relief in 20% of patients. Patients requiring medication need to receive adequate doses of H-2 blockers prior to proceeding to PPI therapy. Recurrent or persistent symptoms while on regular H-2 blockers should have trial of double dose H-2 blocker therapy. PPI's should be reserved for patients who fail to respond to maximum doses of H-2 blockers and those with endoscopically proven erosive esophagitis.

Proposed changes Gastroesophageal Reflux Disease (GERD)
Adopted from Pharmacoeconomic Center Update (May 8 1998:Vol 98 Issue 4



ICD-9 CODES:
530.81 Esophageal reflux
530.11 Reflux esophagitis
530.3 Esophageal stricture
530.7 Mallory-Weiss Tear
553.3 Hiatal Hernia

7.11 ULCERATIVE COLITIS

AEROMEDICAL CONCERNS: There is a small risk of in-flight incapacitation. Discomfort and fatigue persist between episodes, which can detract from operational performance and availability. Patients may have diarrhea and considerable urgency of defecation. Iritis is a complication in up to 3% of patients.

WAIVER: Applicants with UC are CD, no waiver. Restricted waivers are possible for designated aircrew, but are reserved for mild cases in remission for at least one month. The only waiverable maintenance medications are sulfasalazine (max 2 grams/d), Asacol (up to 2.4 grams daily), and/or steroid enemas. If the disease is treated by partial colectomy, a waiver recommendation can be made one year after surgery, provided the patient is asymptomatic.

INFORMATION REQUIRED:

1. Internal medicine or gastroenterology consultation
2. Recent sigmoidoscopy
3. Documentation of the extent of the disease process

FOLLOW-UP: Annual submission with gastroenterology consultation including flexible sigmoidoscopy report. The appropriate specialist must evaluate joint or ophthalmologic symptoms.

TREATMENT: Sulfasalazine in doses up to 2 g/day, or Asacol up to 2.4 grams daily as maintenance therapy. Higher doses may be required for treatment, but are not recommended for waivers. All other pharmacologic therapy, except for dietary adjuncts such as folic acid, is CD. Patients can be considered for waiver after partial colectomy, but a colostomy or ileostomy is CD, no waiver. **All patients requiring surgery for control of the disease must have a PEB finding them fit for full duty before waiver recommendation will be considered.**

DISCUSSION: Following the initial attack, less than 10% remain in remission for 10 years without treatment. 90% of patients younger than 40 years old relapse within 5 years. Even on maintenance treatment of sulfasalazine and Asacol, there is an annual relapse rate of between 13% and 20%. Side effects of sulfasalazine therapy include headaches and nausea (which can be prevented by using an enteric coated formulation), oligospermia, skin rashes, agranulocytosis, and interference with folate absorption. About 15% of patients cannot tolerate the drug. In patients who present with moderately severe symptoms, the 5 year mortality is up to 20%; those who present with severe symptoms run a 10% chance of dying during the first episode and an up to 40% chance of dying in the first 5 years. Of those presenting with disease of any severity, up to 25% will have required total proctocolectomy within 5 years. After 5 years, the risk of requiring surgery for the colitis is fairly constant at about 8%.

ICD-9 CODES:
556.9 Ulcerative Colitis
556.1 UC controlled with Azulfidine

7.12 EOSINOPHILIC ESOPHAGITIS

DEFINITION: To date no absolute diagnostic criteria exist for Eosinophilic Esophagitis (EE) also called allergic esophagitis and small caliber esophagus. The condition is found primarily in children and young men with dysphagia or food impaction. Endoscopic findings include mucosal rings and or furrows, eosinophilic mucosal plaques, and smooth strictures. See article *Eosinophilic Esophagitis in adults: an emerging problem with unique esophageal features* Gastrointestinal Endoscopy vol . 59, no.3, 2004 for more complete description.

AEROMEDICAL CONCERNS: Symptoms relevant to aviation include dysphagia, food impaction, nausea, vomiting, chest and or abdominal pain. The symptoms are of concern primarily due to the potential impact while operating the aircraft or their effects on mission completion.

WAIVER: Waiver will be considered only in asymptomatic, stable cases.

Applicants: Considered Disqualifying / Waiver considered on case by case basis.

Designated: Considered Disqualifying / Waiver recommended if asymptomatic while on or off medications.

FOLLOW-UP: Annual submission with consult from FP, IM or GI unless otherwise specified by code 42.

INFORMATION REQUIRED FOR INITIAL WAIVER:

1. Endoscopy with esophageal biopsy along length of esophagus to confirm presence of Eosinophils. Biopsy of antrum and duodenum should also be obtained to exclude eosinophilc gastritis.
2. Allergy consultation to determine if food allergy is present.
3. IM or GI consultation with treatment recommendations.
4. Waiver considered 3 months after initiation of treatment provided the patient is asymptomatic during that time.

TREATMENT: Options for treatment vary and will be waived separately. Options for treatment include: acid suppression with Proton Pump Inhibitors (PPI), esophageal dilation, elimination diets, topical steroids, non-sedating approved antihistamines and cromolyn. Repeat treatment is often needed due to a high relapse rate (50%). Should significant symptoms recur after initial waiver, the member should be grounded locally until a response to therapy is clearly demonstrated. The waiver will terminate if multiple relapses are noted within one year as this is unexpected.

ICD-9 CODES:
530.19 Other Esophagitis

8.0 HEMATOLOGY

8.1 ANEMIA

AEROMEDICAL CONCERNS: Anemia reduces tissue oxygenation and can be associated with widespread organ dysfunction, particularly when the hemoglobin concentration falls below 10 g/dl or the hematocrit is less than 30%. Work capacity and the compensation to conditions of hypoxia are also reduced. In acute blood loss, cardiovascular decompensation can occur from volume loss, leading to loss of +Gz tolerance and syncope.

WAIVER: The standards for aviation are derived from healthy aviators, not from hospital patients. Hence, our "abnormal" values are generally still within most hospital norms. Acceptable values for hematocrit are 40-52% in males and 37-47% in females. If the average of three hematocrits (*from three separate blood draws, not from the same sample analyzed three times*) falls below the normal range but between 38.0% and 39.9% for males (35.0% - 36.9% for females), the following work-up should be completed:

1. Thorough history (with emphasis on any personal or family history of anemia, ethnicity, blood loss, diet, menstruation, medications, and ETOH)
2. Focused physical (ensure no hepatosplenomegaly or lymphadenopathy)
3. CBC with RBC count, RBC indices, manual differential, RBC morphology, and reticulocyte count
4. Iron studies (serum iron, serum ferritin, and TIBC)
5. Chem 7
6. Liver function tests
7. TSH

If history, physical exam, and all labs are within normal limits as defined below (for labs not listed, use laboratory reference ranges), the member is PQ and no waiver is required. The accepted ranges are:

Acceptable Lab Values:

- RBC count - Male: 4.0-7.0, Female: 3.8-5.3
- Differential – Segs 40-80, Bands 0-10, Lymphs 20-50, Eos 0-10, Basos 0-3, Monos 0-10
- RBC indices - MCV 80-100 fl, MCH 26-36 pg, MCHC 31-38%, Retic count 0.5%-2.0%, RDW 11.0%–16.0%
- Iron studies - Ferritin 20-300 ng/ml, Iron 40-180 ug/dl, TIBC 240-460 ug/dl

If any abnormality exists, or if the average of three hematocrits falls below 38% or above 52% for males (below 35% or above 47% for females), the member is NPQ and a hematology or internal medicine consultation is required. Additional anemia work-up at that time may include hemoglobin electrophoresis, fecal occult blood tests, endoscopy, serum vitamin B12 level, serum or RBC folate level, and/or bone marrow biopsy depending upon the initial findings. This work-up may be initiated by the flight surgeon, depending upon his or her comfort level, so that

laboratory data will be available for the consulting physician. If unsure whether or not a test is indicated, do not order it. Waivers will be considered on a case-by-case basis in light of the underlying diagnosis.

NOTE: Blood donation of 450 cc (1 pint) requires grounding for at least 4 days. Flight personnel in combat or flying in a shipboard environment shall not donate blood within 4 weeks prior to such flying (per General NATOPS).

INFORMATION REQUIRED:

1. Full clinical history
2. Physical examination
3. Laboratory evaluation as outlined above
4. Hematology and/or Internal Medicine consult

TREATMENT: Oral iron supplements are compatible with flying status, but require a waiver if needed to maintain a hematocrit within standards. Any cause that precipitated the iron deficiency must be rectified before a waiver recommendation would be considered.

DISCUSSION: The World Health Organization recommends that anemia should be considered to exist when hemoglobin levels fall below 13 g/dl in males and 12 g/dl in females. Chronic blood loss from the bowel or uterus of 15-20 ml/day will produce a state of negative iron balance in the body, which will eventually lead to anemia. A full hematological response to iron therapy is indicated by a rise in hemoglobin level of 1 g/dl/week.

ICD-9 CODES:
280.1 Iron Deficiency Anemia
285.9 Anemia, unspecified

8.2 HEMOCHROMATOSIS

AEROMEDICAL CONCERNS: Symptomatic cases typically present with the classic triad of diabetes mellitus, hepatomegaly, and skin hyperpigmentation. Cardiac complications manifest primarily as congestive heart failure in young patients that can rapidly progress to death if untreated. CNS complications have been reported but, other than lethargy, are rare.

WAIVER: Waiver recommendations for hemochromatosis are not routinely made.

INFORMATION REQUIRED:

1. Internal medicine or hematology consult
2. Histocompatibility locus antigen (HLA) typing
3. Serum iron
4. Serum ferritin
5. Total iron body content
6. Transferritin saturation
7. Liver biopsy (if indicated)
8. Family studies (if indicated)
9. Cardiology consult
    a. Holter monitor
    b. Echocardiogram

TREATMENT: Frequent phlebotomy and/or treatment with chelating agents such as desferrioxamine are not compatible with waiver.

DISCUSSION: Phenotypic expression of the idiopathic hemochromatosis gene usually occurs between the ages of 20 and 40, with symptoms mainly occurring after the age of 50. Patients have the condition for an average of 3-5 years before the diagnosis is made. Hepatic fibrosis is unusual in patients younger than 35, but it will occur sooner and progress more rapidly to cirrhosis in heavy drinkers. Hypogonadism will occur in 25% of male patients and primary hypoaldosteronism in 10%. Cardiac failure and arrhythmias are common presenting features in younger patients. Up to 50% of patients over 40 years old have ECG irregularities and 43% of autopsied hearts from hemochromatosis patients show iron deposits in the AV node and conduction system.

Arthropathy is present in 30-50% (commonly in the proximal interphalangeal and metacarpophalangeal joints although 10% of patients have destructive arthropathy of the hip and knee joints). Phlebotomy 2-3 times a week until hemoglobin <10 g/dl, serum iron is less than normal, or ferritin is in the low normal range, followed by maintenance phlebotomy every 2-4 months, will reduce the incidence of complications other than arthropathy and the eventual appearance of hepatoma. However, this treatment is not compatible with waiver. The death rate at 5 and 10 years with phlebotomy is 66 and 32%, compared to 18 and 6% without treatment.

ICD-9 CODE:
275.0 Hemochromatosis

8.3 SICKLE CELL DISEASE/TRAIT

AEROMEDICAL CONCERNS: Patients with sickle cell disease have a severe risk of splenic infarct and other vaso-occlusive episodes involving the viscera, lungs, kidneys, or nervous system when exposed to hypoxia, infection, dehydration, or cold temperatures.

WAIVER: By direction from the SECNAV, sickle cell trait (SCT) is not disqualifying for any aviation, undersea or general duty program. Sickle Cell Disease and a history of sickling on exposure to altitude in flight or in a decompression chamber are disqualifying. A completed long form physical (SF-88) should be submitted to NOMI whenever an adverse physiologic event is recognized.

INFORMATION REQUIRED:

1. Hemoglobin electrophoresis documenting the percentage of hemoglobin S
   a. Hemoglobin S greater than hemoglobin A is disqualifying for general duty
2. Information on coexistent hemoglobinopathies.

TREATMENT: Patients requiring treatment for the condition are disqualified from flying.

DISCUSSION: The condition occurs often in African American populations, and sporadically in those of Mediterranean, Middle Eastern, or Indian descent. Between 7 and 9% of African Americans have sickle cell trait (SCT). Cases of sickling have been reported at altitudes as low as 2,500 feet, although patients with SCT are unlikely to sickle below 21,000 feet. Exercise and dehydration predispose to sickling. In addition to the classic sickle cell crisis, transient episodes of bone marrow aplasia can occur in response to infection and sequestration of erythrocytes in the liver and spleen that can also be life threatening. Patients with SCT should be counseled about the dangers of recreational diving and risks of anesthetics.

ICD-9 CODES:
282 Sickle Cell
282.5 Sickle Cell Trait
282.6 Sickle Cell Disease

8.4 SPLENECTOMY

AEROMEDICAL CONCERNS: There is risk of serious, overwhelming infection in patients with co-morbid diseases who have had a splenectomy. Examples include ITP and lymphoproliferative diseases (leukemia, etc.). In such cases, the time between onset of symptoms and death can be rapid (i.e. just a few hours). In cases where splenectomy is performed due to traumatic rupture, these serious complications occur much less frequently.

WAIVER: Waivers are considered on a case-by-case basis after splenectomy, provided there is full recovery from the condition necessitating the operation. This includes splenectomy following traumatic splenic rupture and diagnostic splenectomy for Hodgkin's disease (see section 9.7 – Hodgkin's disease for further waiver requirements).

INFORMATION REQUIRED:

Initial Waiver:

1. Detailed history of the circumstances that led to splenectomy
2. Focused physical exam
3. CBC
4. Confirmation of the absence of malaria, infectious mononucleosis, and leukemia (in cases of spontaneous rupture of the spleen)
5. Fit for Full Duty determination from surgeon

Follow-up:

1. CBC (when co-morbid conditions exist)

Note: In cases where traumatic rupture necessitated splenectomy, no specific follow-up is required, provided there is no resulting compromise of the immune system.

TREATMENT: Prophylactic antibiotics may be acceptable in certain circumstances. Immunizations against pneumococcus, meningitis, and Hemophilus B are compatible with flying status, and should be administered before elective splenectomy if at all possible.

DISCUSSION: Following therapeutic splenectomy, the course is that of the disease requiring the splenectomy. The overall mortality rate is around 3%, of which infections account for 11% of the deaths. Mortality for isolated injury to the spleen is <1%. Late sepsis after splenectomy for Hodgkin's disease occurs in 11.5% of patients, with a 5% mortality rate. This is related to the chemotherapy rather than the splenectomy. In adults who have had a splenectomy, the mortality from pneumococcal pneumonia is 17% despite administration of antibiotics. If the patient is older than 50, the mortality rate is 28%.

ICD-9 CODES:
P41 Splenectomy

P41.5 Splenectomy (complete)
P41.43 Splenectomy (partial)

8.5 THALASSEMIAS

AEROMEDICAL CONCERNS: Thalassemias produce a low-grade anemia that can cause problems at altitude. Splenic enlargement and worsening of the anemia can occur under conditions of stress.

WAIVER: Aviation personnel must meet the hematocrit standards previously listed in the Anemia section (section 8.1). Personnel with beta thalassemia minor (heterozygous carriers – beta thalassemia trait) or with alpha thalassemia minor (1 or 2 gene loci absent) may be considered for waiver provided there are no other hemoglobinopathies present. Any anemia must be limited to a mild, microcytic anemia. Patients who have required splenectomy because of their thalassemia are permanently disqualified from military flying.

INFORMATION REQUIRED:

1. Establishment of the detailed diagnosis
   a. Estimation of HbA2, HbF, serum Fe and ferritin and by quantitative electrophoresis
2. Focused physical exam
3. Internal medicine or hematology consult (if obtained)

NOTE: The diagnosis of thalassemia cannot reliably be made in the face of iron deficiency, hence iron studies must be provided that document normal iron status with submission of the waiver request.

TREATMENT: N/A.

DISCUSSION: The thalassemias probably constitute the world's largest genetic disorder. Beta thalassemia occurs widely in a belt extending from Southeast Asia, through India, the Middle East, the Mediterranean (as far north as Romania and Yugoslavia), and to north and west Africa. Carrier frequencies can vary from 2 to 30% in these populations. Beta thalassemia also occurs sporadically in all racial groups. Splenectomy results in a greater risk of overwhelming infection and of severe malaria, which can affect an aviator's fitness to deploy. The flight surgeon will often make the diagnosis of thalassemia after chart review turns up a chronic, low grade microcytic anemia that does not respond to iron therapy. Patients with homozygous beta thalassemia or deletions in more than two of the alfa chains are almost always severely symptomatic or anemic, and as such rarely make it into the military.

ICD-9 CODE:
282 Thalassemias

9.0 MALIGNANCIES

9.1 GENERAL INFORMATION

Classification: Classification of tumors into categories facilitates decision making and aeromedical disposition. The minimal requirements for return to flight status are an accurate diagnosis, indication of tumor size, differentiation and local invasion, and confirmation of the presence or absence of lymph node or distant metastases.

The American Joint Commission on Cancer (AJCC) **TNM classification** of malignant disease allows a reasonably accurate standardization of the staging of the malignancy, which should allow greater consistency in the aeromedical disposition. In review, T refers to the size of the primary tumor with subscripts to quantify the size, N with subscripts 0 or 1 identifies absence or presence of spread to the lymph nodes and M with subscripts 0 or 1 identifies absence or presence of distant spread. Other classification systems and protocols for staging cancer exist and may be used.

To provide standardization in aeromedical disposition, it is recommended that the histological diagnosis be confirmed by the Armed Forces Institute of Pathology (AFIP). Note: we have seen at least two cases where aviators were treated inappropriately due to a misdiagnosis.

Effects of Treatment: Aeromedical disposition requires knowledge of the primary tumor, the clinical or surgical stage, and interventions that are currently being used, or have been previously used.

Assuming complete healing, surgery itself is not disqualifying for aviation provided major organ dysfunction does not exist. The condition for which the surgery was performed may, however, be disqualifying. Surgical procedures for the removal of cancer will require a variable period of grounding. The length of grounding will depend on the chance of cure, the likelihood that recurrence will cause a flight safety hazard or otherwise interfere with the military task, and on the site and extent of operation.

Radiation therapy is generally delivered to a localized area for a limited time. The immediate side effects of nausea, neutropenia, and other dose-related effects usually disappear a few weeks after completion of therapy. Until then, the patient should be disqualified from flying. Return to flying status will then depend on other factors. Follow-up is required because of the risk of developing another primary cancer. Any complications of radiation therapy (radiation proctitis, xerostomia) may be permanently disqualifying, without recommendation for waivers.

Chemotherapy is incompatible with flying until full recovery from side effects such as anemia, thrombocytopenia, granulocytopenia, nausea, and vomiting has occurred. The use of steroids or hormone therapy for the treatment of tumors is also disqualifying, although waivers can be recommended for their use as replacement therapy. Return to flying duties after completion of drug therapy will then depend on other factors. Follow-up may be required for long term side

effects of chemotherapy such as cardiac or pulmonary toxicity and the development of second malignancies.

Waiver Consideration: Waiver recommendation for applicants with a history of cancer is done on a **case-by-case basis**. Survivors of childhood leukemia or lymphoma are generally considered cured if their disease-free survival is for more years than their age at diagnosis. We occasionally receive requests on such individuals. Recommendation is based on the type of tumor and any residual effects of chemotherapy.

With the exception of basal cell carcinoma, all malignancies require medical board dictation. The board may find the member fit for full duty immediately, as would be expected after excisional biopsy of a low level malignant melanoma, or it may place the member in limited duty status for some period of time. **A member must be on full duty before waiver consideration for flight status or other special duty is appropriate.** Moreover, AFIP confirmation of the diagnosis is necessary. It is helpful to our reviewers if an objective assessment by the oncologist of the chances of cure, the risks, likely nature and ease of detection of recurrence, and recommendations for follow-up are included. Of particular interest is an estimate of the 5 year survival rate.

In general terms, it will be appropriate to recommend a return to restricted flying status provided there is a minimal risk of incapacitation as a result of recurrence of the malignancy. This decision will include an assessment of survival and recurrence rates, in conjunction with the tendency for recurrences to present catastrophically.

The necessity for continued follow-up will almost certainly interfere with operational requirements unless the follow-up is at greater than 6-month intervals, or the tests required for follow-up are very simple (e.g. CBC). In such cases, LIMDU is the only realistic option for these individuals, as the deployed environment may result in a recurrence being overlooked at a curable stage. Medical board dictation is the only way to achieve this restriction on deployability.

In most cases upgrading to full duty, and hence a waiver to full flight status, can be considered 2 years after completion of therapy provided there is no recurrence. Specific exceptions to this are addressed on the individual data sheets.

9.2 BLADDER CANCER

AEROMEDICAL CONCERNS: Urinary frequency and urgency may be distracting in flight. Pain can occur if obstruction is caused by clots. Metastasis to bone can give rise to pathological fractures.

WAIVER: A waiver request can be considered after initial therapy, provided the tumor is confined to the epithelium. Cystectomy or the requirement for repeated catheterization results in disqualification, with no waiver recommended.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board recommendations
3. AFIP confirmation of histology
4. Full long-form flight physical
5. CXR
6. Cystoscopy
7. Contrast studies of the entire urinary tract
8. CT scanning of the abdomen and pelvis.

FOLLOW-UP: Annual submission to include:

1. Annual oncology/nephrology and/or urology consult

TREATMENT: Ongoing therapy is not compatible with flying status.

DISCUSSION: The overall 5 year survival rate is 67%; transitional cell tumors have a 5 year survival rate of <50% and squamous cell tumors have a worse prognosis. However, carcinoma in situ or papillary noninvasive carcinomas are associated with a high probability of cure. Recurrence is primarily local and no sudden symptoms except hematuria occur. The disease is strongly associated with cigarette smoking.

ICD-9 CODES:
188.9 Bladder Cancer
223.3 Benign neoplasm of the bladder

9.3 BREAST CANCER

AEROMEDICAL CONCERNS: There is an unpredictable chance of developing brain metastases, which may cause seizures. Bone metastases may also occur.

WAIVER: Request for waiver may be submitted upon recovery from treatment for early stages of breast cancer. Patients with spread to lymph nodes or more distant sites will not normally be considered for waiver.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board recommendations
3. AFIP confirmation of the histology
4. Surgical/oncology consult

FOLLOW-UP: Annual submission to include:

1. MRI scan of the brain
2. Bone scan
3. CT scan of the liver
4. Mammography of the opposite breast are

TREATMENT: The patient is grounded during treatment.

DISCUSSION: At the time of detection, about half of breast cancers have metastasized to lymph nodes. Of those detected by screening, 42% are too small to detect by physical examination. Up to 80% of those detected by screening have negative axillary lymph nodes. Of patients with up to 3 affected nodes, 60% will relapse by 10 years. Even the earliest stage of breast carcinoma carries a relapse rate of 20% by 5 years. The average time to relapse is 3-4 years in patients with 1-3 involved nodes and 1-2 years if more nodes are involved. From the point of view of comfort when wearing restraint harnesses, it may be necessary to delay return to flying duties until after breast reconstruction has been carried out in cases where simple mastectomy rather than "lumpectomy" has been performed. The site of metastasis is bone in 27% of cases, local in 26% and pulmonary in 21%.

ICD-9 CODES:
217.0 Benign neoplasm of male and female breast
74.9 1Malignant neoplasm of breast, female
175.9 Malignant neoplasm of breast, male

9.4 CERVICAL CANCER

AEROMEDICAL CONCERNS: Later manifestations of the disease include anemia, weakness, and weight loss. Distracting pain may be caused by invasion of the pelvic nerves.

WAIVER: Waiver is not required for carcinoma in situ or for those cases treated as outpatients by laser or cauterization; however, a 4 week grounding period is mandatory following these surgical treatments. For other patients without evidence of spread, waiver can be considered 6 weeks after operation. Aircrew with evidence of metastasis are grounded but may be considered for waiver 2 years after completion of therapy as long as there is no evidence of recurrence.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board recommendations
3. AFIP confirmation of the histology
4. Gynecology/oncology consult

FOLLOW-UP: Annual submission to include:

1. Current gynecology/oncology consult

TREATMENT: Continuation of therapy is incompatible with flying status.

DISCUSSION: For carcinoma in situ, there is an almost 100% survival rate with therapy. The 5 year survival rate for patients with localized but invasive carcinoma of the cervix is about 82% while for all groups as a whole it is 59%.

ICD-9 CODES:
180.9 Malignant neoplasm of the cervix
219.0 Benign neoplasm of the cervix

9.5 COLORECTAL CARCINOMA

AEROMEDICAL CONCERNS: Carcinoma of the colon presents as an emergency (obstruction, perforation) in up to 30% of cases. Rectal carcinoma rarely presents as an emergency. Both can cause anemia to a degree that can cause problems in flight if undetected.

WAIVER: Waiver can be considered after successful resection of the tumor and completion of any adjuvant chemotherapy. It is suggested to wait 2 years before requesting initial waiver recommendation.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board
3. AFIP confirmation of the diagnosis
4. Liver scan
5. Liver enzyme tests
6. Colonoscopy
7. Serum carcinoembryonic antigen measurements

FOLLOW-UP: Annual submission to include:

1. GI/oncology follow-up every six months
2. Colonoscopy report

TREATMENT: Surgery, with or without additional radiotherapy or chemotherapy. Continuing treatment is incompatible with waiver. Colostomy is not compatible with military aviation. (Remember the balloon in the low pressure chamber?)

DISCUSSION: Colorectal cancer accounts for more than 12% of all carcinomas and is the most common malignancy in the USA after skin cancer. On average, 30% arise in the rectum, 30% in the sigmoid colon and 30% in the proximal colon. The distribution of metastases is liver >60%, lung >50%, peritoneum 15% and bone 15%.

There is a 20% incidence of coexisting benign or malignant neoplasm elsewhere in the colon. The overall survival for patients with Duke's Stage I/II/III (i.e. confined to mucosa or submucosa/confined to the wall of the colon or rectum/penetrating all layers including serosa) tumors has been reported as 80/50/30%. Most metastases occur within the first few years and can be predicted up to 6 months in advance by serum carcinoembryonic antigen estimation in 60% of cases. Up to 20% of single hepatic or pulmonary metastases can be cured by resection. Liver function tests (LFT) can remain within normal limits until quite advanced disease exists.

The primary care physician (the flight surgeon) plays an integral role in the detection of curable colon malignancies. Annual rectal examination with guaiac testing can provide substantial benefits, particularly in individuals who are asymptomatic and are most likely to be cured by intervention.

ICD-9 CODES:
153.9 Malignant neoplasm of the colon
154.1 Malignant neoplasm of the rectum
211.3 Benign neoplasm of the colon
211.4 Benign neoplasm of the rectum

9.6 OTHER GASTROINTESTINAL TUMORS

AEROMEDICAL CONCERNS: Esophageal carcinoma carries a risk of sudden hemorrhage and aspiration. Gastric carcinoma has the risk of incapacitating hemorrhage, anemia, or metastasis to brain, bone, or lungs. Hemorrhage is also a risk in primary hepatic carcinoma. Pancreatic carcinoma is associated with a risk of developing diabetes mellitus, thrombophlebitis, and serious psychiatric illness.

WAIVER: Waiver may be considered for aircrew members who have survived 5 years after treatment without symptoms or recurrence.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board recommendations
3. AFIP confirmation of the histology
4. Full flight physical
5. Oncology/internal medicine review
6. CXR
7. CT scan of mediastinum and abdomen
8. Endoscopy (if indicated)

TREATMENT: Any treatment modality is acceptable provided the patient remains symptom-free 5 years after cessation of therapy.

DISCUSSION: The 5 year survival rates for the various carcinomas are as follows: esophagus 3%, stomach 12% (although 90% with early detection and resection has been reported), liver <1%, gall bladder 2%, and pancreas 1%. Three disorders occur in pancreatic carcinoma that could affect aircrew efficiency. Diabetes mellitus occurs in 10-20% of patients. Thrombotic disorders including thrombosis of the splenic vein (15% of cases) or pulmonary embolism (10%) may also occur. Serious psychiatric disorders, particularly depression, can be the presenting symptom and occur in over 75% of patients. Primary lymphoma of the bowel is treated as other lymphomas are. Colonic polyps are also considered separately.

ICD-9 CODES:
150.9 Malignant neoplasm of the esophagus
151.9 Malignant neoplasm of the stomach
157.9 Malignant neoplasm of the pancreas
211.0 Benign neoplasm of the esophagus
211.1 Benign neoplasm of the stomach
211.6 Benign neoplasm of the pancreas

9.7 HODGKIN'S DISEASE

AEROMEDICAL CONCERNS: There is little risk of incapacitation with active disease or in those undergoing therapy. More advanced cases can exhibit thrombocytosis or anemia.

WAIVER: Waiver is possible 2 years after completion of treatment of Stage I and IIA Hodgkin's disease with no evidence of recurrence. Patients with IIB through IVB disease have a greater recurrence rate with up to 75% achieving median length of remission of 3 years, and can be considered for a waiver 5 years after completion of therapy.

INFORMATION REQUIRED:

1. Staging using Ann Arbor classification
2. AFIP confirmation of histology
3. Tumor Board report
4. Medical Board
5. Confirmation that the chemotherapy has not caused residual toxicity
6. Full pulmonary functions testing including DLCO and an echocardiogram with ejection fraction to confirm lack of pulmonary and cardiac toxicity (A gated radionuclide cardiac study can also be provided)
7. Neurological exam for peripheral neuropathy

FOLLOW-UP: Annual submission to include:

1. Oncology/internal medicine evaluations
2. CBC
3. Sedimentation rate
4. CXR are required

NOTE: Formal neuropsychological testing may be required in some cases, as there is an effect of chemotherapy on cognition.

TREATMENT: Patients must be grounded when undergoing therapy.

DISCUSSION: The incidence of Hodgkin's disease is bimodal, with one peak in the mid 20s. Because of the risks of long term complications of therapy, patients should be followed at least quarterly for the first 2 years, then every 6 months for the next 8 years and annually thereafter. After 3 years of remission, there is an 80% chance of permanent cure, which rises to 96% after 5 years. Second malignancies are not unheard of, especially in patients that have received alkylating agents in their initial therapy.

ICD-9 CODES:
201.9 Hodgkin's Disease

9.8 KIDNEY TUMORS

AEROMEDICAL CONCERNS: Renal cell carcinoma tends to metastasize to the brain, with seizure as the initial presentation. Bone metastases carry a risk of pathological fracture.

WAIVER: Waiver recommendations may be considered 2 years after successful resection of a renal carcinoma provided that the disease was confined to the kidney and that there has been no recurrence. Since applicants for flight training with congenital absence of one kidney are rejected, it follows that applicants with a history of nephrectomy for Wilms tumor will be treated the same way.

INFORMATION REQUIRED:

1. Medical Board finding the member fit for full
2. Tumor board appraisal
3. AFIP confirmation of the histology
4. Full flight physical
5. Oncology/nephrology consult
6. CXR
7. CT scan of abdomen and retroperitoneum
8. MRI scan of the brain

FOLLOW-UP: Annual submission to include:

1. Flight physical
2. Oncology/nephrology consult
3. CXR
4. CT scan of abdomen and retroperitoneum
5. MRI scan of the brain

TREATMENT: Ongoing therapy is not compatible with flying status. Chemotherapy results for treatment of renal cell carcinoma have been dismal.

DISCUSSION: With localized disease, the 5 year survival rate is reported as 72%. The smallest tumors that exhibit minimal caliceal distortion and are surrounded by normal renal parenchyma have a good prognosis after surgery but they are at risk for relapse. One third of patients already have disseminated disease at diagnosis, involving the lung in 50% of cases, bone in 30%, liver in 30%, and brain in 25%. Brain metastases from kidney cancer are reported to be particularly susceptible to hemorrhagic degeneration with abrupt onset of headache and neurological compromise. Hypertension occurs in about 30% of cases with renal cell carcinoma (hypernephroma) and a polycythemia syndrome occurs in 2-3%. Hematuria may be the only manifestation of renal tumors, and as such renal tumors should enter into the differential diagnosis of protracted hematuria.

ICD-9 CODES:
189.0 Kidney Tumors
223.9 Benign neoplasm of the kidney

9.9 LARYNGEAL CANCER

AEROMEDICAL CONCERNS: Airway compromise and speech difficulties.

WAIVER: Early diagnosis (T1N0M0) and treatment not involving laryngectomy, with no evidence of recurrence or speech dysfunction, will be considered for a waiver 12 months after completion of treatment.

INFORMATION REQUIRED:

1. Surgical and/or radiation reports
2. Medical Board
3. Tumor Board recommendations
4. AFIP confirmation of histology
5. Current ENT/oncology consult

FOLLOW-UP: Annual submission to include:

1. ENT/oncology consult

TREATMENT: Laryngectomy is CD, no waiver considered, but other types of treatment will be considered once treatment is completed and there is no airway compromise or speech dysfunction. Treatment, depending on site of lesion and its extent, can range from local laser excision to total laryngectomy with neck dissection and post-operative radiation therapy. Pre-operative chemotherapy is also used in selected advanced cases.

DISCUSSION: Overall, early laryngeal cancer carries a 5 year survival of 76%, but localized glottic cancer has a figure of 90%. Recurrence is primarily local. Early laryngeal carcinoma (all sites) has a 5 year survival of 76% while localized true vocal cord carcinoma has a 5 year survival of 90%. Recurrence is primarily local.

ICD-9 CODES:
161.9 Laryngeal Cancer
212.2 Benign neoplasm of the larynx

9.10 LEUKEMIA

AEROMEDICAL CONCERNS: Most of the leukemias present with lethargy, malaise, infection, anemia or hemorrhage. Disseminated intravascular coagulation as a complication of acute lymphocytic leukemia (ALL) can give sudden, fatal cerebral hemorrhage or disabling bone pain. A relapse of ALL can present in the CNS. Prophylactic CNS radiation in cases of ALL can produce leukoencephalopathy, the symptoms of which can include ataxia and confusion.

WAIVER: A history of ALL as a child is compatible with waiver. Patients with other leukemias may be considered for waiver recommendation, provided they have been free of symptoms and off treatment for 2 years. Aircrew with satisfactory response to treatment for early hairy cell leukemia may be considered for waiver on completion of treatment.

INFORMATION REQUIRED:

1. Tumor Board recommendations
2. Medical Board disposition
3. AFIP confirmation of the diagnosis
4. Neuropsychological review and testing (in patients who have had prophylactic CNS radiation)

FOLLOW-UP: Annual submission to include:

1. Oncology consultation.

TREATMENT: Ongoing therapy is not compatible with waiver. Patients who have had bone marrow transplantation are not likely candidates for waiver, unless they are asymptomatic and on no medications.

DISCUSSION: Overall, the requirement for frequent assessment may interfere with military mobility. Adult ALL has a high relapse rate and long term survival is uncommon. 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, this is short (15 months on average) and 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 also increase long term survival. Relapse in hairy cell leukemia can usually be identified by regular CBC.

ICD-9 CODES:
204.9 Lymphoid leukemia
205.9 Myeloid leukemia
206.9 Monocytic leukemia

9.11 LUNG CANCER

AEROMEDICAL CONCERNS: The major concern for aviators is the risk of cerebral metastasis with the development of seizures. There is also the likelihood of diminished pulmonary function producing symptoms in flight or, more rarely, hemorrhage leading to incapacitation. Chest discomfort is a presenting feature in 40% of cases and this may be exacerbated by the pressure of a restraint harness. Depending on the tumor subtype, there may also be associated neuropathies or endocrine disturbances.

WAIVER: Aviators with carcinoma of the lung are CD, no waiver. Patients with successful resection of early stage carcinoma could be considered for waiver recommendation after 5 years without recurrence.

INFORMATION REQUIRED:

1. Tumor Board recommendations
2. Medical Board
3. AFIP confirmation of the diagnosis
4. Oncology consult
5. CXR
6. MRI of the brain
7. Full physical exam
8. Pulmonary function testing

TREATMENT: Patients who have had lobectomy may be considered for waiver provided the criteria listed above are met. Pneumonectomy will inevitably result in permanent disqualification.

DISCUSSION: Overall, lung cancer has a 5 year survival rate of 9%; between 17-20% survive 1 year after diagnosis. Even those who have curative surgery for localized cancer of the lung, and in whom all disease is confined to the lung without any spread to any lymph nodes, have a 5 year survival rate of only 42% and a 10 year survival rate of 16-18%. The 5 year survival rate for resected Stage I carcinoma has been reported as 70%. However, most recurrences are distant suggesting that micrometastasis has already occurred by the time of diagnosis. The rate of cerebral metastasis for the varying types of lung carcinoma has been reported to range from 14-30%.

ICD-9 CODE:
162.9 Lung Cancer

9.12 MALIGNANT MELANOMA

AEROMEDICAL CONCERNS: Melanoma has become an epidemic cancer. Incidence has increased over 300 percent in the last 40 years. Of the cancers causing mortality in the 15-34 year old age group, melanoma ranks fourth. There is a risk of visceral metastases to lung, liver, brain, bone and gastrointestinal tract, in order of decreasing occurrence. Brain metastases may present as a seizure disorder, raising concerns of acute in-flight incapacitation. There is no specific evidence that melanoma sequelae have been directly implicated in any aviation mishap. However, in an examination of 584 AJCC stage Ill patients, one third of metastases were noted to be in the brain or liver. The CNS frequently appears as a sanctuary for melanoma because immune defenses have difficulty crossing the blood-brain barrier. In clinical series, the CNS is involved in 12-20% of the time, and this incidence increases to 36-54% in autopsy series. Other research shows that 75% of lesions found at autopsy are asymptomatic in the clinical setting. Behavioral changes are most frequently seen, followed by focal neurological deficits. Due to the vascular nature of melanoma, these tumors hemorrhage easily, at a rate of 19% in one study of head CT features in 28 brain metastatic melanoma patients. Asymptomatic screening contrast MRI represents a necessary screening tool for safety of flight concerns in our population.

WAIVER: Malignant melanoma or a history of malignant melanoma is disqualifying for aviation duties. Applicants are generally not considered for waivers, but may be evaluated on a case-by-case basis if greater than 5 years disease-free. Waivers may be considered for designated personnel after treatment is complete, using the AJCC staging system as a guide.

T-category:

– 1.00 mm (T1) a= no ulceration

– 2.00 mm (T2) b = ulceration

– 4.00 mm (T3)

> 4.00 mm (T4)

AJCC Stage IA (T1a < 1.00 mm, Clark II or III): 95% 5-year survival. Return to SG I flight status when surgical wounds are healed, provided no interference with function or flight equipment as determined by local flight surgeon or aerospace physiologist. Follow up mucocutaneous skin examinations submitted every six months for two years, then annually. Examinations should be done annually by a Dermatologist and should include a careful history and physical with emphasis on skin, lymph node, and neurological exams. All semi-annual exams may be submitted with the annual physical.

AJCC Stage lB (T1b < 1.0 mm, T2a: 1.0 - 2.0 mm, Clark IV or V): 91% 5-year survival. Same as above, but mucocutaneous skin examinations should be every six months for three years, then annually. Examinations should be done annually by a Dermatologist and should include a careful history and physical with emphasis on skin, lymph node, and neurological exams. All semi-annual exams may be submitted with the annual physical.

AJCC Stage IIA (T2b, T3a: 2.0-4.0 mm): 60-80% 5-year survival. Because of increased morbidity and mortality associated with these lesions, additional diagnostic information should be applied. Analysis of sentinel node for melanoma metastasis has been shown to predict nodal involvement in 96% of cases, and should be obtained prior to consideration for return to flight. The pathologic indicators of mitotic rate, tumor-infiltrating lymphocytes, and histological regression have been shown to alter the probabilities of long-term survival and should be obtained in these intermediate cases if possible. Readily available clinical data such as age, gender, anatomic site, ulceration of the lesion, and growth pattern can also be submitted, as they have been shown to more accurately predict outcomes than tumor thickness alone. Lesions that are classified as IIA without evidence of ulceration or nodal involvement may be considered for waiver for SG I after complete excision. A semi-annual physical exam with specific attention to the skin and lymph nodes for three years then annually, with an annual dermatology consultation, is required. All semi-annual exams may be submitted with the annual physical.

AJCC Stage IIB (T3b, T4a > 4.0 mm): 60-80% 5-year survival. Because of increased morbidity and mortality associated with these lesions, additional diagnostic information should be applied. Analysis of sentinel node for melanoma metastasis has been shown to predict nodal involvement in 96% of cases, and should be obtained prior to consideration for a return to flight. The pathologic indicators of mitotic rate, tumor-infiltrating lymphocytes, and histological regression, have been shown to alter the probabilities of long-term survival and should be obtained in these intermediate cases if possible. Readily available clinical data such as age, gender, anatomic site, ulceration of the lesion, and growth pattern can also be submitted, as they have been shown to more accurately predict outcomes than tumor thickness alone. Consideration of SG Ill status can be entertained in aviators with predicted greater than 80% disease free five-year survival. Otherwise, a downing period of at least five years is appropriate prior to consideration to SG I. Follow up examinations submitted semi-annually for five years, then annually thereafter. Annual Dermatology consult is required. All semi-annual exams may be submitted with the annual physical. All aviators with a diagnosis of Stage IIB need an MRI with and without contrast prior to consideration to return to flight status (SG I – SG III).

AJCC Stage IIC, Ill A/B/C (IIC: T4b > 4.0 mm, III: regional nodes): All aviators with the diagnosis of Stage IIC or Stage III A/B/C will be considered for a waiver on a case-by-case basis after a minimum of 5-years disease free from completion of treatment. All required follow up care is in accordance with the guidelines for Stage IIB.

AJCC Stage IV (distant metastasis, elevated serum LDH): 5-25% 5-year survival. Because of the relatively poor prognosis and high likelihood of recurrent disease over time, waivers will not be routinely entertained.

INFORMATION REQUIRED:

1. Complete mucocutaneous examination performed by a dermatologist and lymph node exam with particular attention to the primary draining nodal area
2. Neurological exam (performed by the flight surgeon for Stage IIA and lower)
3. Serum chemistries
4. CBC

5. CXR
6. Tissue examination performed by a dermatopathologist. If a dermatopathologist is not available then tissue specimens should be sent to AFIP for confirmation of diagnosis. Must include comment about presence or absence of ulceration and Breslow depth
7. Tumor board report and medical board report returning the member to full duty (if applicable)
8. All patients with a diagnosis of Stage IIB and higher tumors require MRI with and without contrast and a full Neurology exam performed by a neurologist

TREATMENT: The treatment of primary non-metastatic melanoma consists of complete local surgical excision to the underlying muscle fascia with a margin of normal appearing skin, usually 1-3cm.

DISCUSSION: The most common clinical presentation is a pigmented lesion changing in size, shape, or color. The diagnosis is based on an excisional biopsy whenever possible (i.e. the entire lesion is removed down to the subcutaneous fat). For disease confined to the skin at presentation, the treatment, prognosis, and follow-up recommendations are most accurately based on the tumor thickness and presence or absence of tumor ulceration (see average 5-year survivals above). However, other factors such as increasing age, male gender, and tumors of the palms or soles are associated with a worse prognosis. Pathologic factors that are associated with worsening survival are high mitotic rate, absent tumor-infiltrating lymphocytes, and presence of histological regression. These modifiers can be used in various mathematical models to more accurately predict outcomes and to make better aeromedical decisions.

Aviation-specific studies of morbidity and mortality are scarce, but there are many large studies derived from the general population that are the basis for these waiver guidelines. It should be noted that Stage I cases and Stage II cases associated with a favorable prognosis will in general be recommended for a waiver. Close follow-up as outlined above is required because recurrence rates have a linear slope over time and are not negligible (1-7% per year) even after a 10-15 year period. There is no point where it is safe to conclude that a melanoma patient is "cured." Aviation personnel on melanoma waivers and their flight surgeons must be cognizant of the potential for recurrence and maintain close follow-up.

Patients should be taught how to examine their own skin for the “ABCD” characteristics of melanoma and should be encouraged to do so on a monthly basis. **A** stands for asymmetry, **B** for border irregularity, **C** for differences in color within the lesion, and **D** for increasing diameter (>5 mm or about the size of a pencil eraser). Avoidance of midday sun, use of sunscreens with sun protection factor 15 or higher, and the use of protective clothing are all-important preventive measures.

ICD-9 CODE:
172.9 Malignant Melanoma

9.13 NEUROLOGICAL TUMORS

AEROMEDICAL CONCERNS: Brain tumors carry a risk of seizures and disability due to both tumor location and therapy. There is a risk of sudden dysfunction in tumors of the spinal cord.

WAIVER: Tumors of the spinal cord may receive a waiver recommendation 5 years after therapy provided there is no recurrence or sequelae. Waiver may be granted for tumors of the peripheral nervous system if there is no impairment of function. All tumors involving the brain or meninges, irrespective of therapeutic outcome, are CD with no waiver recommended.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board recommendations
3. AFIP confirmation of the histology
4. All imaging studies performed
5. NAMI evaluation of the patient

TREATMENT: For those conditions that are waiverable, the aviator should be grounded during treatment.

DISCUSSION: Approximately 33% of all patients with malignant brain tumors experience unexpected and incapacitating seizures. Survival rates for malignant gliomas approach 20% after one year. The survival rates for other tumors vary, with some reaching as high as 90%, but in most there is a greater than 10% chance of recurrence. Those tumors with the best prognosis (i.e. the least chance for subsequent seizure disorders or loss of neurological function) are subtentorial, axial, and encapsulated. Those with the greatest chance of subsequent seizure disorder are the opposite (i.e. supratentorial, extra-axial and unencapsulated).

ICD-9 CODES:
171.9 Malignant Neoplasm of the peripheral nervous system
191 Malignant neoplasm of the brain
192.2 Malignant neoplasm of the spinal cord
225.0 Benign neoplasm of the brain
225.3 Benign neoplasm of the spinal cord
225.4 Benign neoplasm of the spinal meninges
215.9 Benign neoplasm of the peripheral nervous system

9.14 NON-HODGKIN'S LYMPHOMA

AEROMEDICAL CONCERNS: The major concern is that of poor prognosis, particularly in lymphocytic lymphoma, histiocytic lymphoma, and T-cell diffuse histiocytic lymphoma. Occasionally, patients present with CNS disease. Acute incapacitation is rare.

WAIVER: Waiver recommendations may be possible for aircrew with low-stage, non-Hodgkin's lymphomas if treated in the early stages of the condition. Interestingly, more aggressive disease carries a better chance for cure than indolent lymphomas. The low-grade lymphomas are not yet considered curable and do not normally warrant waiver recommendation, although waiver may be possible after 5 years of remission.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board appraisal
3. AFIP confirmation of the histology
4. Oncologist/hematologist opinion
5. CT scans of the chest and abdomen
6. Confirmation that the chemotherapy has not caused residual toxicity
7. Full pulmonary functions testing including DLCO and an echocardiogram with ejection fraction to confirm lack of pulmonary and cardiac toxicity (A gated radionuclide cardiac study can also be provided)
8. Neurological exam for peripheral neuropathy

FOLLOW-UP: Annual submission to include:

1. Hematology/oncology consultation

TREATMENT: All forms of treatment are acceptable provided the patient remains symptom-free with no recurrence. Ongoing treatment is not compatible with flying.

DISCUSSION: Extranodal presentation occurs in 20-30% of patients. Primary lymphoma of the stomach represents up to 10% of all gastric cancers, with the presenting symptom being pain in 80% of cases and hemorrhage in 20%. Surgery with postoperative radiotherapy or chemotherapy yields a 5 year survival of 50%. Generally, the 5 year survival for low grade non-Hodgkin lymphomas is about 45% compared to 35% for high grade tumors.

ICD-9 CODE:
202.8 Non-Hodgkin's Lymphoma

9.15 ORAL CAVITY CANCER

AEROMEDICAL CONCERNS: Localized and referred pain can occur. Difficulties with speech or with the wearing of an oxygen mask are possible. Salivary control may be marginal. Cancer of the tongue can give rise to local pain and to earache.

WAIVER: Waiver will be considered on a case by case basis 12 months after completion of therapy for localized disease without recurrence, speech dysfunction, or airway obstruction. Pharyngeal cancer is CD, with no waiver recommended.

INFORMATION REQUIRED:

1. Surgical report
2. Pathology report
3. ENT consult
4. Oncology consult
5. Medical Board
6. Tumor Board recommendations
7. AFIP confirmation of the histology

TREATMENT: Ongoing treatment, such as chemotherapy or radiation therapy, is not compatible with waiver.

DISCUSSION: Cancer of the lower lip has the best prognosis of the oral cancers, with a 10 year survival rate for early cases of over 95%. Most recurrences (to the lip in 43% and cervical nodes in 43%) occur in the first 2 years. Up to 12% of patients with lip cancer develop a second primary lesion, usually of the mouth or pharynx. Cancers of the upper lip carry a 5 year survival rate of 58-73%. Stage I (T1N0M0) and Stage II (T2N0M0) cancers of the oral cavity carry 5 year survival rates of 76% and 65% respectively, but overall the 5 year survival rates are 25-35% for tongue, 20-40% for the floor of the mouth, 30-50% for cheek and 25% for oropharynx, palate and gingiva. 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 manifest their metastases within 12 months. Between 15-35% of patients develop a second squamous carcinoma (head and neck 10-20%, esophagus 2-10%, bronchus 3-10%). Of those patients who have had a radical neck dissection, 30% develop a dropped shoulder because of sacrifice of the 11th cranial nerve causing weakness of the trapezius muscle; this may preclude flying duties. Pharyngeal cancers are usually diagnosed late and carry a 5 year survival of 33%.

ICD-9 CODES:
145.9 Oral Cavity Cancer
528.6 Leukoplakia of oral soft tissues
210.4 Benign neoplasm of the oral cavity

9.16 OVARIAN TUMORS

AEROMEDICAL CONCERNS: The vast majority of ovarian tumors are benign, and waivers are not necessary for benign ovarian disease. Because the majority of ovarian carcinomas have already metastasized by the time of diagnosis, the prognosis is usually grim.

WAIVER: Waiver may be considered 2 years after cessation of therapy provided the patient is symptom-free and has no evidence of recurrence. Waiver is not required for excised benign ovarian tumors.

INFORMATION REQUIRED:

1. Medical Board
2. Tumor Board recommendations
3. AFIP confirmation of the histology
4. Full physical exam
5. Gynecology/oncology consult
6. CT scan of the abdomen, retroperitoneum and pelvis
7. Intravenous pyelogram
8. Tumor markers (if obtained)

TREATMENT: Hormone replacement therapy after bilateral oophorectomy is acceptable for service members in aviation billets.

DISCUSSION: Almost 75% of ovarian tumors are benign. Of those with malignant disease, 80% will have metastases by the time of diagnosis. Metastasis of breast or colonic carcinoma to the ovary is more common than primary carcinoma of the ovary. The 5 year survival of early ovarian carcinoma can reach 90%.

ICD-9 CODES:
183.0 Malignant neoplasm of the ovary
220 Benign neoplasm of the ovary

9.17 PITUITARY TUMORS

AEROMEDICAL CONCERNS: The aeromedical complications largely center on the consequences arising from hormone hypersecretion. These include heat intolerance, diabetes mellitus, diabetes insipidus, hypercalciuria, hypothyroidism, nerve entrapment syndromes, hypertension, cardiomyopathy and spondylosis. Local effects from the tumor can also cause headache, cranial nerve palsies, and visual field defects.

WAIVER: Waiver may be considered provided sequelae are within acceptable limits. Diabetes insipidus (either as a result of posterior pituitary tumor or following surgery or Yttrium-90 implant) is not waiverable.

INFORMATION REQUIRED:

1. Medical Board disposition
2. Tumor Board recommendations
3. AFIP confirmation of the histology (in those cases where surgical removal has been carried out)
4. Endocrinology consult
5. Postoperative visual field studies

FOLLOW-UP: Annual submission to include:

1. Endocrinology consult

TREATMENT: Surgical removal of the tumor and insertion of Yttrium-90 implant are both compatible with aviation duties. Ongoing treatment with bromocriptine is not waiverable.

DISCUSSION: Cure rates of up to 80% for anterior pituitary tumors resulting in acromegaly can be expected with any of the treatment modalities. Prolactinomas have an even better success rate.

ICD-9 CODES:
227.3 Benign neoplasm of the pituitary
194.3 Malignant neoplasm of the pituitary

9.18 PLASMA CELL DYSCRASIAS

AEROMEDICAL CONCERNS: Plasma cell dyscrasias require frequent toxic therapy. They are also associated with side effects that can lead to sudden incapacitation, such as neurological impairment. Vertebral involvement is common in myelomas, giving rise to severe backache and increased susceptibility to injury on ejection. These individuals are immunocompromised, and are thus prone to life threatening infections.

WAIVER: Aviators who remain free of recurrence 3 years after treatment for a single plasmacytoma may be considered for waiver. Personnel with monoclonal gammopathy of unknown significance (MGUS) may be considered for waiver provided that the monoclonal spike comprises <2 g/dl of protein, there are fewer than 5% plasma cells in the bone marrow, the serum viscosity is normal, and there is no hematopoietic compromise or osteolytic lesions. Other plasma cell dyscrasias are not waiverable. These include amyloidosis associated with plasma dyscrasia, heavy chain disease, cold agglutinin disease, and cryoglobulinemia.

INFORMATION REQUIRED:

1. Oncology/hematology consult
2. Medical Board disposition
3. Tumor Board recommendations
4. AFIP confirmation of diagnosis

FOLLOW-UP: Annual submission to include:

1. Hematology/oncology consult

NOTE: Patients with benign monoclonal gammopathy require assessment every six months by hematology/oncology, and waiver request submission every six months.

TREATMENT: Continuing therapy is CD, no waiver.

DISCUSSION: The risks of benign monoclonal gammopathy are progression to multiple myeloma and increased serum viscosity leading to neurological impairment. The median survival for patients with gamma heavy chain disease is 12 months. Neurological involvement is insidious and, although usually a condition of older patients, has been reported in those a young as 23. Alpha heavy chain disease is associated with progressive and fatal abdominal lymphoma. There is a risk of sudden hemolysis in cold agglutinin disease, and a risk of sudden vascular accidents and neurological dysfunction in cases of cryoglobulinemia. Up to 60% of patients with myeloma present with skeletal pain, while anorexia and depression associated with hypercalcemia are present in 30%. About 10% present with paraplegia while others exhibit mental impairment or visual disturbance resulting from hyperviscosity. Amyloidosis is encountered in 5-10% of myeloma patients. Two year survival ranges from 9-76% depending on the stage of the disease at the time of diagnosis.

ICD-9 CODE:
203.1 Plasma Cell Dyscrasias

9.19 PROSTATE CANCER

AEROMEDICAL CONCERNS: Advances in screening for prostate cancer have resulted in most cases being asymptomatic at the time of diagnosis. In rare cases, a variety of symptoms capable of affecting safety of flight and/or mission completion may be present. These include hesitancy, urgency, frequency, urinary retention, dysuria, hematuria, and acute obstruction. Furthermore, metastatic disease can affect bony sites, most often the spine, which can result in pain and/or pathological fracture. In the military aviation population, which is relatively younger, healthier, and with better access to health care when compared to the general population, symptom occurrence as described above would be less likely.

WAIVER: Waivers are considered on a case by case basis. Waiver may be considered as early as six months post-treatment (radical prostatectomy or radiation therapy) for tumors staged as T2, Gleason 3+3. Individuals with lesions staged as T3 or higher or Gleason score greater than or equal to 7 may submit a waiver request, but due to their having a greater chance of local recurrence, the urology/oncology consult must specifically mention the likelihood of disease progression. Treatment by "watchful waiting" with quarterly PSA and biannual urology consultation and follow-up may be considered for waiver, however, member shall be restricted to current command and CONUS-only. In all cases, the member must be fully recovered, off all medications including estrogen compounds, and have no urinary incontinence. The wearing of absorbent undergarments (Depends) or intermittent self-catheterization is not compatible with full or special duty.

INFORMATION REQUIRED:

1. Initial history, with details of the presentation and treatment course
2. Medical Board disposition
3. Tumor Board recommendations
4. Pathological reports
5. AFIP confirmation of the histology (must include Gleason grade)
6. Primary definitive treatment reports (surgical or radiation as applicable)
7. Post-treatment urology or oncology consult
8. Renal function testing (including serum BUN and creatinine)
9. IVP (only required if BUN or creatinine are elevated)
10. Pre-treatment and serial PSAs every three months post-treatment
11. Remarks affirming that the member is free of symptoms/side effects and physical limitations, and retains full bladder continence and function
12. Remarks concerning future required follow-up (as per urology or oncology recommendations)
13. Bone scan (if recommended by the urologist/oncologist)

NOTE: Any residual or unresolved treatment complications or side effects (incontinence, anesthesia, DVT/PE) will make the waiver request more complex and will have to be considered separately as part of the complete waiver package. All individuals approved for a waiver will be required to have DRE and PSA every three months for the first post-treatment year, followed by

every six months indefinitely. A yearly follow-up by a flight surgeon will be required to ensure this is being performed.

TREATMENT: The choices for the treatment of prostate cancer involve multiple factors. The disease itself is most often slowly progressive, and when coupled with a number of well-documented side effects of therapy, recommended treatment options can be variable and are often individualized. Both surgery and radiation therapy offer the potential for complete cure, with surgery having a higher cure rate. Radiation, if not curative, will likely halt the progression of disease. Both therapies have their associated benefits, risks and side effects. Watchful waiting, which is not curative, is less often preferred but remains an acceptable choice in certain cases if the patient and specialist are in agreement. This therapy requires closer follow-up for progression of disease. Special cases involving newer therapies such as cryotherapy will be handled on a case by case basis. Individuals requiring chemotherapy/estrogen therapy will be considered NPQ/WNR.

DISCUSSION: Carcinoma of the prostate is the second leading type of cancer in men next to skin cancer. Increased incidence is seen with increasing age and in African American populations. Over their lifetime, approximately 15 percent of men in the United States will be diagnosed with prostate cancer, with the vast majority being over the age of 65 at the time of diagnosis. Being that the disease is usually slow growing, and that most treatment modalities are associated with significant risks and side effects, patients and health care providers are often left with no one definitive treatment decisions. Very low-grade tumors have an approximately 95% 15-year survival. Young African American individuals tend to have more poorly differentiated tumors and do less well than older African American patients. This age/severity correlation has not been definitively recognized in Caucasian males. The presence of related symptoms, rarely seen anymore, suggests locally advanced or metastatic disease. Hormonal therapy, when indicated, is known to have significant side effects. Patients must be made aware of the specific risk related to each agent being considered.

ICD-9 CODES:
185 Malignant prostate cancer
233.4 Prostate carcinoma in situ
222.2 Benign neoplasm of the prostate
600 Benign prostate hypertrophy
H605 Status post radical prostatectomy

9.20 SKIN CANCERS (NON-MELANOMA)

AEROMEDICAL CONCERNS: The lesion may be irritated by the wearing of protective equipment or, if it is on the face, may prevent adequate mask seal.

WAIVER: Waiver is not required for adequately treated basal cell carcinoma. Waiver may be required if grafting has been necessary, once the graft has settled adequately to allow wear of flight clothing or equipment and provided that there is no disability. Squamous cell carcinoma is CD, with waivers considered on a case-by-case basis.

INFORMATION REQUIRED:

1. AFIP confirmation of diagnosis is required
2. Dermatology consult

TREATMENT: The aircrew member should be grounded during treatment.

DISCUSSION: The incidence of metastasis varies. Primary cutaneous squamous cell carcinomas have a secondary rate of 3%, compared to 11% with mucocutaneous lesions and 10-30% with tumors secondary to inflammatory and degenerative processes. Metastases tend to be in the regional lymph nodes.

ICD-9 CODES:
173.0 Skin Cancers (Non-Melanoma)
M8091 Multicentric Basal Cell Carcinoma
M809B Basal Cell Carcinoma
M8070 Squamous Cell Carcinoma

9.21 TESTICULAR TUMORS

AEROMEDICAL CONCERNS: Treatment with bleomycin-based chemotherapy can lead to compromised pulmonary function. This is significantly exacerbated by breathing high concentrations of oxygen. Pulmonary metastases may eventually cause respiratory symptoms, which could be exacerbated by hypoxia. Very rarely, cardiac or cerebral metastases have been reported.

WAIVER:

Seminoma: Patients with Stage I or IIA seminomatous tumors treated by orchiectomy and/or external beam radiation may be considered for waiver after completion of radiation, provided tumor markers are absent. Stage IIB or III treated with orchiectomy plus chemotherapy must complete a 2 year LIMDU board, during which time no waiver will be considered. After completion of LIMDU, waiver may be considered provided patient is free from recurrence (normal physical exam, tumor markers negative) and pulmonary function tests show no evidence for oxygen toxicity/hypersensitivity.

Non-Seminomatous Germ Cell: Clinical Stage I or low volume Stage II treated with orchiectomy and retroperitoneal lymph node dissection and confirmed to be pathological Stage I or low volume Stage II may be considered for waiver after 6 months LIMDU board, provided patient is free from recurrence. If pathology is upstaged to Stage IIB, adjuvant chemotherapy is required, as well as a 2 year LIMDU board. Wavier may then be considered after completion of the 2 years of LIMDE. Patients with Stage III disease treated with orchiectomy and chemotherapy require a 2 year LIMDU board. After completion of LIMDU, waiver may be considered if the patient is free from recurrence (normal exam, tumor markers negative, abdominal CT scan free from residual masses) and pulmonary function tests are normal.

INFORMATION REQUIRED:

1. Medical Board disposition
2. Tumor Board recommendations (if available)
3. AFIP confirmation of histology
4. CXR and/or CT scan reports

FOLLOW-UP: Annual submission to include:

1. Urology consult
2. CXR, chem panel, tumor markers and physical exam as follows:
   a. Monthly for first year
   b. Bimonthly for second year
   c. Every 6 months for third year
   d. Annually after third year

TREATMENT: Treatment by orchiectomy with or without prosthetic implant, with or without surgical staging, radiotherapy, or chemotherapy can all be considered for waiver as described above.

DISCUSSION: Overall cure rate for all stages of testicular cancer is 98%. Seminoma is the most common cell type, seen in 40% of cases, with a peak incidence between the ages of 30 and 39 years. Embryonal carcinoma or teratocarcinoma is present in another 45-55% with a peak incidence of 25-35 years. 25% of seminomas and 50-70% of nonseminomatous tumors will have metastatic nodes at time of diagnosis. The addition of radiation therapy decreases the relapse rate for Stage I seminomas from 30% down to 5-10%. Retroperitoneal lymph node dissection results in a recurrence rate of 5% for pathological stage I and 5-20% for pathological low volume stage II nonseminomatous tumors. Two cycles of adjuvant chemotherapy for pathological stage IIB tumors lowers the recurrence rate from 30-40% down to <10%. Except in the cases of pure teratoma, where recurrence may occur out to five years, it is rare to see recurrence beyond two years.

ICD-9 CODES:
186.9 Malignant testicular tumor
222.0 Benign neoplasm of the testes

9.22 THYROID CARCINOMA

AEROMEDICAL CONCERNS: There is almost inevitable hypothyroidism after surgical treatment. The condition also carries a small risk of damage to the recurrent laryngeal nerves either from local invasion of the tumor and/or surgical damage. The parathyroid glands may also be involved, resulting in hypoparathyroidism.

WAIVER: Waiver will be considered after treatment of papillary or follicular carcinoma of the thyroid. Medullary or undifferentiated thyroid tumor will normally lead to permanent disqualification, with no waiver recommended. This is a reflection of the differing prognoses of the varied histologies.

INFORMATION REQUIRED:

1. Medical Board disposition
2. Tumor Board recommendations
3. AFIP confirmation of the histology
4. Confirmation of clinical and chemical euthyroid status
5. Evidence of TSH suppression
6. Endocrinology consult

FOLLOW-UP: Annual submission to include:

1. Confirmation of clinical and chemical euthyroid status
2. Evidence of TSH suppression
3. Endocrinology consult

TREATMENT: Surgery is generally the first line of therapy. Some authorities prefer to use radioiodine treatment. Surgical procedures have the risk of injuring the recurrent laryngeal nerve, resulting in voice changes. In addition, removal of the parathyroid glands may lead to symptomatic hypoparathyroidism.

DISCUSSION: Generally, men over 40 years old and women over 50 have a poorer prognosis. Another poor prognostic indication is a primary tumor over 5 cm. Papillary carcinoma is slow growing, spreading locally to the strap muscles of the neck, lymph nodes, and occasionally trachea, but it may metastasize to lungs or bone. Some 20% are said to be multicentric. Overall 5 and 10 year survivals of better than 95 and 90% respectively can be achieved. Because the growth rate is slow, there is no particular trend to early recurrence (recurrence rates from 10-24% have been reported); patients should be able to return to flying as soon as they are euthyroid. Follicular carcinoma tends to metastasize to lungs and bone rather than infiltrate locally. A major determinant of outcome is the extent of microinvasion. The usual treatment of choice is total thyroidectomy, because there is an 87.5% chance of the opposite lobe containing microscopic follicular carcinoma. For patients treated with total thyroidectomy and radioactive iodine, the death rate at 5 years is quoted as 11%, rising to 30% when treatment is by incomplete thyroidectomy alone. This can be largely explained by the fact that only total thyroidectomy allows subsequent accurate localization and treatment of distant metastases by Iodine-131.

Medullary carcinoma and undifferentiated carcinomas have a 10 year survival of 50 and 20% respectively.

ICD-9 CODES:
193 Malignant neoplasm of the thyroid
226 Benign neoplasm of the thyroid

9.23 UTERINE CANCER

AEROMEDICAL CONCERNS: Some cases develop anemia, but there are otherwise very few specific aeromedical concerns in carcinoma of the uterus.

WAIVER: Waiver may be considered 6 weeks after hysterectomy provided that there has been a full recovery and there is no indication of metastasis. Waiver may be requested 2 years after treatment of disseminated disease provided there is no evidence of sequelae or recurrence. Leiomyosarcoma of the uterus is not waiverable.

INFORMATION REQUIRED:

1. Medical Board disposition
2. Tumor Board recommendations
3. AFIP confirmation of the histology
4. Gynecology/oncology consult
5. Intravenous pyelogram
6. CT scan of the abdomen, retroperitoneum and pelvis

FOLLOW-UP: Annual submission to include:

1. Gynecology/oncology consult

TREATMENT: Aircrew are grounded during treatment and during the immediate postoperative period.

DISCUSSION: The earliest truly invasive carcinoma of the endometrium has a cure rate of 90%. Spread is usually slow and recurrence is usually local for long periods of time. However, recurrence for all stages is unpredictable. The incidence of leiomyosarcoma arising in uterine fibroids has been reported to be 0.1-0.6%, with a 5-year survival rate of 31%.

ICD-9 CODES:
179 Malignant neoplasm of the uterus
219.9 Benign neoplasm of the uterus

10.0 NEUROLOGY

10.1 CRANIAL NEURALGIA

AEROMEDICAL CONCERNS: The pain of cranial neuralgia can be incapacitating in flight. The symptoms of trigeminal neuralgia may be stimulated by the wearing of an oxygen mask. Glossopharyngeal neuralgia has been associated with syncope and cardiac arrest.

WAIVER: Because of the severity and chronic recurrent behavior of the neuralgias, these are CD, waiver usually not considered.

INFORMATION REQUIRED:

1. Neurology or neurosurgical consultation

TREATMENT: Pharmacological treatments (Tegretol, Triavil, Prolixin, Mexitil), although effective, are not waiverable due to their side effects profiles. Surgical "cures" (microvascular decompression) may be achieved, and waivers may then be considered on a case by case basis.

DISCUSSION: Although most cranial neuralgias are probably due to microvascular compression at the root entry zone, other etiologies need to be considered, especially in the young adult population in whom demyelinating disease, aneurysms, neoplasms, and infectious etiologies (post-herpetic, Lyme disease, etc) may be more common. The finding of sensory loss in the company of neuralgia should alert the flight surgeon to consider these other causes of cranial neuralgia.

ICD-9 CODES:
350.1 Trigeminal Neuralgia
352.1 Glossopharyngeal neuralgia

10.2 DECOMPRESSION SICKNESS

AEROMEDICAL CONCERNS: Residual neurological/neuropsychological impairment is a safety of flight issue. Most individuals who have suffered DCS make a full recovery and are not at increased risk for recurrent DCS. Decompression sickness with full recovery is not considered disqualifying (NCD) for flying duties. Type I or Type II DCS with residual symptoms after treatment is CD, however waiver may be considered on a case by case basis. Neurology (and possible neuropsychological examination) is required for waiver consideration.

The flight surgeon with a patient with suspected DCS should:

1. Make an aeromedical disposition after consulting with NOMI Neurology.
2. Document a normal evaluation by neurologist, DMO or HMA prior to returning a member to flight status.
3. Members with a history of DCS should be referred for hypoxic training using the Reduced Oxygen Breathing Device (ROBD) as it becomes available for use.
4. Bubble contrast echo is offered to patient only as an option.

Grounding requirements:

1. Type I DCS: at least 3 days with no evidence of residual effects
2. Type II DCS: at least 14 days with no evidence of residual effects

TREATMENT: Recompression therapy is the standard, however many Type I patients will respond completely to surface oxygen therapy and may not require hyperbaric oxygen.

DISCUSSION: Often we err on the conservative side and treat patients whose findings and symptoms may be equivocal, especially in the training commands where students are instructed to report any and all symptoms that occur following low pressure chamber flights. A high index of suspicion in this setting coupled with enthusiasm for treatment must be weighed in evaluating the outcome and disposition. Diving-related cases of DCS tend to be more straightforward, as well as more severe. These patients often receive relatively delayed treatment and are more likely to suffer permanent residual effects. Except for older age, no factors are clearly linked to increased risk for recurrent DCS. Individuals who do suffer recurrent DCS are probably at higher risk for reasons that cannot be defined or predicted and should not be considered for waiver without careful evaluation of the risk-benefit factors. The above recommendations adopt the policy used by the Navy diving community and consider DCS as a treatable occupational hazard that should have no adverse impact on a member's future career following full clinical recovery.

ICD-9 CODES:
993.3 Decompression Sickness
993.30 Type I DCS, pain only
993.35 Type II DCS

10.3 EPILEPSY/SEIZURE

AEROMEDICAL CONCERNS: The aeromedical implication of a seizure in flight is severe.

WAIVER: A single, febrile seizure under age 5 is NCD. Two or more febrile convulsions are CD, waiver considered. A single seizure clearly attributable to a toxic cause may be considered for waiver. All other seizures are CD, no waiver. Myoclonic jerks associated with G-LOC are NCD.

INFORMATION REQUIRED:

1. Neurological consultation
2. EEG
3. MRI scan

TREATMENT: N/A for waiver purposes.

DISCUSSION: The risk of having a first seizure falls from about 0.4% at age 20 to 0.06% at age 50, before rising sharply to 0.8% 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, the risk of a second episode while not taking anticonvulsants is 64% over 3 years and 80% at 5 years, with over two thirds of these occurring during the first year. With no risk factors, such as previous neurological insult or a sibling with epilepsy, the risk of a second seizure is 23% at five years. Relapse, even after many years of symptom-free existence without therapy, is possible. These figures apply to individuals living at one atmosphere and one +Gz. The risk for seizure recurrence associated with exposure to the physiological stressors of military aviation is likely to be much higher. Etiologies for seizures in the adult include alcohol (25%), brain tumor (16%), cerebral infarction (14%), trauma (4%), miscellaneous (5%) and unknown (36%). The EEG does not prove or disprove the diagnosis, although an unequivocally abnormal EEG with a good history of seizure does support the diagnosis. EEGs are normal in half of the patients with frank epilepsy. An epileptiform EEG does not, by itself, signify the presence of epilepsy.

ICD-9 CODES:
780.3 Epilepsy/Seizure
780.3 Convulsive episode, unspecified cause
780.30 Infantile Seizure
345.9 Epilepsy

10.4 GUILLAIN-BARRE SYNDROME (ACUTE INFLAMMATORY DEMYELINATING POLYNEUROPATHY - AIDP)

AEROMEDICAL CONCERNS: Skeletal muscle weakness which can involve extremity, truncal or bulbar groups and typically evolves over a matter of several hours to a few days can affect flying and aircrew abilities, creating safety of flight as well as mission completion concerns. In the C. Miller-Fisher variant, ataxia as well as ophthalmoplegia (internal and external) accompanies the obligatory findings of areflexia. Dysautonomia may also be present, posing an additional concern regarding tolerance of gravitational force changes, blood pressure, and cardiac rhythm disturbances that may be especially life-threatening in the aviation environment.

WAIVER: A waiver can be considered after full recovery of strength and autonomic nervous system function. Tendon-stretch reflexes may never return, but would not prohibit waiver recommendation.

INFORMATION REQUIRED:

1. Neurology or PM&R (physical medicine and rehabilitation) consultation that includes quantified strength testing of all motor groups and assessment of autonomic nervous system function (orthostatic BP measurements, treadmill testing, and, if appropriate, thermal stress testing)
2. Functional cockpit and egress testing should be considered, but are not necessarily required
3. Gravitational tolerance testing should be performed if autonomic instability is a concern

TREATMENT: Plasmapheresis and/or intravenous immunoglobulin (IVIG) therapy is warranted in those cases which involve weakness progressing to the point of impairing walking or respiratory abilities. Adrenocorticosteroid therapy is not beneficial and may actually worsen the outcome.

DISCUSSION: Antecedent flu-like illness within two weeks prior to the onset of neurological symptoms occurs in approximately 65% of cases. This syndrome often occurs in clusters of small epidemic proportions and may have broad spectral presentations ranging from minor (e.g. Bell's palsy) to severe (complete paralysis of all skeletal muscle groups with respiratory and cardiovascular support dependency). Some of these patients may experience relapses and progress to chronic inflammatory demyelinating polyneuropathy (CIDP). HIV positive patients may present with AIDP. Lyme disease may mimic AIDP. The presence of pleocytosis in the CSF is incompatible with AIDP and suggests alternative diagnoses (e.g. sarcoidosis, leptomeningeal lymphomatosis).

ICD-9 CODE:
357.0 Guillain-Barre Syndrome

10.5 HEADACHES AND MIGRAINE (including headache algorithm)

AEROMEDICAL CONCERNS: Severe headaches can be incapacitating in flight, while milder headaches may act as a distraction. Migraine may involve visual and other aura, nausea and vomiting, and transient neurological deficits that may include aphasia, hemisensory and hemimotor impairment, vertigo, syncope, confusion, and disorientation. These are of obvious concern in aviation personnel. Cluster headaches are incapacitating and may be associated with transient neurological symptoms, lacrimation, and a unilateral Horner's syndrome.

WAIVER: The specific nomenclature or diagnostic label of the headaches is not the key factor for determining whether it is disqualifying. Of greater concern is the effect on general performance, special senses, and risk of recurrence. The aeromedical disposition of members with headache will depend on the frequency and severity of the symptoms, the etiology, and the medication required to control the headaches. The accompanying algorithm may be used to help determine whether a history of headache is disqualifying or not.

Severity criteria: If *any* of the following criteria are met, the headache is considered disqualifying:

1. Prohibits performance of required social, vocational or academic activities
2. Member sought Emergency Department, hospital or acute care
3. Neurological dysfunction other than nausea/vomiting or photophobia (especially disturbance of special senses, balance, or motor function)
4. Requires other than simple analgesics or non-pharmacologic methods for control.

Waiver Consideration Factors: If the headache is determined to be disqualifying, the following factors are considered in the waiver recommendation. Please note these conditions require evaluation by NAMI Neurology and Code 342 prior to issuance of clearance. A Local Board of Flight Surgeons or Aeromedical Summary should not issue clearance prior to review. The following factors should be considered when submitting for a waiver:

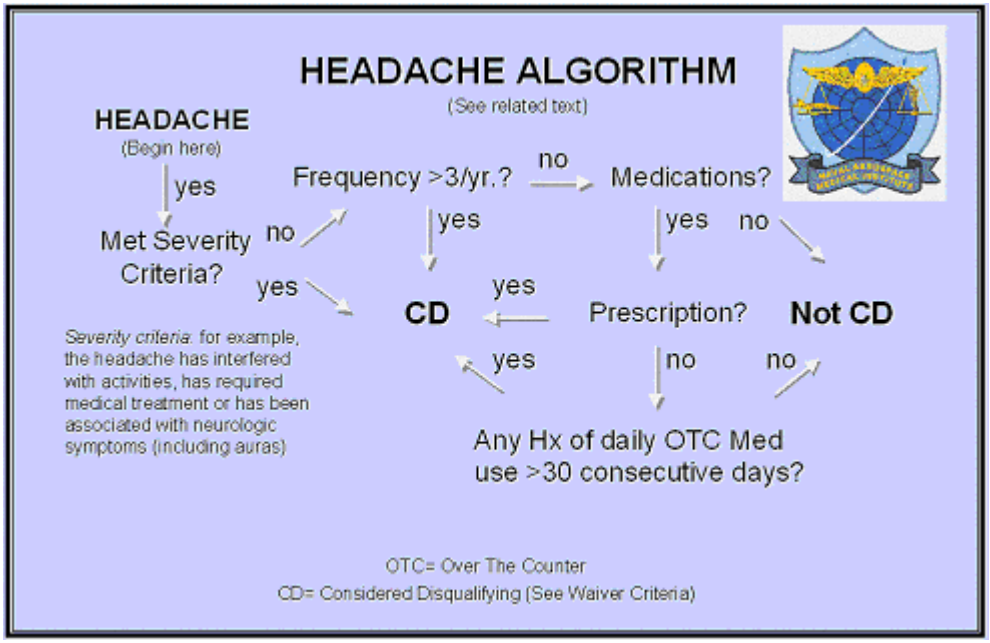
1. Frequency
   a. Severe headache occurred during flight
   b. More than three severe headaches per year
2. Predictability
3. Severity
4. History of any Incapacitation
5. Treatment Required
   a. Non-pharmacologic
   b. PRN abortive therapy
   c. Prophylactic therapy
      i. Verapamil daily considered for waiver if effective and without side effects
      ii. Topamax and inderal are not considered for waiver

6. Type of aircraft

7. Flight hours and experience
8. Specific diagnosis and presentation
9. Status
    a. Applicant or designated
    b. Class I vs. Class II/III

INFORMATION REQUIRED:

1. Neurology consultation



TREATMENT: Simple analgesics are acceptable. The use of NSAID's may be considered for waiver on a case-by-case basis. Life-style changes, biofeedback, and relaxation therapy, if successful, may permit return to flight status for the muscle-contraction or "tension" headache sufferer. Psychiatric/psychological evaluation of these members is strongly recommended. Lithium, methysergide, intranasal lidocaine, adrenocorticosteroids, oxygen inhalation, and sumatriptan may be effective in treating cluster headaches, however neither the cluster headaches nor these treatments generally would be considered for waiver. Although there are many effective pharmacologic treatments for migraine, most are incompatible with waiver.

DISCUSSION: Historically, migraine patients who have returned to flying duties claimed to have had no symptoms for periods ranging from 6 months to several years. This suggests that the original diagnosis was incorrect, that our understanding of the natural history of migraine is at fault, or that symptoms are being deliberately suppressed in order to return to flying. Migraines often begin in adolescence then may remit for several years, usually returning by mid-life. At least 70% of migraineurs have a family history for the same. Less than one third of patients have "classic" migraine with visual aura, but nearly one half will have paresthesias (usually lingual and perioral) with their attacks. Vertigo occurs in about 10% of the cases. Auras typically last 15 - 20 minutes and are followed by unilateral, throbbing headaches associated

with photo- and phonophobia, nausea, anorexia, and lethargy. Most patients prefer to lie in a dark quiet room for relief. Precipitants for migraine may include dairy products, chocolate, MSG, nitrates (preserved meats), tyramine (aged cheese, pickled herring, yogurt, fava beans), sleep deprivation, food deprivation, barometric pressure changes, ice cream, and alcoholic beverages. Digital pressure applied to the temples, cold packs, and caffeine are usually beneficial in providing relief. Many patients have a history of carsickness in childhood.

Cluster headaches occur almost exclusively in men, begin in the third or fourth decade, are unilateral, and never change sides. Clusters consist of recurrent severe headaches lasting about 45 minutes, several times daily for a few weeks to months at a time, with a tendency to recur annually, often around the summer or winter solstice.

Recurrent muscle-contraction or tension headaches are associated with depression in the majority of cases, however, underlying cervical spondylosis and DJD may be a contributing factor and will respond to NSAID's and physical therapy. Exertional headaches, cough headaches, and immersion headaches may be associated with posterior fossa pathology (especially Arnold-Chiari Malformation), thus warranting a MRI scan. Coital headaches are almost always benign. Incorrect prescription for astigmatism may also be a cause for headaches; however eye and ENT pathologic explanations are unlikely unless the patient has obvious gross clinical findings of disease in these areas.

ICD-9 CODES:
346.0 Migraine with aura
346.1 Migraine without aura
346.2 Cluster headache
346.8 Other forms of migraine (include ophthalmoplegic)
307.81 Tension headache

10.6 MULTIPLE SCLEROSIS

AEROMEDICAL CONCERNS: MS typically presents with visual disturbance, vertigo, lower body weakness, or sensory changes. The symptoms can present over a period of time as short as a few hours. Mild dementia may occur in 20% or more of patients. In some cases, paroxysmal events lasting less than 5 minutes (trigeminal neuralgia, abdominal "crises", myoclonus) can be the presenting feature.

WAIVER: A diagnosis of definite MS is permanently disqualifying without waiver. Waivers may be considered for uncertain diagnoses that may be classified as monosymptomatic demyelinating disease, possible MS, etc. Usually a period of grounding for observation of 6 to 12 months after full recovery from the "attack" of monosymptomatic disease is required. Laboratory findings are critical in predicting the likelihood of progression to MS.

INFORMATION REQUIRED:

1. Neurology consultation
2. Multimodality evoked potentials
3. MRI scans (brain and spinal cord)
4. CSF (cells, protein electrophoresis, IgG, oligoclonal bands, myelin basic protein)
5. Monocular color vision testing
6. Visual fields
7. Retinal photographs (if indicated)
8. Neuropsychological testing (if indicated)

TREATMENT: High dose intravenous methylprednisolone (250 mg qid x 3 days) followed by eleven days of tapering prednisone (1 mg/kg) given ASAP for the first "attack" of MS may reduce or delay the subsequent progression to relapsing-remitting or chronic progressive MS. Beta Interferon may also have a prophylactic or delaying effect on the development of MS.

DISCUSSION: The average age of onset is 33 years, with a male:female ratio of 2:3. The onset is of a single CNS white matter lesion in 55% of cases, with optic neuritis (ON) occurring in 16-30% of initial presentations. ON will occur at some time during the disease in 30-70% of cases, and 25% of these will have a recurrence of ON. In 90% of persons with ON, recovery is complete. Up to 20% of cases follow a benign course with no permanent disability, 20-30% follow an exacerbating/remitting course, 40% follow a remitting/progressive course, and 10-20% show steady progression. In the early stage the attack rate is 0.5/year falling to 0.25/year in intermediate years. In 5% of cases, there is a latent period of several years between first and second attacks, while in a few cases the disease becomes totally quiescent. The features suggesting favorable prognosis are onset before 35 years, acute onset with only 1 symptom, and predominantly sensory symptoms. Poor prognosis is associated with onset at age greater than 35 years, more than 1 symptom with each attack, early onset of motor signs within 5 years, and male gender.

ICD-9 CODES:
340.0 Multiple Sclerosis
341.9 Monosymptomatic demyelinating disease or possible MS

10.7 PERIPHERAL NEUROPATHY

AEROMEDICAL CONCERNS: Depending upon the nerve or nerves involved, peripheral nerve dysfunction may represent a trivial nuisance (e.g. meralgia paresthetica) or a grounding impairment (e.g. radial nerve palsy). Full recovery of neurological function, elucidation of the underlying etiology, and certainty regarding the prognosis are issues to be considered in the individual with peripheral nerve abnormalities.

WAIVER: Most conditions require grounding pending full recovery (if it occurs) and establishment of a firm diagnostic understanding of the cause of the patient's neuropathy.

INFORMATION REQUIRED:

1. Neurology consultation
2. Supporting laboratory findings (where appropriate), such as EMG, NCV, evoked potentials, thyroid functions, Lyme serology, VDRL, HIV, B12, folic acid, ESR, protein electrophoresis, heavy metals, etc.

TREATMENT: Depends on the underlying cause, if known and if treatment exists.

DISCUSSION:

Bell's Palsy: During the acute phase of the paralysis, grounding is required both as a result of the disabling nature of acute facial nerve weakness (difficulty speaking clearly, inability to blink and close the eye in response to visual threats) and because of the fact that not all Bell's palsies are mononeuropathies (i.e. may evolve into acute inflammatory demyelinating polyneuropathy a.k.a. Guillain-Barre, or may be associated with other systemic conditions such as Lyme disease or sarcoid). Once full function has returned, member is PQ. In the event of incomplete recovery or recurrence of facial palsy, waivers are considered on a case-by-case basis.

Carpal Tunnel Syndrome: Safety of flight concerns due to impaired fine motor coordination, strength, sensation, and abnormal sensations in the fingers and hands require grounding until adequate resolution of the neuropathy has been achieved. Waiver requests should include results of electrophysiological studies and functional demonstration of satisfactory recovery (e.g. performance in simulator, cockpit egress testing, operation of safety harness and parachute fittings, etc).

Ulnar/Radial Neuropathy: Same as for Carpal Tunnel Syndrome.

Peroneal Neuropathy: Must demonstrate sufficient return of strength to control rudder and brake pedals and safely egress from aircraft (documented by actual testing) to be considered for waiver. Please also submit electrophysiological test results.

Sciatica: Return of strength (as for peroneal neuropathy) in addition to disappearance of pain (off medication) is required for waiver consideration.

Meralgia Paresthetica: As this is only a sensory neuropathy, waiver can be recommended as long as the member is not disabled or impaired by discomfort and can tolerate the symptoms without need of medication.

ICD-9 CODES:
351.0 Bell's Palsy
355.0 Sciatica
355.1 Meralgia Paresthetica
354.0 Carpal Tunnel Syndrome
356.1 Peroneal neuropathy

10.8 SUBARACHNOID HEMORRHAGE (SAH)

AEROMEDICAL CONCERNS: The major risk is rebleeding, but there is also a risk of developing hydrocephalus. Bleeding usually follows sudden increases in blood pressure, and it is likely that the anti-G straining maneuver could be just as effective in this as exercise, lifting, or defecation.

WAIVER: Waiver is not usually granted for patients who have undergone surgical repair of leaking intracerebral aneurysms or removal of AVM's. Patients who have recovered fully from idiopathic SAH with conservative measures may be considered for waiver after 2 years. Patients who have undergone surgical repair of unruptured aneurysms and exceptional cases of repaired ruptured aneurysms may be considered for waiver by way of SBFS.

INFORMATION REQUIRED:

1. Neurosurgical opinion and confirmation of successful obliteration of the vascular anomaly
2. Neurological evaluation
3. Neuropsychological evaluation
4. MRI or CT scan to confirm absence of hydrocephalus or superficial siderosis

TREATMENT: Intracranial surgery is disqualifying for flying duties.

DISCUSSION: Most patients with this condition have ruptured a Berry aneurysm. Approximately 5% have bled from an AVM and 15% have no identifiable cause. About 25% of patients treated conservatively die within 24 hours of rupture of intracranial aneurysm and up to 25% die in the following 6 months from recurrent hemorrhage, cerebral infarction, or following vasospasm. In the survivors, the risk of rebleeding is just over 2% for the first year declining to almost 1%/year after that. Only 32% of such cases are reported to lead a normal life after the bleed. Those patients in whom no cause is found tend to have a better prognosis. Aneurysms are multiple in 10-20% of cases, and the rate of rebleeding for these is 3% a year. In those patients treated surgically, the risk of rebleeding is negligible if the aneurysm is solitary and has been successfully isolated from the cerebral circulation, but up to 20% of such patients exhibit cognitive or psychosocial decrements at one year. AVMs cause less early death (about 10%); the risk of rebleeding is 7% in the first year and 3% a year thereafter. In patients with AVMs who did not undergo operative repair and were followed for 20 years, there was a 42% incidence of hemorrhage, 29% incidence of death, 18% risk of epilepsy, and a 27% chance of having neurological impairment.

ICD-9 CODE:
430 Subarachnoid Hemorrhage (SAH)

10.9 SYNCOPE

AEROMEDICAL CONCERNS: Loss of consciousness in flight.

WAIVER: A waiver is not required for simple episodes of vasovagal syncope, with known precipitating causes such as pain or the sight of blood. Normal physiological syncope in response to a training event (i.e. hypoxia demonstrated in a hypobaric chamber or G-induced loss of consciousness (G-LOC) in a centrifuge) does not require a waiver. A waiver is necessary for unexplained syncope, recurrent syncope, syncope associated with pathology (e.g. cardiac conduction or valvular defect), syncope with LOC > 1 minute, delay in recovery of normal function > 5 minutes, or G-LOC > 18 seconds, or syncope associated with convulsions lasting over 6 seconds. Non-waiverable situational syncope includes cough-, postural-, Valsalva-, and exertion-induced syncope.

INFORMATION REQUIRED:

1. Detailed history of the event(s)
2. Physical exam
3. EKG
4. Additional cardiovascular studies as indicated (see Syncope algorithm)
5. Psychiatric evaluation (as indicated)

SYNCOPE WORK-UP

Syncopal Episode → **History, Physical, EKG** → **Clear Diagnosis?** [Yes] → **DIAGNOSIS**
Arrythmia (eg. PSVT)
Seizure; Vasovagal
Orthostatic Hypotension

[No] ↓

Holter Monitor ← [Yes] **Cardiac Findings?** [No] → **Psychiatric Evaluation**
(Without clear Dx)

↓ ↓

DIAGNOSIS ← [Yes] **Diagnostic?**
Arrythmia
Heart Block

[No] ↓

Electrophysiologic Study ↓

DIAGNOSIS ← [Yes] **Diagnostic?** [No] →→ **Tilt Test** [Normal] →→→→→ **DIAGNOSIS**
Arrythmia
Unexplained Syncope

[Abnormal] ↓

DIAGNOSIS
Orthostasis
Other

DIAGNOSIS ← ← [Yes] **Diagnostic?**
Panic Disorder
Depression
Somatization

[No] ↓

TREATMENT: Avoidance of known stressors (if possible).

DISCUSSION: In 12% of patients with syncope, some type of convulsive movement may occur. Careful history taking, the presence of facial pallor, and the rapid recovery without amnesia help to distinguish syncope from epilepsy. Head injury sustained during the fall may confuse the issue. Presence or absence of incontinence does not help in distinguishing between syncope and seizure. Tongue-biting is strong evidence in support of a seizure and is unlikely in syncope. Recurrent unexplained syncope often can be attributed to psychiatric causes, especially panic disorder, depression, and somatization. Brain scans, EEGs, carotid ultrasound, and lab tests are not usually helpful in arriving at a cause for syncope. If the history, PE, and EKG don't provide the diagnosis, it is unlikely that further studies will help. In cases of cough-, Valsalva- and exertion-induced syncope, remember to consider posterior fossa pathology, especially Arnold-Chiari malformation.

ICD-9 CODE:
780.2 Syncope

10.10 SLEEP DISORDERS (July 2009)

AEROMEDICAL CONCERNS: Disorders of sleep architecture and timing are common in the general population. These disorders frequently result in complaints of excessive daytime somnolence or insomnia with demonstrable deficits in cognitive and psychomotor performance. Aviation personnel perform a variety of complex tasks requiring a high degree of mental and physical well being. Fatigue, sleepiness, and circadian rhythm disturbances can have a critical effect on aviation safety.

WAIVER: Because of the persistent nature and impact on psychomotor and cognitive performance, a history of sleep disorders is generally considered permanently disqualifying without waiver. Waivers may be considered in cases when successfully treated.

INFORMATION REQUIRED:

1. Neurology/sleep specialist consultation with polysomnography (PSG)
2. Vigilance testing (see: The Nerve Center)
3. Psychiatric evaluation (as indicated)

TREATMENT: Treatment options for the sleep disorders vary based upon diagnosis.

DISCUSSION: Diagnosis of a potential sleep disorder requires a detailed history around the individuals sleep complaint. This should include severity, duration, details of sleep schedule, collateral history from a spouse or partner regarding snoring or apneas, significant environmental stressors, and any evidence of underling psychopathology. Prior to referral to a specialist, every attempt should be made to distinguish a pathologic sleep disorder from poor sleep hygiene. In these cases, simple behavioral modifications may be all that is needed to return the individual to normal function.

Further discussion on the following are discussed below: somnambulism, obstructive sleep apnea, insomnia, idiopathic hypersomnia, narcolepsy, periodic limb movement disorder, restless legs syndrome, and circadian rhythm disorders.

Somnambulism: Due to undesirable or fatal activities that can occur while sleepwalking, a history after age 12 is disqualifying for naval duty, but waivers have been granted for general duty. Sleepwalking episodes typically occur in children before puberty. It is unusual after age 12, with most outgrowing these episodes by age 15. The prevalence in adults has been reported to be approximately 1%, with most persisting from puberty. Recurrent sleepwalking rarely may be associated with a seizure disorder. Other disorders can result in nocturnal wandering (i.e. REM sleep behavior disorder, dissociative disorders, and sleep apnea). These disorders need to be investigated before a primary diagnosis of somnambulism is given. Due to the variable and unpredictable risk to the individual onboard ship, this condition is generally not waived for aviation duty.

Obstructive Sleep Apnea (OSA): OSA has emerged as a major sleep disorder and accounts for the majority of requests for sleep related waiver submissions. Members generally present with complaints of excessive daytime sleepiness (EDS) and snoring. Estimates are that OSA afflicts 1-10% of the general public and has been associated with an increased risk of cardiovascular complications, especially hypertension. Prevalence in aviation personnel is not known. Accurate diagnosis of OSA requires polysomnograghy (PSG) at a sleep disorders laboratory. An important OSA variant is Upper Airway Resistance Syndrome (UARS). UARS does not show the characteristic apneas of OSA, but arousals correlate with excessively negative intrathoracic pressures on esophageal manometry. Manometry is not part of the routine sleep study, and therefore UARS is usually a presumptive diagnosis when a snoring, tired, sleep-fragmented patient responds to nasal continuous airway pressure (CPAP). CPAP is considered the treatment of first choice in OSA. CPAP may be used for designated aviation personnel. CPAP use IS NOT approved for aviation applicants. There has been concern raised regarding the deployability of members on ship with CPAP, however CPAP has been successfully deployed in the aircraft carrier environment. Approval for use of CPAP aboard ship must be obtained from the Commanding Officer of the ship in advance (with the Senior Medical Officer's endorsement). Another option is uvulopharyngopalatoplasty (UPPP). UPPP is very effective for treating snoring associated with OSA, but has a less than 50% cure rate for apnea. Oral appliances are less effective than UPPP and not well tolerated, but are a noninvasive alternative in mild to moderate cases. Both are considered second line therapies. Waivers may be considered for OSA with UPPP and/or CPAP after complete resolution of symptoms and documentation of no Excessive Daytime Sleepiness (EDS) by vigilance testing. EDS must be documented objectively (for more details go to The Nerve Center).

Insomnia: The term insomnia is a symptom rather than a specific diagnosis. Insomnia refers to difficulty initiating or maintaining sleep. Among individuals complaining of sleep problems, insomnia is the most common complaint. Insomnia can result from a multitude of diagnoses, including sleep apnea and periodic leg movement disorder. Insomnia is commonly associated with psychiatric disorders including anxiety, depression, personality disorders, or maladaptive traits. Transitional situational insomnia can also result from changes in sleeping environment or in proximity to a significant life event. The psychology of insomnia can occur as a result of a preoccupation with a perceived inability to sleep, or when poor sleep habits persist following resolution of a life stressor. Drug or alcohol related insomnia is another common cause of this complaint. This can result from a variety of agents, including caffeine, which may disrupt sleep architecture as long as 14 hours after ingestion. Most insomnia complaints are transient, resolve in less than 3-4 weeks, and do not require a waiver. Persistent insomnia requires work-up to define an underlying cause. In those cases where an underlying cause is not found, the term Primary Insomnia has been used. Treatment of the underlying diagnosis and a normal sleep study are required before waiver submission.

Idiopathic Hypersomnia: This is a diagnosis of exclusion. It is characterized by complaints of excessive daytime somnolence, generally develops in adolescence or early adulthood, and is persistent. It is important to differentiate this from Upper Airway Resistance Syndrome, a variant of OSA. Stimulant medications are frequently used in treatment and are not compatible with aviation duty. Despite adequate treatment, it is difficult for patients to maintain adequate task performance. Waiver will not be considered for this diagnosis.

Narcolepsy: Narcolepsy affects 50-70 persons per 100,000. Peak onset occurs in the teens and the 25-30 year age group. The classical tetrad of symptoms includes excessive daytime sleepiness, cataplexy, hypnogogic hallucinations, and sleep paralysis, but not all of these are present in every individual. There is a 40-fold increased risk if there is an immediate family member with the disorder. EDS and sleep attacks are generally the first symptoms observed. Diagnosis is confirmed by sleep studies including a polysomnogram and a Multiple Sleep Latency Test (MSLT). The disorder is characterized by short sleep latencies and rapid-onset REM. Treatment consists of stimulants, which are not compatible with aviation duties. Waivers will not be considered for this diagnosis.

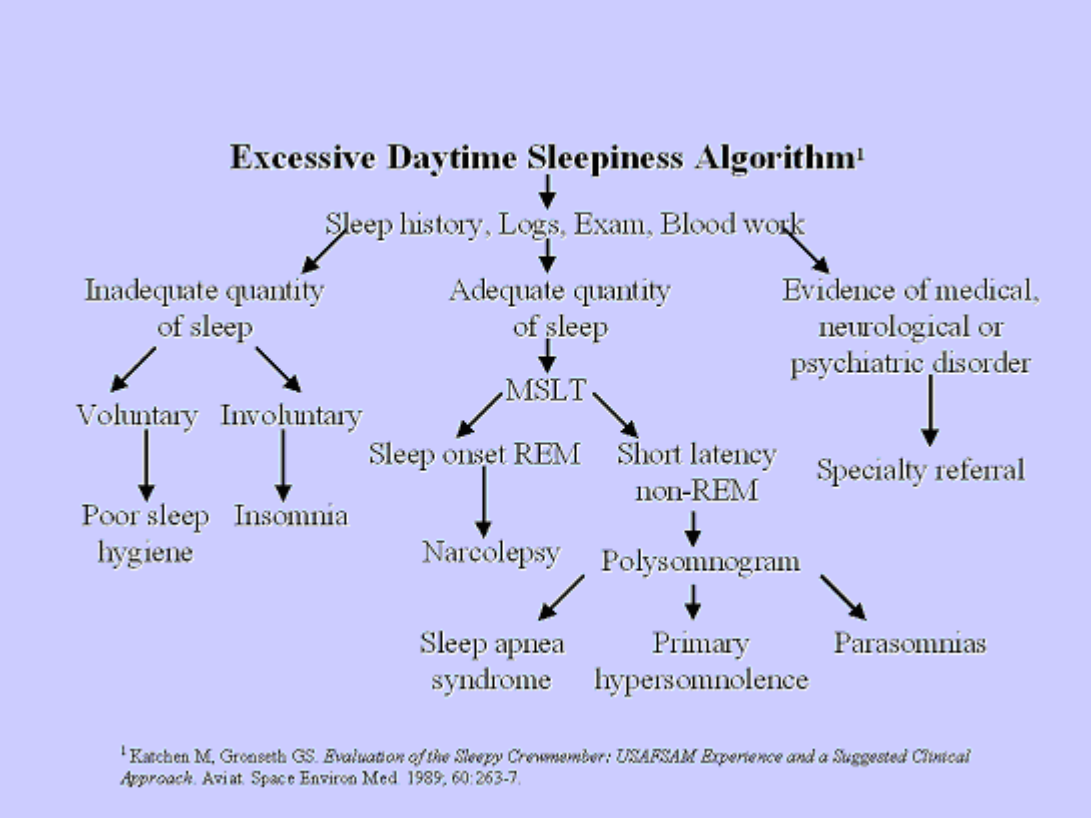
Periodic Limb Movement Disorder (PLM): This disorder is manifested by rhythmic nocturnal myoclonus of the arms and legs and may last minutes to hours. It occurs in the first half of the sleep period and may result in frequent arousals and sleep fragmentation. PLM is present in 17% of those having a polysomnogram for insomnia and can coexist with other sleep disorders including narcolepsy and sleep apnea. 11% of individuals with PLM complain of excessive daytime sleepiness. Treatment consists of benzodiazepines (e.g. clonazepam), which are not consistent with aviation duty. Waivers will not be considered for this diagnosis.

Restless Legs Syndrome (RLS): This disorder is manifested by uncomfortable leg sensations that occur at rest. Unlike PLM, night time awakenings in RLS are associated with conscious awareness of the limb movements. RLS affects up to 10% of the U.S. population and over 90% of patients with RLS report sleep disturbance. Despite this, RLS is typically under diagnosed. Only 30% of PLM patients have RLS, but 85% of cases with RLS will also have PLM. Waivers are not considered in patients with PLM. Primary idiopathic RLS manifests an early age and is associated with a better prognosis than secondary RLS. Secondary RLS may occur as a result of pregnancy, end stage renal disease, arthritis and iron deficiency. The severity of RLS symptoms correlates inversely with serum ferritin levels in iron deficient individuals. Iron and magnesium supplementation may resolve RLS, but iron supplementation is not therapeutic in those individuals with ferritin levels above 50ng/mL. Beneficial lifestyle modifications include alterations in timing, duration and intensity of physical exercise, elimination of alcohol, caffeine and tobacco products as well as optimization of personal sleep hygiene. Stretching, hot baths, alternation of warm and cold soaks to the legs, engaging in mentally engrossing activity and cooling of the feet have also been reported to alleviate symptoms. Waivers are not considered for applicants. For designated aviators, vigilance testing and polysomnogram are required for waiver consideration. Underlying medical conditions in secondary RLS must be addressed. Medications such as opiates, tramadol, clonazepam, and dopaminergic agents such as levodopa, ropinirole and pramipexole, are not approved for waivers due to common side effects.

Circadian Rhythm Disorders: This refers to a series of disorders in which there is a disorganization of the regular daily alteration between sleep and wakefulness and its synchrony with the day-night cycle. These disorders can be classified as either persistent or transient. The persistent disorders include Delayed Sleep Phase Syndrome (DSPS), Advanced Sleep Phase Syndrome (ASPS), Non-24 hour Sleep Syndrome, and Irregular Sleep-Wake Syndrome. In DSPS, the circadian system is shifted markedly later than normal (e.g., unable to fall asleep before 3 am and cannot wake up before noon without extraordinary effort). This syndrome occurs in young to middle aged adults. DSPS has been estimated to occur in over 7% of

adolescents. It should be noted that the remaining diagnoses are rare. ASPS occurs in the aged and is the exact opposite circadian shift seen in DSPS. In Non- 24 hour Sleep-Wake Syndrome, environmental cues fail to synchronize the internal sleep-wake rhythm with the day-night cycle. This results in the circadian rhythm being shifted 1-2 hours later each day, resulting in cyclical insomnia. Irregular Sleep-wake Syndrome represents a failure of the internal clock. It is manifested by random, scattered sleep-wake periods throughout the 24-hour period. This is usually associated with a tumor or other destructive neurological lesion. Transient conditions include Time-zone Change Syndrome or "Jet-Lag" and Shift-work Syndrome. Jet-Lag is a self-limiting and is NCD, but may necessitate grounding until re-synchrony occurs. The transient sleep disruptions and performance decrements seen in jet-lag may become chronic in the shift worker. Individuals affected severely enough to seek medical attention may best be treated by removal from the shift-work environment. In almost all cases this condition is not compatible with aviation duty and is CD, waiver not recommended. All persistent disorders are CD, but waiver may be considered in successfully treated cases. One should recognize that treatment of these disorders involves sleep schedule manipulations and successful treatment only occurs in a small percentage of individuals.

Medical Conditions that may disrupt normal sleep include depression (20%), post-viral fatigue syndrome, head injury, anemia, hypoglycemia, thyroid disease, drugs/alcohol, pain, GERD, and pulmonary disease, among others. Treatment of the medical condition generally resolves the sleep complaint.



ICD-9 CODES:
307.40 Nonorganic sleep disorder NOS
307.42 Persistent disorder of initiating or maintaining sleep
307.44 Primary Hypersomnia
307.45 Circadian Rhythm Sleep Disorder
307.46 Somnambulism or Night Terrors
333.94 Restless Legs Syndrome
347.00 Narcolepsy
780.57 Sleep Apnea, NOS
780.51 Insomnia with sleep apnea
780.52 Insomnia NEC
780.59 Other Sleep Disturbance

10.11 TRANSIENT ISCHEMIC ATTACK (TIA)

AEROMEDICAL CONCERNS: The symptoms develop abruptly and are unrelated to any particular activity. Symptoms depend on the distribution of the blood vessel concerned and can range from distracting to incapacitating.

WAIVER: TIA's are permanently disqualifying. In rare cases where a curable cause is identified and treated (e.g. ASD with aneurysmal defect - surgically cured), referral for SBFS waiver consideration may be undertaken.

INFORMATION REQUIRED:

1. Neurology consultation
2. MRI scan
3. ECHO (to include bubble-contrast and if negative, trans-esophageal ECHO)
4. Cerebral angiography
5. ESR
6. Lupus anticoagulant
7. Antiphospholipid antibodies
8. CBC (including platelet count)
9. Coagulation studies (PT, PTT)
10. Protein S
11. Homocysteine levels

TREATMENT: Treatment depends upon the underlying cause, if identified. If no surgically correctable etiology, then ASA, low-dose Coumadin, or ticlopidine may be appropriate. Life-style changes and treatment of risk factors (smoking, obesity, HBP, diabetes, hyperlipidemia, alcohol excess, sedentary behavior) need be explored.

DISCUSSION: About 25% of patients with TIA do not appear to have any identifiable serious disease. Approximately 30% have a potential cardiac cause and diabetes is present in 6-28% of patients with TIA. The risk of developing cerebral infarction following TIA is 5-7% a year, with a further 5% a year developing myocardial infarction. The risk of stroke and/or death is 10% a year. These risks rise with age, blood pressure, and the presence of ischemic heart disease. In cases of purely retinal TIA (amaurosis fugax), the 7 year cumulative rate of cerebral infarction is 14% and the 5 year cumulative rate of recurrence is 37%.

ICD-9 CODE:
435.9 Transient Ischemic Attack (TIA)

10.12 TRAUMATIC BRAIN INJURY – MILD

Loss of consciousness (LOC) + post-traumatic amnesia (PTA) = 5 to 60 minutes

Note: Minor Traumatic Brain Injury (PTA + LOC less than five minutes) requires only a careful neurological exam by the examining flight surgeon; if exam is normal condition is NCD.

AEROMEDICAL CONCERNS: Clinically these may appear to be mild injuries, although a surprising percentage of these patients (up to 11%) have significant craniocerebral damage (basilar skull fractures, linear as well as depressed skull fractures, sinus fractures, intracranial hemorrhages, fronto-temporal contusions) which would upgrade the severity level of their injury.

WAIVER: A waiver may be considered as soon as the required work-up is completed. Applicants who have not completed the required workup will be required to wait two years before requesting a waiver.

INFORMATION REQUIRED:

1. Neurology consultation
2. Neuropsychological consultation (e.g. CogScreen-AE plus assessment of memory and information processing skills)
3. Brain imaging study (CT or MRI).

TREATMENT: All patients with head injury causing either loss of consciousness or amnesia (no matter how long) should undergo brain imaging (preferably CT) ASAP as part of initial management.

DISCUSSION: Acute post-traumatic seizures (within one hour of the injury) are not a factor in determining the risk for developing post-traumatic epilepsy (PTE). The risk of developing PTE is not appreciably greater in the mildly head injured population than in the general population. There is a risk of posttraumatic cognitive problems (e.g. memory and information processing skills) and recovery should be documented prior to requesting a waiver.

ICD-9 CODE:
854.06 Traumatic Brain Injury - MILD

10.13 TRAUMATIC BRAIN INJURY – MODERATE

LOC + PTA = 1-24 hours

AEROMEDICAL CONCERNS: Risks include personality and performance changes and the development of posttraumatic epilepsy (PTE).

WAIVER: May be considered for waiver after 12 months grounding. Applicants will not be considered until three years post-injury unless they have completed the required workup.

INFORMATION REQUIRED:

1. Neurology consultation
2. Neuropsychological consultation (e.g. CogScreen-AE plus assessment of memory and information processing skills)
3. Brain imaging study (CT or MRI).

TREATMENT: These patients should undergo initial CT scanning and if neurologically impaired, repeat scanning within 12 hours of the injury in order to detect "delayed" or progressive intracranial damage that would warrant a change of therapy. Non-surgical measures consist of the basic "ABCs" of ATLS, 30 degrees head elevation, beta-blockers as needed for control of elevated blood pressure, and, when indicated, intubation with hyperventilation, mannitol, and THAM to manage increased ICP (best done with intracranial pressure monitoring).

DISCUSSION: The risk of PTE in cases of moderate head injury at one and 5 years is 0.6% and 1.6%. Of those individuals who develop PTE, 80% do so within the first 2 years. The risk then declines to equal that of the normal population by 10 years post-injury. Approximately 50% of cases with PTE will spontaneously remit within 20 years.

ICD-9 CODE:
854.07 Traumatic Brain Injury - Moderate

10.14 TRAUMATIC BRAIN INJURY - SEVERE

LOC + PTA > 24 hours

AEROMEDICAL CONCERNS: In cases of severe traumatic brain injury, there are greater risks for the development of post-traumatic epilepsy (PTE) and the persistence of permanent neurological and neuropsychological sequelae.

WAIVER: After 30 months grounding, designated personnel may be considered for waiver following NAMI review, patient evaluation, and/or SBFS. Applicants who have not completed the required workup will be required to wait five years prior to waiver consideration.

INFORMATION REQUIRED:

1. Neurology consultation
2. Neuropsychological consultation (e.g. CogScreen-AE plus assessment of memory and information processing skills)
3. Brain imaging study (CT or MRI).

Note that EEGs are no longer required as they have very poor predictive value for PTE. Furthermore, the finding of eplileptiform activity in the EEG following head injury has only a 14% correlation with the development of PTE, while fully one half of patients with epilepsy will have normal or non-diagnostic EEG findings even after the clinical appearance of seizures.

TREATMENT: These patients require neuro-ICU level care, frequently with neurosurgical intervention as well.

DISCUSSION: The cumulative risk of PTE at one and 5 years is 7.1% and 13.3%.

ICD-9 CODE:
854.08 Traumatic Brain Injury - Severe

10.15 TRAUMATIC BRAIN INJURY - PERMANENTLY DISQUALIFIED

Permanently disqualifying for all aviation personnel (designated, student, or applicant):

1. Depressed skull fracture with LOC > 5 minutes
2. PTS > one month
3. LOC & PTA > 1 month
4. CSF leak > 7 days
5. Any intracranial bleeding (SDH, EDH, ICH, IVH, SAH)*
6. Dural penetration (traumatic or surgical)
7. Post-traumatic seizures

AEROMEDICAL CONCERNS: These patients are likely to have permanent, disabling residual neurological and neuropsychological impairments as well as an unacceptably high risk for PTE.*

WAIVER: These members are usually permanently NPQ, no waiver, with rare exceptions.

INFORMATION REQUIRED: Rare exceptions may be considered for Special Board of Flight Surgeons (SBFS).

TREATMENT: In addition to neuro-ICU and neurosurgical care, these patients require long-term neuro-rehab care as well.

*Glossary
SDH
Subdural Hematoma
EDH
Epidural Hematoma

ICH
Intracranial Hemorrhage
IVH
Intraventricular Hemorrhage

SAH
Subarachnoid Hemorrhage
PTE
Post Traumatic Epilepsy

ICD-9 CODE:
854.0 Traumatic Brain Injury - Permanently Disqualified

10.16 Aeromedical Disposition of Traumatic Brain Injuries

Severity	PTA+LOC	GCS	Work-up Documentation				Eligible for Waiver *
.	.	(Lowest score within 24 hour of injury)	FS Exam	Neuro Consult	Neuro Psych Testing	Imaging Study	.
Minor	< 5 min	-	X	.	.	.	NCD
Mild	>5 min but <1 hr or...	13-15	X	X	X	X	LBFS when workup complete
Moderate	>1 hr but <24 hr or...	9-12	X	X	X	X	NAMI review at12 months
Severe	>24 hr or...	3-8	X	X	X	X	NAMI review/eval at 30 months
Penetrating	.	.	.	.	.	.	No waiver

NOTES:

- In all but minor injuries, submission of pertinent contemporaneous medical records is required.
- Waiver eligibility times predicated based on normal exams, neuropsychological testing, imaging studies, etc.
- Any abnormalities or irregularities must be reviewed at NAMI (submit actual films or studies)
- Applicants with history of mild TBI more than 2 years previously require only a normal detailed neurological exam by Flight Surgeon.
- Applicants with history of moderate TBI more than 3 years previously require only a normal detailed neurological exam by FS.
- Applicants with history of severe TBI more than 5 years previously require only a normal detailed neurological exam by FS

11.0 OBSTETRICS AND GYNECOLOGY

11.1 CHRONIC PELVIC PAIN

AEROMEDICAL CONCERNS: Chronic recurrent pain can be a distraction in flight and may occasionally cause incapacitation. Chronic pelvic pain is defined as pelvic pain present throughout most of the menstrual cycle for 3 or more months. The causes of chronic pelvic pain include gynecological etiology, GI tract, urinary tract, musculoskeletal, and psychiatric conditions. Aircrew should be grounded during a work-up for chronic pelvic pain until the etiology is known and the condition is controlled. Waivers may be considered for the individual causes.

WAIVER: Chronic pelvic pain is CD. Waiver recommendations will be highly individualized depending on cause and degree of treatment.

INFORMATION REQUIRED:

1. Full gynecological evaluation
2. GI consult (as appropriate)
3. Orthopedic consult (as appropriate)
4. Psychiatry consult (as appropriate)

TREATMENT: If chronic pelvic pain is of gynecologic etiology, more than 50% of cases will be controlled with NSAIDS and oral contraceptives. Laparoscopy may be required for diagnosis and treatment. Therapy should be directed at the cause and, if successful, a waiver should be recommended.

DISCUSSION: Gynecological causes for chronic pelvic pain include:

- Endometriosis
- Dysmenorrhea
- Adhesive disease
- Uterine fibroids
- Ovarian cysts
- Adenomyosis
- Pelvic Inflammatory Disease/Infection

11.2 DYSPLASIA

AEROMEDICAL CONCERNS: There are no specific aeromedical concerns for cervical dysplasia. Treatment for cervical dysplasia may require temporary grounding for a period of 2-4 weeks after surgical procedures. The need for frequent retreatment or follow-up may restrict deployability.

WAIVER: Not required. Condition is NCD. Carcinoma in Situ (CIS) or any degree of malignancy is CD and considered for waiver on a case by case basis. See Chapter 9, Malignancies, for further guidance.

INFORMATION REQUIRED:

1. Gynecological evaluation
2. Follow-up is recommended as per the member's Gynecologist

TREATMENT: Dysplasia may require frequent colposcopy and biopsy and increased frequency of Pap smear follow-up. High-grade squamous intraepithelial lesions (HGSIL) require colposcopy and may need surgical treatment (LEEP, Cold knife conization (CKC)). Evaluation of HGSIL is not emergent and should be performed within 2-4 months. Low grade SIL requires repeat pap smears at 3-4 month intervals and, if persistently abnormal, should be treated as HGSIL.

DISCUSSION: The current grading system for pap smears is quite simple and includes only normal, LGSIL, or HGSIL. The cytopathologist's comments on adequacy of specimen and other minor abnormalities tend to be confusing. Anything less than HGSIL need only be followed with pap smears every 3-6 months. There is nothing about dysplasia per se that is disqualifying, but it is important to note that abnormal pap smears should NOT be ignored and gynecology consultation is recommended.

ICD-9 CODE:
622.1 Cervical dysplasia

11.3 ENDOMETRIOSIS

AEROMEDICAL CONCERNS: Dysmenorrhea, intermenstrual pain, and backache can be distracting and the menorrhagia in some women can produce anemia. There is also a rare association with spontaneous pneumothorax.

WAIVER: Mild endometriosis, requiring only mild analgesia and oral contraceptive pills is NCD. The use of any medication requires supervision by a Flight Surgeon. For more recalcitrant cases, a waiver can be recommended when the symptoms are controlled; recommendations will be on a case-by-case basis depending on symptoms and medications.

INFORMATION REQUIRED:

1. Gynecology evaluation

TREATMENT: Mild analgesia is permitted without requiring a waiver. The use of progesterone or anti-gonadotropin agents such as Danazol may be compatible with selected flight duties once the patient is stabilized on therapy. Patients may also return to flying duties after conservative surgical treatment including laser ablation.

DISCUSSION: Danazol, if used for medical treatment of endometriosis to suppress the pituitary-ovarian axis, may cause fluid retention. An increase in the incidence of migraine cephalgia has also been reported. Gonadotropin releasing hormone (GnRH) analogs can lead to perimenopausal symptoms including hot flashes and mood alterations. The ultimate cure of endometriosis is total abdominal hysterectomy and bilateral salpingo-oophorectomy (TAHBSO). Following this procedure, patients should be placed on estrogen replacement therapy and should be considered fit for duty without need for waiver.

ICD-9 CODES:
617 Endometriosis
617.0 Endometriosis of uterus
617.9 Endometriosis, site unspecified

11.4 HORMONAL REPLACEMENT THERAPY AND CONTRACEPTION

DEFINITION: Hormonal replacement therapy and contraception includes birth control, estrogen replacement therapy, and hormone replacement therapy.

AEROMEDICAL CONCERNS: Alterations of hormone balance may lead to nausea and vomiting, depression, bloating, and emotional irritability. Regardless of the reasons for initiation of estrogen hormones, an initial down period of two weeks in order to assess tolerance is recommended.

WAIVER: Waiver is not required. Use of estrogen and progesterone preparations is NCD.

INFORMATION REQUIRED:

1. Annual gynecological exam per OPNAVINST 6000.1 series
   a. Pap smear
   b. Breast examination
   c. Pelvic exam

TREATMENT: None

DISCUSSION: Oral contraceptives in the current dosing formulations contain very low doses of estrogen/progesterone and have minimal side effects. If a patient has taken any preparation of oral contraceptive pill in the past and tolerated it well, a down period is not required. However, as with all medications, the use (or resumption) of contraceptive medication must be with the approval of the local flight surgeon. Side effects of combination oral hormonal contraceptives may include nausea, vomiting, depression or irritability, weight gain and headaches. Side effects of progesterone only preparations (Depo-Provera, Micronor, Norplant, etc.) may include depression, irregular vaginal spotting, bloating, and fluid retention.

Estrogen replacement therapy is generally well tolerated when given in recommended physiologic doses and is strongly recommended for all women without endogenous production of estrogen. Replacement therapy constitutes reestablishing the normal physiologic levels of estrogen/progesterone. This replacement should not be construed as introducing a foreign chemical into the body but rather the restoration of the natural state. Estrogen replacement therapy involves a lower dose of estrogen than is in use in currently available oral contraceptives (Ethinyl estradiol in a dose of 5 micrograms is equivalent to 0.625mg conjugated estrogens).

11.5 PELVIC INFLAMMATORY DISEASE

AEROMEDICAL CONCERNS: Pelvic inflammatory disease is an acute infection of the upper female genital tract characterized by severe lower abdominal pain. Sequelae can include chronic pelvic pain and infertility. Aviation personnel should be grounded during treatment of the acute phase.

WAIVER: A history of pelvic inflammatory disease (PID) in female aircrew who are symptom free is NCD. Female aircrew members who have chronic pelvic pain as a sequelae to PID should be evaluated by a Gynecologist and a waiver may be recommended on a case-by-case basis.

INFORMATION REQUIRED:

1. Gynecology consult
2. Documenting resolution of acute PID

TREATMENT: Antibiotic treatment during the acute phase will result in grounding. Initial outpatient treatment is Rocephin® 250 mg IM plus Doxycycline 100 mg bid for 14 days. Patients should be re-evaluated in two days if symptoms are not better. In those cases, the diagnosis of PID should be reconsidered or the patient should be admitted to the hospital for IV antibiotic treatment. Surgical treatment for the sequelae of PID (adhesions) is compatible with a return to flying duties. Patients may return to flying one week after laparoscopy provided they remain asymptomatic.

DISCUSSION: The incidence of PID in the US is approximately 1% in young females. The diagnosis of pelvic inflammatory disease is made based upon the triad of abdominal pain, cervical motion tenderness, and adnexal tenderness (usually bilaterally) along with any one of multiple non-specific indications of inflammation or infection (e.g. temperature elevation, leukocytosis, leukorrhea, etc). Many women are improperly diagnosed with PID, and definitive diagnosis is made with laparoscopy. Sequelae include pelvic adhesions, infertility, chronic pelvic pain, and increased risk for ectopic pregnancy.

ICD-9 CODE:
614.9 Pelvic Inflammatory Disease

11.6 PREGNANCY April 2010

AEROMEDICAL CONCERNS: Pregnancy is a normal female condition associated with various dynamic physiological changes capable of modifying an aviator's expected tolerance to the aviation environment. Examples of aeromedically relevant changes include hypotension, physiologic anemia (dilutional), hypercoagulability, and alterations in pulmonary function, glucose metabolism, and visual acuity.

Pregnancy is also associated with certain pregnancy-specific disorders that may pose additional risk in the aviation environment. Examples of these disorders include ectopic pregnancy, hypertension-seizure, bleeding, miscarriage and even morning sickness (hyperemesis). Pregnancy can also increase the risk of other non-pregnancy specific conditions that could affect the member's flight safety. Pregnancy increases the risk of blood clots and pulmonary emboli. Underlying clotting disorders increase this risk. Screening for preexisting clotting disorders should be considered and may be offered to pregnant aviators.

Although incompletely researched, flying during pregnancy may place the fetus at risk. The physiologic stresses of aviation duty, in addition to noise, vibration, Gz forces, pressure changes, and hypoxia all introduce potential risk to the mother and fetus. See Request to Continue Flying While Pregnant for common physiologic changes in pregnancy and potential hazards to the pregnant aviator.

WAIVER: Pregnancy is considered disqualifying (CD) for all aviation duties except for Air Traffic Controllers. Pregnancy is not considered disqualifying (NCD) for Air Traffic Controllers, provided the pregnancy remains uncomplicated. Designated aviators may request a waiver to continue flying after the completion of a full obstetrical evaluation by 12 weeks to remain in effect up to 28 weeks gestation, as Class I-Service Group 3, Class II or Class III. No waivers are considered for candidates or student aviators in training. Participation in aviation physiology, aviation water survival, or other water survival programs is not authorized at any time during pregnancy. Aviation physiology qualifications and anticipated expiration dates must be considered prior to waiver request. Specific guidance on pregnancy in flight personnel is contained in the OPNAVINST 3710.7 and OPNAVINST 6000.1 series, and includes the following conditions:

1. A waiver of physical standards may be granted for pregnant designated aviators to Service Group 3 only, and will not include shipboard operations.
2. A waiver will only permit flight in Transport/Maritime/Helicopter aircraft with a cabin altitude of 10,000 feet or less.
3. Flying in solo or ejection seat aircraft will not be considered for waiver.
4. The member may request an authorization for Pilot-in-Command, as described in OPNAVINST 3710.7 series. In these circumstances, a completed Pregnancy AMS (LBFS) with ultrasound, laboratory, and full obstetric evaluation will be accepted in lieu of a typed SF 88.

Upon confirmation of her pregnancy, an aviator shall immediately notify her flight surgeon, and obtain a referral for initial obstetric evaluation. To continue flying during

pregnancy, an aviator must request a pregnancy-specific waiver by signing and submitting the Request to Continue Flying while Pregnant form. The flight surgeon shall recommend the member's Commanding Officer convene a Local Board of Flight Surgeons (LBFS), comprised of the member's flight surgeon, a second flight surgeon, and the member's obstetrical care provider. A Pregnancy Aeromedical Summary shall be completed for all pregnant flight personnel and submitted to NAMI Code 342. All abnormalities must be addressed on the AMS by the obstetrical care provider and the LBFS. The unit flight surgeon shall notify the Commanding Officer of the LBFS's recommendation, in addition to the member's condition and intentions. If the pregnancy is uncomplicated (as defined below), the LBFS recommends a waiver, the Commanding Officer is in concurrence, and there are no other medical conditions requiring a waiver, a 90-day aeromedical clearance notice may be issued to the aviator. The flight surgeon shall submit the completed Pregnancy Aeromedical Summary (LBFS), with all documentation, to NAMI Code 342 for final review and submission to BUPERS/CMC.

For those aviators who do not desire to continue flying while pregnant or a waiver is not recommended, the aeromedical summary may be signed solely by the member's flight surgeon, and submitted to NAMI Code 342 as a grounding physical.

Pregnancy, Uncomplicated: For aeromedical purposes, pregnancies are considered uncomplicated when the formal obstetrical evaluation determines the pregnancy to be uncomplicated, and the member has no other medical condition requiring a waiver. The minimum determinants for an uncomplicated pregnancy require consultation with an obstetrical care provider, ultrasound confirmation of a singleton intrauterine pregnancy with estimated gestational age, routine obstetric laboratory studies, and a visual acuity examination documenting 20/20 vision. Complications, or new disqualifying conditions which arise in a pregnancy after initial granting of the waiver, shall terminate the waiver, and NAMI Code 342 will be notified immediately.

Pregnancy, Uncomplicated; with Other Medical Conditions/Waivers: Pregnancies are considered uncomplicated, with other medical conditions/waivers for aeromedical purposes when the formal obstetrical evaluation is found to be uncomplicated, but the member has other medical condition(s) that require a waiver. Pregnancy can affect or be affected by other medical conditions and/or medicine regimens. Even if these conditions were previously waived and stable pre-pregnancy, they must be reevaluated. In general, these cases must be deferred to NAMI for final disposition on the pregnancy and other conditions, before an upchit can be issued. In some instances, the "other condition(s)" may be unaffected by and inconsequential to the uncomplicated pregnancy. In these cases, a 90-day upchit may be issued only after discussion with and approval from NAMI. The other medical condition(s) and the current status of each must be described in the aeromedical summary. The minimum determinants for an uncomplicated pregnancy are described under pregnancy, uncomplicated. Complications or new disqualifying conditions which arise in a pregnancy after initial granting of the waiver shall terminate the waiver, and NAMI Code 342 will be notified immediately.

Pregnancy, Complicated: For aeromedical purposes, pregnancies are considered complicated if the formal obstetrical evaluation finds the pregnancy complicated, any abnormal pregnancy-specific condition exists at any time in the pregnancy, or the member has another medical condition(s) shown to be affected by, or influencing the pregnancy. In these cases, an aeromedical clearance notice shall NOT be given until reviewed by NAMI Code 342, and forwarded to the appropriate waiver authority for final disposition. For circumstances involving a complicated pregnancy, a completed Pregnancy AMS, obstetrical notes, and documentation

regarding all other non-pregnancy condition(s), medications, and waivers must be submitted to NAMI Code 342.

Air Traffic Controllers: An uncomplicated pregnancy is not considered disqualifying (NCD) for Air Traffic Controllers. A Pregnancy AMS is submitted to NAMI for information only. They may continue to perform their duties, until the beginning of the 28th week gestation, or until the medical officer, the member, or the command determines the member can no longer perform her duties as an ATC. At this time, a Pregnancy AMS shall be submitted to NAMI Code 342 as a grounding physical or to request a waiver with restrictions. Complicated pregnancies are considered disqualifying (CD) for Air Traffic Controllers. These members shall be grounded and processed as a complicated pregnancy with a Pregnancy AMS as described above.

For CNATRA Air Traffic Controllers: Uncomplicated pregnancy is not considered disqualifying (NCD) for CNATRA Air Traffic Controllers. These personnel may continue to perform their duties until the beginning of the 28th week gestation. After the 28th week gestation, they may work in a supervisory capacity only, and shall not work in the tower. At 28 weeks, a Pregnancy AMS shall be submitted to NAMI Code 342 as a grounding physical, or notification for continuation of non-tower duties. Complicated pregnancies are considered disqualifying (CD). These members shall be grounded and processed as a complicated pregnancy with a Pregnancy AMS as described above.

Pilot in Command: According to OPNAVINST 3710.7 series, waivers to Class I, Service Group 3, automatically include Pilot In Command (PIC) authority, unless the PIC authority is specifically restricted. In addition, student aviators may not assume flight controls /fly with a Service Group 3 Pilot. The appropriate box in the Pregnancy AMS (LBFS) may be checked if there are no specific restriction recommendations. The reason for a PIC restriction recommendation should be listed on the AMS (LBFS).

INFORMATION REQUIRED (templates on ARWG front page):

1. Request to Continue Flying while Pregnant – signature required.
2. Obstetric Evaluation to include an Obstetric Ultrasound, Estimated Date of Confinement (EDC), and baseline labs.
3. Pregnancy AMS (LBFS) with any abnormalities evaluated by the obstetrical care provider and explained in the Flight Surgeon comments section.

Monitoring by Flight Surgeon:

1. The pregnant aviator shall routinely meet with her flight surgeon every two weeks.
2. The member will be evaluated to confirm she:
   a. Desires to continue flying while pregnant
   b. Is receiving routine obstetrical care
   c. Has not developed any condition which defines a complicated pregnancy
   d. Has not developed any condition which impairs her safety in flight or emergency egress
   e. Maintains 20/20 vision (or corrects to 20/20)
3. The member shall be educated to return to her flight surgeon should any concerning symptoms develop between visits.
4. Any time in the continuum of care these conditions are not met, the pregnancy waiver shall be terminated and NAMI Code 342 notified immediately.

Postpartum Return to Flight Status (template on ARWG front page):

1. In accordance with OPNAVINST 6000.1 series, convalescent leave, following any uncomplicated delivery or cesarean section, will normally be for 42 days after discharge. For aviation purposes, this will allow adequate time for recovery and return to pre-pregnancy physiologic baseline. This form is also used for miscarriage and termination. A shorter grounding period may be considered for a first trimester pregnancy loss with a normal obstetrical exam, aeromedical exam and appropriate grieving period.
2. Return to flight status may be requested after convalescent leave. The aviator must meet physical standards before returning to flight duty. The flight surgeon shall submit to NAMI Code 342:
    a. Completion of Pregnancy Aeromedical Summary (AMS) to NAMI
        i. Information of aeromedical significance regarding the pregnancy, delivery, post-partum course or complications.
        ii. Information of aeromedical significance regarding the health of the child and mother.
    b. Post Partum obstetrical exam
    c. Long Form Flight Physical Complete to include:
        i. Hematocrit
        ii. Visual acuity

DISCUSSION:

The reasons for flight restrictions vary with each stage of pregnancy. As in aviation, one can employ a risk management model to determine when a pregnant aviator can safely fly. In this case, both the probability and severity of adverse outcomes are greatest in the first and third trimester, effectively eliminating these times for waiver consideration. In the first trimester, ectopic pregnancies, bleeding and miscarriages are common, and often present unexpectedly. These complications are difficult to predict, and frequently present with life-threatening or incapacitating emergencies. Also in the first trimester, potential teratogenic exposures, vibration, hypoxia, Gz forces and other stresses of the aviation environment can have undesirable effects on the developing fetus. The uncertainties of the first trimester, combined with the severity of pregnancy-specific complications, present unacceptable risks to the pregnant aviator, thus limiting the consideration for waivers at this time.

In the second trimester, a normal intrauterine pregnancy can be confirmed with ultrasound, therefore mitigating some of the risk uncertainty present in the first trimester. For this reason, the aviator with an uncomplicated pregnancy can more safely fly at this time, assuming careful consideration is given to limit her exposure to other potentially harmful effects of the flight environment, such as hypoxia or excessive Gz exposure.

In the third trimester, pre-term labor, rupture of the membranes and bleeding can occur in an unpredictable fashion, creating an emergent risk to the mother, fetus, and aircrew. These events introduce unacceptable risks to the safety of flight and prohibit the issuance of waivers in the third trimester.

Pre-existent medical conditions represent an additional risk consideration in the pregnant aviator. Pre-gravid, stable medical issues may become exacerbated during pregnancy, or impart an adverse effect on the pregnancy. Additionally, chronic medication regimens are frequently discontinued or changed during pregnancy. For these reasons, each aviator with a previous medical waiver, including medication waivers, must be evaluated in the context of her pregnancy, prior to issuance of a pregnancy waiver. In these circumstances, NAMI Code 342 must be consulted prior to determination of waiver recommendation or LBFS upchit.

Prior to waiver recommendation, and during waiver continuance, careful consideration must be given to the effects of pregnancy on the aviator, including how she is coping with the physiologic, emotional, and professional stresses of pregnancy. Regular follow- up is required to confirm her desire to continue flying during pregnancy, and the absence of any condition(s) which may adversely impact her safety in flight.

ICD-9 Codes:
V22 Pregnancy, Uncomplicated
630-650 Pregnancy, Complicated

12.0 OPHTHALMOLOGY

12.1 CATARACT

AEROMEDICAL CONCERNS: Cataracts reduce visual acuity (VA). When the cataract involves the visual axis, visual acuity is most affected in bright sunlight and conditions of glare.

WAIVER: The condition is considered disqualifying. Once vision has deteriorated to less than 20/20 correctable or the patient has a positive Glare test, the flier should be disqualified from flying until successful surgical removal of the cataract. Waiver to SG1 may be considered after surgery provided the VA returns to 20/20 corrected, is within refraction limits, and the Glare test is negative (normal).

INFORMATION REQUIRED:

1. Ophthalmology consultation is required for initial waiver request.
2. Because of the potential for deterioration, ophthalmologic follow-up may be needed every 6 months until surgery is deemed necessary.
3. Prior to and after surgery, a Mentor Brightness Acuity Test (BAT, a glare-testing device) should be performed with VA documented for each eye separately at the low, medium and high settings.
4. Confirmation is needed of exclusion of underlying pathology such as Wilson's disease, diabetes or hypoparathyroidism.

TREATMENT: Surgery with an intraocular lens (IOL) implant usually provides a sufficiently acceptable VA result for military flying duties. Consultation with NOMI ophthalmology prior to surgery is recommended.

DISCUSSION: The visual effect of a cataract depends on its encroachment on the visual axis and the proximity to the nodal point. A posterior subcapsular cataract can have a devastating effect on vision. 2 to 3 episodes of serious dehydration can increase the risk of developing a cataract 21 fold. Surgical success of greater than 90% in achieving a 20/40 best corrected VA after 1 year has been reported. The RAF restricts the flying of personnel with IOL from high performance aircraft and helicopters. This is because of the risk of pressure on ciliary body blood vessels under high Gz or vibration and because of the unknown long term effect on the corneal epithelium.

ICD-9 CODES:

366 Cataract
366.1 Posterior Sub-Capsular Cataract (senile)
366.20 Traumatic Cataract
366.45 Drug induced Cataract
743.30 Congenital Cataract

12.2 COLOR VISION ABNORMALITIES

AEROMEDICAL CONCERNS: Normal color vision is required to accurately identify warning lights and color visual displays in the cockpit, external visual cues including airfield lighting, the Fresnel lens, and aircraft formation lights. Interactions with other optical devices, such as laser and protective visors may compound a given problem.

WAIVER: Applicants are CD, no waiver. Waivers have been granted for flight surgeons, aerospace physiologists and other selected Class II aircrew on a case-by-case basis. Waivers for a change in color vision in designated personnel are usually granted if not due to ocular pathology.

INFORMATION REQUIRED:

1. Based on a conference with the U.S. Air Force on vision standards and procedures, the Pseudo-Isochromatic Plates (PIP) are considered the preferred primary test.
   a. For the Navy, 12 of 14 correctly identified plates constitute a passing score. The preferred lighting is the MacBeth lamp. If one is not available, a daylight fluorescent bulb may be used. Do not use incandescent lighting as this may allow persons with mild deuteranomalous (green weak) deficiencies to pass. Passing criteria is 12 or more plates correctly read, i.e., no more than 2 errors. Record the findings as the number of plates correctly read out of 14. For example: PIPs 13/14 correct "PASS" or PIPs 9/14 correct "FAIL."
2. If member cannot pass the PIP, the FALANT may be administered as an alternative, if available.
   a. Passing criteria for FALANT remains 9/9 or 16/18 correct responses.
3. If a designated crewmember fails both tests, evaluation is required to screen for acquired pathology, as well as a test of demonstrated ability, usually performed with the flight surgeon and safety officer as observers.

TREATMENT: N/A.

DISCUSSION: Defective color vision is usually congenital. In Caucasians, approximately 8% of males have inherited color defective vision and approximately 2% are dichromats with severe deficiency. The largest group is actually trichromatic, actually color weak rather than color deficient. Dichromatics are protanopes if they have a red-green deficiency related to red-sensitive cone loss, deuteranopes if they are red-green deficient related to green-sensitive cone loss and tritanopes if they have blue-yellow deficiency related to blue-sensitive cone loss. Deuteranopes and protanopes have difficulty interpreting VASI lights' red-white color relationship. Protanopes have difficulty interpreting red high speed taxiway exit and runway end marker lights. At night, dichromats may be further reduced to monochromaticity when the physiological phenomenon of small field tritanopia is added; this is of relevance in distinguishing navigation and anti-collision lights. Color vision can be affected after optic neuritis or in macular degeneration, central serous retinopathy, and multiple sclerosis or as a sequela to heavy metal poisoning. Some color vision deficiencies are acceptable, but the most problematical being red-green abnormalities.

ICD-9 CODES:
368.5 Color Vision Abnormalities

12.3 DECREASED VISUAL ACUITY

AEROMEDICAL CONCERNS: Decreased visual acuity degrades lookout and target acquisition.

WAIVER: A waiver for visual acuity less than standards may be considered in designated individuals, provided the central and peripheral retina is normal and all other visual standards are met.

Category	Unaided Visual Acuity	Refractive Limits	NATOPS Restrictions
SG1	20/100 or better each eye	No refractive error limits	None
SG2	20/200 or better each eye	None	* Restricted from shipboard duties including VSTOL * Helicopters OK
SG3	20/400 or better each eye	None	* Dual Controlled only * Requires SG1 or 2 onboard * Separate Pilot in Command Waiver required

Consider whether a waiver is actually required. An aviator whose vision is worse than 20/400 will need a waiver to fly in any Service Group. A clear justification is required, including primary type of aircraft in which he or she will be flying and the number of hours in that type of aircraft. Remind your aviators that SG3 Pilot in Command waivers are addressed to CNO (N889) and are valid only for the current command. Refer to OPNAVINST 3710.7 Chapter 8 Section 5 for further details.

INFORMATION REQUIRED:

1. Optometry or ophthalmology consults for any waiver request for refractive error.
2. Ophthalmology consult required for cases of decreased visual acuity not due to simple myopia, hyperopia, astigmatism or presbyopia.
3. Obtain retinal evaluation at corrections greater than -5.50 diopters.
4. Progressive astigmatism should be evaluated to exclude keratoconus.

TREATMENT: Refraction by spectacles within the limits set by MANMED Chapter 15. Contact lenses are permissible for aviation personnel, but spare clear spectacles must be carried in flight and the aviator must demonstrate 20/20 with contact usage. Radial keratotomy, LASIK, or other corneal surgical procedures for the correction of myopia is CD, no waiver. NAMI

ophthalmology should be consulted for applicants who have had or are suspected of having excimer laser photorefractive keratotomy (PRK).

DISCUSSION: Myopia is usually a progressive condition, stabilizing around age 30. Significant myopia is complicated by considerable visual distortion at the periphery of corrective lenses. Individuals with significant myopia may see halos or flares around bright lights at night and are more at risk for night blindness. Elongated globes are at an increased risk of retinal detachment and of lattice degeneration. Whenever a prescription is changed, aircrew should be warned about transient visual distortion and counseled on the period of adjustment. Evidence suggests that there is no difference in civil accident rates or in naval carrier landing accidents in pilots who require visual correction. Severe myopia tends to be a problem pertaining to Class II personnel since the entry requirements for other pilots tend to be sufficiently stringent to exclude those whose vision would deteriorate that much. The risk of retinal detachment in normals is 0.06% over 60 years compared to 2% in 5 diopter myopes. Beyond -9.75 diopters, the risk increases to 24%. Recent studies of radial keratotomy suggest that the procedure leaves 28% of the eyes with unstable refraction and nearly all with glare problems.

ICD-9 CODES:
367.9 Decreased Visual Acuity
367.9 Ametropia [Includes Myopia and Hyperopia]
367.95 Ametropia, exceeding standards
368.0 Amblyopia

12.4 DEFECTIVE DEPTH PERCEPTION

AEROMEDICAL CONCERNS: Although many visual cues regarding the relative positions of objects in space (depth perception) are monocular. The binocular visual reflex of stereopsis is an important indicator of normal visual acuity in each eye, with normal ocular alignment and normal binocular visual development. Defective stereopsis may make certain piloting duties such as formation flying and aerial refueling more difficult.

WAIVER: No waivers shall be recommended for any candidate or designated Class I duty involving actual control of aircraft. Class II and III personnel must meet standards for depth perception except when remarked as "not required" under types of aviation duty specified under MANMED Articles 15-87 through 15-99.

INFORMATION REQUIRED:

1. Valid tests of stereopsis include:
   a. **Armed Forces Vision Tester (AFVT**)
   b. **Verhoeff Stereoptor**
   c. **Stereoacuity Plates** used with polarized viewers such as the Stereo Optical or Titmus Optical **Stereo Fly** or **Randot**. A randomized version of these tests may be used if the examiner deems it necessary.
2. Although the devices test stereopsis at optical infinity, intermediate or near distance-respectively, a pass of any one test meets the stereopsis standard. The tests must be administered and results recorded as specified in MANMED and elsewhere in the ARWG.
3. Recent loss of stereopsis in a designated Class I naval aviator is usually due to a change in refraction or onset of presbyopia, but may also be a sign of cataract, macular or optic nerve disease or new motility disturbance.
4. New failures to meet the stereopsis standard must be evaluated by an ophthalmologist including completion of the ocular motility worksheet as specified by the attached instructions found elsewhere in the ARWG.

TREATMENT: Correct any underlying refractive error or eye disease.

DISCUSSION: Defective stereopsis is typically innate and due to abnormal visual development prior to the age of 9. Causes of defective stereopsis include abnormal ocular muscle balance, amblyopia, anisometropia, microtropia, and monofixation syndrome.

ICD-9 CODES:
368.33 Defective Depth Perception

12.5 HISTORY OF STRABISMUS SURGERY

AEROMEDICAL CONCERNS: Single, fused, simultaneous binocular vision in all versions at all times with the stereopsis reflex active is a requirement for safe and effective duty involving actual control of aircraft. Congenital or acquired defects of ocular alignment as well as any surgery to correct ocular misalignment present a grave hazard to normal binocular vision.

WAIVER: History of strabismus surgery is considered disqualifying for all aviation duty. A waiver will not be considered for an SNA applicant. A waiver for aviation duty other than an SNA applicant will be considered on a case-by-case basis no sooner than six months after a successful and stable strabismus surgery if post-operatively, the member otherwise meets the visual standards appropriate for his or her duty.

INFORMATION REQUIRED:

1. Submission must include an ocular motility worksheet completed at the time of waiver request by a provider qualified to measure all required data.
2. Include copies of all eye exams and operative report(s) with AMS.

TREATMENT: Strabismus surgery involves enhancing or retarding the action of one or more extraocular muscles in either or both eyes. An extraocular muscle tendon may be shortened (resection) to strengthen its action, or the insertion of the muscle moved posteriorly on the globe (recession) to weaken its action. Suspending the tendon on hangback sutures is an alternative to traditional recession surgery. Adjustable sutures may be employed to fine tune ocular alignment in the perioperative period. A spacer may be inserted in the muscle tendon with unusual forms of vertical muscle surgery. In general, vertical muscle strabismus surgery is more complex and problematic than horizontal muscle surgery for simple eso- or exotropia.

DISCUSSION: Ocular misalignment is always the consequence of disease and never a normal finding. Surgery on extraocular muscles is imprecise and has a risk of regressing to the original state of misalignment or progressing in effect and causing sequential overcorrection. Multiple surgeries are frequently necessary for congenital misalignment. Scarring of the globe and adnexa after muscle surgery may lead to restricted ductions. Vertical muscle surgery often causes or does not fully correct cyclotorsional misalignment.
Realignment of the eyes with muscle surgery does not resolve the underlying disorder in congenital misalignments and while peripheral binocular function may be partially enhanced, normal central binocular visual development and stereopsis are rarely achieved. Even after satisfactory surgical alignment in congenital esotropia, residual comorbidities such as latent nystagmus and dissociated vertical deviations are often seen. The desirable cosmetic result after strabismus surgery is 10 or fewer prism diopters of misalignment since this relatively small degree of tropia is not noticeable to casual observation of the eyes. Asymptomatic vision with tropia less than 10 prism diopters meets the NOHOSH standard for Class II and III.

ICD-9 CODES:
H153 Surgery for strabismus or ocular muscle imbalance

12.6 EXCESSIVE PHORIAS

AEROMEDICAL CONCERNS: Excessive phorias are frequently associated with defective stereopsis and/or diplopia, a devastating state if this occurs during a critical phase of flight.

WAIVER: CD for Class I aviators. No waivers are considered.

INFORMATION REQUIRED:

1. Evaluation by an eye professional or an ophthalmologically proficient flight surgeon is necessary.
2. The consult should address any history of diploplia or previous eye surgery, and include all the studies requested on the accompanying ocular motility worksheet.

ICD-9 CODES:
378.4 Excessive Phorias
378.41 Esophoria
378.42 Exophoria
378.43 Hyperphoria

12.7 RETINAL DETACHMENT

AEROMEDICAL CONCERNS: A detached or torn retina can lead to visual impairment, the seriousness of which depends on the part of the retina involved and the success of therapy. Routine exposure to slow-onset G forces has not been shown to increase the risk of retinal detachment.

WAIVER: Waiver will usually be considered on a case by case basis and will often require three months of recovery time if surgical treatment is indicated.

INFORMATION REQUIRED: Please submit all relevant eye examinations and operative reports to include a Humphrey Visual Field, detailed retinal drawings, motility exam if scleral buckling is performed and a glare testing if a pneumatic retinopexy or vitrectomy is performed.

TREATMENT: Surgical intervention is required in most cases. The best approach will usually be determined by the operative surgeon and may consist of one or more of the following techniques cryotherapy, laser retinopexy, pneumatic injection, scleral buckling, or vitrectomy.

DISCUSSION: Visual acuity and visual field loss, changes in refractive error, motility disorders, and cataracts are possible (and not infrequent) outcomes of this disease.

ICD-9 CODES:
361.0 Retinal Detachment with retinal defect

12.8 GLAUCOMA & OCULAR HYPERTENSION

AEROMEDICAL CONCERNS: The most common types of glaucoma (open angle) are usually asymptomatic. Gradual, almost imperceptible loss of peripheral visual field is typically the earliest manifestation with loss of central vision occurring only in the most advanced stages. Elevated eye pressure is not always present in patients losing vision from open angle glaucoma. Roughly a third of those presenting with glaucoma have intraocular pressures (IOPs) less than 21 mm Hg and many will continue to lose substantial amounts of vision even with significant lowering of IOP.

The less common acute angle closure types of glaucoma will present in a much different manner with symptoms such as eye pain or decrease in central vision with halos around lights. Signs may include a red eye with a hazy cornea and a mid-dilated poorly reactive pupil.

Both types require referral to the eye clinic with the latter requiring urgent referral through the local emergency room to reduce the risk of severe vision loss. Both types are considered disqualifying because loss of peripheral visual field to a significant degree is incompatible with flight duties.

Ocular hypertension (high pressure in the eye without visual field loss and with normal optic nerves and gonioscopy) is not equivalent to a diagnosis of glaucoma. In fact, most people with what is often considered to be high pressure (>21 mm Hg) never develop vision loss. This population, nonetheless, is at higher risk of developing glaucoma and so this condition is also considered disqualifying.

WAIVER: For the purposes of Naval Aviation, any IOP consistently (on at least 2 different exams on different days) and accurately measured above 22 mm Hg by a method other than non-contact tonometry is considered disqualifying whether or not the diagnosis is simply ocular hypertension or glaucoma.

Any diagnosis of glaucoma is considered disqualifying regardless of IOP.

Designated: Waivers are considered on a case by case basis.

Applicants: Waivers are usually not considered.

INFORMATION REQUIRED:

Initial Evaluation:
A complete eye exam must include the following:

1. IOP by Goldmann applanation tonometer or Tonopen
2. Central Corneal Thickness
3. Dilated fundus examination (to include comment on the cup-to-disc ratio and description of the nerve)
4. Automated visual field testing (30-2)

5. Slit lamp examination
6. Gonioscopy
7. Retinal nerve fiber layer analysis (using a GDX, OCT, HRT, etc.), is desirable, but is not required.

Annual Waiver Evaluation:
A complete eye exam must include all of the above except:
1. Central corneal thickness
2. Gonioscopy, except when indicated.

TREATMENT:
The following are acceptable topical agents:
1. Prostaglandin analogs
2. Beta blockers
3. Carbonic anhydrase inhibitors
4. Sympathomimetics

Miotic drugs are incompatible with night operations due to the inability of the pupil to dilate to admit sufficient light. Beta blockers, if used, must NOT cause any reduction in circulatory or respiratory function. Practitioners must be mindful of the unique cardio-respiratory demands of the aviation environment.

DISCUSSION:
Waivers may be granted if visual field loss is minimal and stabilized either with an acceptable topical agent as listed above or with laser trabeculoplasty. Filtration or tube shunt surgery is usually not considered compatible with safe flight operations. Continuation of the waiver requires only annual submission, but eye examinations are usually conducted more frequently as determined by the treating eye doctor.

ICD-9 CODES:
365 Glaucoma & Ocular Hypertension
365.04 Ocular hypertension
365.10 Open angle glaucoma
365.20 Closed angle glaucoma

12.9 KERATOCONUS

AEROMEDICAL CONCERNS: Keratoconus is a degeneration of the cornea leading to its progressive thinning and irregular deformation. Visual acuity may be reduced in such a way that it cannot be corrected to 20/20 with spectacle lenses. Other symptoms may include diplopia, ghosting of images or reduced ability to discern low contrast images.

WAIVER: A waiver is usually not recommended for applicants, but may be considered in designated personnel if correctable to 20/20 with spectacles.

INFORMATION REQUIRED:

1. Current ophthalmologic/optometric exam to include:
   a. Corneal Topography
   b. Best corrected visual acuity (BCVA) with contact lenses if used
   c. BCVA with spectacles
2. Annual submission is required.

TREATMENT: Contact lenses are often necessary to achieve the best vision. Advanced disease management may include corneal transplant. Corneal refractive surgery is contra-indicated in the presence of keratoconus. Contact lens use in any aviator requires specific authorization on the aeromedical clearance form (up-chit). Please refer to section 12-16, Naval Aviation contact lens policy.

DISCUSSION: The syndrome is usually bilateral but may rarely affect one side only. The symptoms usually start in the teens. The condition has been reported to be slowly progressive in 22.5% of cases but stabilization can occur at any time. It is very difficult to diagnose keratoconus in the early stages unless a corneal topographic mapping apparatus is used. Aviators with rapidly increasing myopia or astigmatism may warrant such testing.

ICD-9 CODES:
371.6 Keratoconus

12.10 TOPIC IN REVIEW

12.11 RETINAL VEIN OCCLUSION

AEROMEDICAL CONCERNS: Symptoms range from mild peripheral visual blurring to severe visual field loss.

WAIVER: The granting of a waiver will depend on the resultant visual acuity and the absence of other pathology.

INFORMATION REQUIRED:

1. Ophthalmology consultation is necessary with confirmation that the visual acuity meets standards and that neovascular glaucoma has not developed.
2. Exclusion of other pathology such as hypertension, diabetes, blood dyscrasias, multiple myeloma and dysgammaglobulinemia is required.

TREATMENT: Photocoagulation is sometimes useful in central retinal vein thrombosis and in long-standing cases of branch retinal vein occlusion.

DISCUSSION: Macular edema occurs in 57% of cases of occlusion of the temporal branch of the retinal vein. Visual acuity improves in 60% of patients with branch retinal vein occlusion and 50% achieve visual acuity of 20/40 or better within 1 year. In central retinal vein occlusion, neovascular glaucoma develops in 15% of cases.

ICD-9 CODES:
362.3 Retinal Vein Occlusion

12.12 UVEITIS

AEROMEDICAL CONCERNS: Anterior intraocular eye inflammation (often referred to as iritis) can result in mild to severe eye pain, photophobia, excessive tearing, and blurred vision. Although it is usually an isolated, auto-immune condition, there may be an associated underlying systemic diagnosis. Further testing may be indicated required to determine this.

WAIVER: A waiver can be considered for a single episode of anterior uveitis that resolves without complication and is not associated with any underlying systemic condition. A waiver is usually not recommended for recurrent uveitis or for more posterior inflammation in applicants. Any associated underlying diagnoses should be considered accordingly.

INFORMATION REQUIRED:

1. Eye consultation
2. Appropriate referral as necessary for any underlying systemic condition.

TREATMENT: Treatment for uveitis depends on the portion of the uvea that is affected. Anterior uveitis is usually successfully treated with topical steroids and cycloplegics.

DISCUSSION: Uveitis is an inflammation of the uveal layer inside the eye. The uvea consists of the choroid, ciliary body, and iris. It provides most of the blood supply to the retina. Uveitis may be unilateral or bilateral and occurs most frequently in people ages 20-50.

Anterior uveitis, or an inflammation of the iris, is often termed iritis and is the most common form. These patients usually report a deep aching of the eye and orbit, mild redness (circumlimbal injection), and sensitivity to light. Vision may or may not be affected, however, some patients will report a 'haziness' to their vision. The hallmark signs of anterior uveitis are "cells and flare" in the anterior chamber. White blood cells and iris protein strands are liberated into the anterior chamber as an inflammatory response. Other signs include circumlimbal injection, and possible corneal edema. In more severe cases, patients may present with keratic precipitates (white blood cell collections on the posterior corneal surface) and posterior synechiae (iris adhesions to the anterior lens capsule). Acute iritis is most commonly a result of blunt ocular trauma, however, many cases are idiopathic. It can also be the result of an autoimmune disorder, infection, or exposure to toxins. A single episode of iritis is generally not an indication for further testing to determine a systemic cause, however, recurrent, or persistent iritis warrants further work up.

Posterior uveitis is an inflammation of the choroid and/or ciliary body (inflammation of the ciliary body, or pars planitis, is often termed intermediate uveitis, however, will be grouped with posterior uveitis for the purpose of this discussion). Patients with this type of inflammation may complain of ocular pain and/or floaters, however, are quite often asymptomatic. Comprehensive slit lamp examination may reveal an inflammatory response ("cells and flare") in the posterior chamber. The severity of the response may result in a "snow banking" or "snowball" appearance, and resultant scarring can form leading to areas of vision loss.

Possible underlying conditions may include:

Toxoplasmosis	Histoplasmosis	Tuberculosis

Sarcoidosis	Syphillis	AIDS
CMV	Ulcerative colitis	Rheumatoid Arthritis
Herpes Zoster	Ankylosing Spondylitis	Behcet Syndrome
Reiter Syndrome	Lyme Disease	

Standard lab tests include:

CBC with differential	ANA	HLA-B27
RF	ACE	PPD
FTA-ABS	Lyme titer (if appropriate)	RPR

ICD-9 CODES:
364.3 Uveitis

12.13 PTERYGIUM

AEROMEDICAL CONCERNS: A pterygium is an elevated patch of subconjunctival tissue that extends from the medial canthus to the border of the cornea or beyond, with the apex pointing towards the pupil. The progressive encroachment of a pterygium upon the cornea may lead to progressive astigmatism and refractive error that does not correct with common spectacles. Pterygia may also cause irritation of the corneal and/or conjunctival surface resulting in complaints of a scratchy, itchy, or dry eye. The use of UV protective lenses may reduce the likelihood of disability from pterygium growth and/or inflammation.

WAIVER: Asymptomatic ptyergia up to and including 1.0 mm corneal invasion (measured from the limbal border) are NCD for both applicants and designated aviation personnel, provided vision corrects to 20/20 with spectacles. Designated aviation personnel with symptomatic pterygia or pterygia greater than 1.0 mm are CD but a waiver will be considered if vision corrects to 20/20 with spectacles and symptoms, if present, are controlled with conservative measures such as artificial tears. If a pterygium requires surgical removal, a waiver may be considered when the member's vision has stabilized and is correctable to 20/20, post-op complaints have resolved, and the member is returned to full duty by the operating surgeon. Aviation applicants with pterygia greater than 1.0 mm are NPQ with waiver not recommended.

INFORMATION REQUIRED:

1. Ophthalmology or optometry consult to include:
    a. Drawing or clear description of the pterygium and the amount of encroachment on the cornea.
    b. Manifest refraction documenting visual acuity corrects to 20/20 with spectacles.
    c. Documentation of any symptoms (e.g. tearing, sratchiness, etc…) and treatments.
2. Post-op patients also must submit:
    a. Operative report
    b. Clearance for full duty by operating surgeon
    c. Post-op manifest refraction documenting visual acuity corrects to 20/20 with spectacles
    d. Documentation of absence of post-op complications or complaints

ICD-9 CODES:
372.4 Pterygium

12.14 OCULAR MOTILITY WORKSHEET

OCULAR MOTILITY WORKSHEET

Pertinent history

Distance VA	**Manifest Refraction**
OD 20/	**OD** _____ **Corr to 20/**
OS 20/	**OS** _____ **Corr to 20/**

Cycloplegic Refraction	**Habitual Rx**
OD _____ **Corr to 20/**	**OD** _____ **Corr to 20/**
OS _____ **Corr to 20/**	**OS** _____ **Corr to 20/**

Correction used for remainder of examination ☐ Habitual ☐ Manifest ☐ None

Cover Test

Far (all gazes)

Near (all Gazes)

Extraocular Motility	**Maddox Rod @ 20 ft distance**	**Stereopsis (Verhoeff)**
Worth 4 Dot @ 20 ft distance	**Vectograph (anti-suppression)**	**Stereopsis (Randot)**
4 Δ Base Out (microstrab)	**Other test results (as applicable)**	**Stereopsis (AFVT)**

Impression:	**Is Patient NOHOSH?** (No Obvious Heterotropia or Symptomatic Heterophoria) ☐ Yes ☐ No
Optometrist/Ophthalmologist's name and phone number	**Date**
Patient Name	**SSN**
Rank/Rate	**Unit/Address**

IF YOU HAVE ANY QUESTIONS REGARDING THE EXAMINATION OR HOW TO FILL OUT THIS WORKSHEET, PLEASE CALL NOMI OPHTHALMOLOGY AT DSN 922-4558 OR COMMERCIAL (904) 452-4558.

PERTINENT HISTORY: Explain why the work-up is being done. For example: "scored 7 esophoria on AFVT" or "muscle surgery OS at age 6 years."

REFRACTION: SNAs and SNA applicants need a cycloplegic refraction recorded, all others require a manifest refraction. SNAs and SNA applicants who see less than 20/20 unaided also require a manifest refraction recorded.

HABITUAL RX: Record the subject's habitual Rx here if different from the manifest. If none is used, or the subject wears contact lenses, please note on the form.

COVER TEST: Report **numerical** values. Use a prism bar or loose prisms. Do horizontal and/or vertical as applicable to the case. Horizontal limits are approximately 45 degrees to the left and right of center. Vertical limits are approximately 25 degrees above and 35 degrees below center. Limits may need to be modified as dictated by the size of the nose and brow.

EXTRAOCULAR MOTILITY: Give description, such as "Smooth and full."

MADDOX ROD/VON GRAEFE: Report **numerical** values for **both** horizontal and vertical phorias. Fixation target must be at 20 feet.

STEREOPSIS: Verhoeff, done at 1 meter in a normally lit room, is currently the only acceptable test. Neither the device nor the patient should move during the test.

WORTH 4 DOT: Perform at **both** distance and near. Report "fusion," "diplopia," or "suppression OD/OS."

VECTOGRAPH: Test on the 20/40 (V O C S R K 4) line of the A.O. Vectographic slide. Report any suppression, and which eye is suppressing. If there is no suppression, state so.

RED LENS TEST: Test all 9 position of gaze, just like the cover test. Report any diplopia. If no diplopia is reported, state so.

4D BASE OUT TEST: Used to augment the A.O. Vectograph in the diagnosis of microstrabismus. This test is not always applicable and may be left blank if not used.

NOHOSH = **N**o **O**bvious **H**eterotropia **o**r **S**ymptomatic **H**eterophoria. Answer this question if the subject is NPQ (Not Physically Qualified for SNA (Student Naval Aviator), but would consider applying for the SNFO (Student Naval Fight Officer) program.

PROVIDER PHONE NUMBER: Indicate **both** DSN and commercial.

12.15 CORNEAL REFRACTIVE SURGERY (PRK/LASIK)

AEROMEDICAL CONCERNS:

Definitions:

Corneal Refractive Surgery (CRS): A laser is used to reshape the anterior corneal surface reducing refractive error and reliance on spectacles or contact lenses. A "wavefront-guided" (WFG) or "custom" procedure uses wavefront analysis technology, and may improve the visual outcome of the procedure.

Photorefractive Keratectomy (PRK) or Laser-Assisted Epithelial Keratectomy (LASEK) : Laser energy is applied to the anterior corneal surface after the epithelium is temporarily displaced or removed. No corneal flap is created. PRK variants include LASEK (epithelium is preserved), and Epi-LASIK (epithelial flap is created). Pain can be moderate to severe, and visual recovery can take months.

Laser in-situ keratomileusis (LASIK): A cornea stromal flap is created with a surgical blade or infrared laser after which, an excimer laser is used to reshape the exposed corneal stroma. The corneal flap is then repositioned. Pain is minimal and vision recovery is much faster than PRK.

All forms of refractive surgery are disqualifying for aviation duty, but waivers are readily granted if the member meets all waiver guide policy guidelines. Designated members who undergo refractive surgery shall be grounded at the time of surgery, but a grounding physical is not required. Designated members shall not return to flight duty until a Local Board of Flight Surgeons (to include one eye provider) recommends a waiver via an Aeromedical Summary (AMS) and issues a ninety-day temporary aeromedical clearance notice.

Both PRK and LASIK are waiverable at this time (see specific sections below).

All other forms of refractive surgery, or any vision or corneal manipulation or surgery, including **RK** (radial keratotomy), **LTK** (laser thermal keratoplasty), **ICR** (intracorneal ring), **ICL** (intraocular corrective lens), and clear lens extraction, are **permanently disqualifying (CD/WNR)** for all aviation duty Class I, II and III personnel. The prior use of orthokeratology (rigid contact lens corneal reshaping) is NCD provided that it is permanently discontinued prior to obtaining flight status and all appropriate refractive standards are met with stable topography.

PRK AND LASIK GENERAL GUIDELINES (applicants and designated personnel)

1. Post-operatively, the member must still pass all MANMED vision standards for their class or applicant status, and must wear corrective lenses while flying, if required, to achieve the vision standard.

2. Refractive stability and a satisfactory postoperative slit lamp exam is required. Trace peripheral haze or scarring that is considered stable by the eye care provider, and not visually significant, is not a hindrance to waiver.

3. There must be no symptoms that would be cause for concern when considering the performance of the member's usual flight duties, including, but not limited to, severe dry eye, recurrent corneal erosions and visually significant glare, haloes, or central scarring.

4. A subsequent PRK or LASIK enhancement or "touch-up" must meet the same timeframe and clinical guidelines, and requires a second waiver submission package and AMS.

5. Wavefront-guided, or "custom", PRK or LASIK is preferred, but in no way is required for a waiver recommendation. This custom treatment may increase visual acuity and final vision outcomes significantly, but not all patients are candidates for custom treatments.

6. Copies of all pre-operative, and post-operative examination paperwork, including the laser treatment reports, are required for waiver considerations. NAMI may request additional information as deemed medically necessary to make a waiver determination.

7. For PRK and LASIK waiver renewal, submission is as stated in the member's BUMED waiver letter. In general, those enrolled in the LASIK studies require annual submission. All others only require routine five-year submission.

Applicants only:

1. All applicants for Naval aviation must satisfy the above general guidelines and the following more specific guidelines:

2. Civilian applicants must obtain PRK or LASIK at their own expense at a civilian refractive surgery center. Active duty applicants may apply for waiver whether their surgery was performed at a civilian refractive surgery center prior to joining the military, or at a military RSC. The minimum wait time before submitting a waiver request for applicants is six months from the date of surgery. All paperwork and operative reports must be available and submitted for waiver consideration. **See section 12.15B for additional information and requirements for LASIK in Student Naval Aviators.**

3. SNA applicants: pre-operative refractive error must not exceed -8.00 to + 3.00 (SE) and 3.00 diopters of cylinder, with no more than 3.50D of anisometropia. They must additionally have a post-operative cycloplegic refraction using cyclopentolate performed at a military installation.

SPECIFIC PRK AND LASIK GUIDELINES (cont):

Active duty designated aviation personnel only:

1. Designated aviation personnel must satisfy all the above general guidelines and the following guidelines:

2. A PRK waiver request may be submitted for:
   a. myopia -6.00 diopters or less spherical equivalent (SE): 3 months
   b. myopia greater than -6.00 diopters SE: 6 months
   c. hyperopia SE: 6 months

3. A LASIK waiver request may be submitted for:
   a. myopia: 2 weeks
   b. hyperopia and mixed astigmatism: 4 weeks

4. If still requiring prescription topical medication (Restasis or cyclopsporine drops excluded) then restriction of flight activities to the local area is recommended.

5. Class I aviators, specifically, must undergo PRK or LASIK treatment at one of the USN designated refractive surgery centers (includes Tripler AMC and Keesler AFB, which have Navy ophthalmology support). (See section 12.15A for additional information)

6. Class II, III, and other flight personnel (e.g. select passengers) may undergo PRK or LASIK at any DoD refractive surgery center.

7. For PRK, there are no pre-operative refractive limits for already designated personnel within their aviation class. For LASIK, waivers may be granted for myopia up to -11.5D spherical equivalent with no more than 3.5D of astigmatism, and hyperopia up to +3.75D spherical equivalent with no more than 2.75D of astigmatism.

8. Regardless of prior designated aviation class, any personnel applying for SNA status must abide by all MANMED and waiver policy guidelines and refractive limits for SNA applicants.

9. The CRS/PRK AMS template (available on the NAMI website) may serve as a Local Board of Flight Surgeons, following review and endorsement by two flight surgeons, plus an eye care provider (military optometrist or ophthalmologist), and commanding officer approval. A ninety-day aeromedical clearance notice may be issued at that time, pending BUPERS waiver approval. Submit the AMS and waiver package immediately to NAMI to avoid unnecessary delays in obtaining BUPERS final approval.

10. No deployment for at least three months following PRK and one month following LASIK surgery (per BUMED policy).

SPECIFIC PRK AND LASIK GUIDELINES (cont):

Select Reserve designated aviators:

1. Reservists must satisfy all the above general guidelines and the following guidelines:

2. May obtain PRK or LASIK at their expense from civilian sources of care.

3. A pre-operative evaluation is strongly encouraged to be submitted to NAMI Ophthalmology before corneal refractive surgery is performed. Contact NAMI Ophthalmology at 850-452-2933 or NOMI-EyeDept@med.navy.mil.

4. Final approval to proceed with PRK or LASIK requires written permission from the unit commander and unit flight surgeon.

REFRACTIVE SURGERY DISCUSSION:

The goal of corneal refractive surgery is to reduce or eliminate dependence on spectacles or contact lenses, which can be bothersome at times while flying. Refractive surgery has been studied extensively in the aviation environment and has yielded highly satisfying results. More than 95% of Naval Aviators reported "increased effectiveness" after undergoing refractive surgery.

Wavefront guided (WFG), or "custom", refractive surgery has been evaluated by the Naval Refractive Surgery Center and yielded results that are superior compared to conventional treatment. Based on this analysis, aviation personnel should undergo a wavefront-guided or custom procedure, if possible. Some patients are not candidates for a wavefront-guided treatment for various reasons, and a conventional treatment remains a viable option. As with any surgical procedure, there are inherent risks, such as quality of vision deficits (e.g. halos and glare at night) and persistent eye discomfort (e.g. dry eye or recurrent erosions). A detailed description of the risks, benefits, and alternatives should be discussed and consented between the patient and their refractive surgeon.

History of PRK or LASIK does not guarantee qualification for an aviation duty waiver. The member must meet pre-operative standards in MANMED and this waiver policy guide. Post-operatively the applicant must meet all MANMED vision standards appropriate to their aviation class.

When obtaining corneal refractive surgery it is incumbent upon the member and the member's commanding officer and flight surgeon to be aware of corneal refractive surgery waiver recommendations at the time of the surgery and subsequent submission. Rapidly evolving technology results in changes to waiver guidelines when appropriate. Every effort will be made to publish new regulations widely, but the only valid source of current recommendations shall remain the Manual of the Medical Department. When in doubt, NAMI ophthalmology remains available for consultation through phone or email:
850-452-2933 ; NOMI-EyeDept@med.navy.mil

Medical Codes:
P1177 / H1177 PRK
P1171 / H1171 LASIK

12.15A LASIK IN DESIGNATED AVIATORS STUDY

Class I, Class II: The LASIK Study for designated Class I and Class II personnel has been closed. Be aware that Class I personnel are required to have their LASIK procedure performed at one of the DoN Refractive Surgery Centers (including Tripler AMC and Keesler AFB, which have Navy ophthalmology support). Class II personnel may have LASIK performed at any DoD refractive surgery center. For designated personnel previously enrolled in the study, annual submission is required for renewal with supporting documentation per the LASIK study protocol.

12.15B LASIK IN STUDENT AVIATORS STUDY

AEROMEDICAL CONCERNS: The goals of this study are to evaluate safety, efficacy, and visual performance of LASIK in student naval aviators, flight officers and aircrew.

WAIVER: At this time, waivers for LASIK in Class I aviation applicant personnel require enrollment in the LASIK in student aviators study. For more information on study enrollment and inclusion criteria contact NMCSD Refractive Surgery Center at : http://www.med.navy.mil/sites/nmcsd/Patients/Pages/RefractiveSurgeryCenter.aspx. For Class II and III aviation applicant personnel, waivers will be considered without study enrollment.

GENERAL GUIDELINES:

1. Pre-LASIK refractive error measured under cycloplegia must not exceed -8.00 to +3.00 (spherical equivalent, SE) and 3.00 diopters of cylinder. Anisometropia shall not exceed 3.50 diopters (using SE for each eye).

2. At least three months have elapsed since surgery or re-treatment and evidence of stable refractive error.

3. Applicant must have screening vision exam performed at one of 10 participating screening sites:
   - NH Bremerton
   - NH Camp Pendleton
   - NMC San Diego
   - WRNMMC (Bethesda, MD)
   - NMC Portsmouth
   - NH Camp Lejeune
   - NH Jacksonville
   - BMC Newport
   - BMC Annapolis
   - NAMI (Pensacola, FL)

   Applicant requirements for waiver consideration:

   a. Total post-operative higher order RMS aberrations less than or equal to 0.70 microns as measured by a Hartmann-Shack aberrometer, and adjusted for pupil size per nomogram.

b. Best-corrected mesopic (low-light) visual acuity better than or equal to 0.50 logMAR as measured on a Precision Vision 25% low contrast visual acuity chart.

c. Submission of detailed pre-operative, operative print-outs, and post-operative LASIK follow-up records.

d. Demonstrate refractive stability.

e. Submission of aviation physical examination (including Standard Form 2808 and SF507)

f. Free of significant complaints (glare, haloes, starbursts, ghosting, excessive dry eye syndrome, pain, photophobia, etc.)

g. Not requiring topical ophthalmic medications, aside from occasional artificial tear use.

h. Have a normal postoperative slit lamp exam, with no visually significant complications (ectasias, epithelial ingrowth, central scarring, etc.)

i. Meet refractive, cycloplegic, and vision standards post-operatively as defined by MANMED for aviation class.

j. Annual submission is required for renewal with supporting documentation per the LASIK study protocol.

Discussion: "All-laser" LASIK is preferred, which utilizes two types of lasers to create the LASIK flap and perform the vision correction. The laser is preferred over a metal keratome blade to reduce the risk of operative complications and enhance post-op stability. "Wavefront-guided" or "custom" LASIK is also preferable, if available and the patient is a candidate for such. "All-laser, custom LASIK" gives a better visual outcome over conventional treatments. This has been borne out by repeated Navy research studies. Please note that no specific method of LASIK is mandatory for waiver consideration, as long as all pre- and post-op study criterion are met.

Medical Codes:
P1171 / H1171 LASIK

12.16 NAVAL AVIATION CONTACT LENS POLICY

All classes of Naval aviation personnel shall be allowed to wear contact lenses during duty involving flight when the following requirements have been met as outlined below. A notation from the flight surgeon authorizing contact lens use is required on the aeromedical clearance notice (up-chit) NAVMED 6410/2. Contact lens use is not disqualifying. A waiver for their use is not required.

REQUIREMENTS:

1. Visual requirements specific to each class and service group must continue to be met while wearing contact lenses.
2. Near visual acuity must be 20/20 in each eye. Presbyopic personnel may use spectacles over their contacts to achieve this standard.
3. There must be no symptoms incompatible with safe flight, e.g. fluctuating vision, reduction in vision at night or under glare conditions, or discomfort.
4. Must have worn contact lenses on a daily basis without complication for a minimum of one month before their use can be authorized on the “up-chit”.
5. The prescribing eye doctor must note in the patient’s record that a good fit has been achieved and that no further changes are planned.
6. SCLs are not to be worn overnight while in flight training or flight status unless operationally mandated. If extended contact lens wear (greater than 24 hours) is an operational requirement, lenses may be worn for a maximum of seven consecutive days. Personnel are encouraged to limit extended wear to the shortest period possible. A minimum 12 hour recovery period, during which no contact lenses are worn, shall follow each extended wear period. Rigid gas permeable lenses shall not be used overnight.
7. During aviation duties, it is the responsibility of all contact lens wearers to carry clear spectacles in a readily accessible protective case which correct the wearer's vision to all applicable standards.
8. Follow-up examinations for personnel wearing contact lenses shall be conducted at least annually by a Navy optometrist or ophthalmologist.

APPROVED CONTACT LENSES:

1. Only nationally available, FDA approved lenses and solutions are allowed.
2. Lenses of first choice shall be FDA approved silicone hydrogel contact lenses. Rigid gas permeable lenses are permissible, but strongly discouraged.
3. The following are NOT authorized:
   a. Bifocal/multifocal contact lenses.
   b. Cosmetically tinted contact lenses.
   c. Sports tinted contact lenses (e.g. amber or green).
   d. Contact lens wear for corneal refractive therapy (ortho-K).
4. The following are only authorized with an appropriate waiver:
   a. Combinations of rigid and soft contact lenses.
   b. Contact lens use for therapeutic reasons such as keratoconus or basement membrane dystrophies.

For any other questions regarding specific brands of contact lenses or waiver issues, please contact NAMI Ophthalmology Department.
http://www.med.navy.mil/sites/navmedmpte/nomi/nami/clinical/Pages/Ophthalmology.aspx

12.17 ALLERGIC CONJUNCTIVITIS

AEROMEDICAL CONCERNS: The condition can cause blurred vision, ocular itching, burning, tearing/discharge, eyelid edema, and photophobia. These signs and symptoms, along with the use of medications with unacceptable side effects, have the potential for in-flight incapacitation and prolonged periods of grounding.

WAIVER: Chronic allergic conjunctivitis is CD for all applicants according to the MANMED. Perennial and seasonal allergic conjunctivitis in designated personnel is NCD. The member shall be grounded while symptomatic. A waiver is not required if the member is treated with an approved medication. If the condition is associated with rhinitis, see chapter 6.1, ALLERGIC/VASOMOTOR RHINITIS.

TREATMENT: Mild symptoms of allergic conjunctivitis may be relieved by cool compresses and artificial tears to flush away the antigens. Moderate to severe symptoms may require, in addition to cool compresses and artificial tears, ophthalmic antihistamines and/or mast cell stabilizers. **Only prescription ophthalmic antihistamines and mast cell stabilizers are approved**; OTC or prescription ophthalmic vasoconstrictors/ decongestants, NSAIDS, and corticosteroids are **not approved**. Note that ophthalmic antihistamines containing vasoconstrictors/decongestants are **not approved**. If necessary, oral non-sedating antihistamines may also be used, see 6.1 ALLERGIC/VASOMOTOR RHINITIS for an approved list of medications.

DISCUSSION: Two forms of allergic conjunctivitis are quite common: seasonal (SAC) and perennial (PAC). SAC tends to be seasonal or multi-seasonal and coincides with pollen blooms (e.g., ragweed). PAC may occur at anytime or even year round (e.g., exposure to cat dander or dust mites). The most effective treatment is elimination or avoidance of the potentially offending allergen, although this may not always be possible or practical. Due to the potential chronicity of SAC/PAC, long term use of medication may be necessary to keep the member asymptomatic for aviation duties. Ophthalmic antihistamines and/or mast cell stabilizers have minimal side effects and are approved for use in aviation personnel. Contact lenses may exacerbate the condition and should not be worn until the member is asymptomatic.

ICD-9 CODES:
372.14 Chronic Allergic Conjunctivitis
372.05 Acute Atopic Conjunctivitis

13.0 ORTHOPEDICS

13.1 ABNORMAL SPINAL CURVATURE

AEROMEDICAL CONCERNS: Excessive kyphosis, scoliosis, lordosis, or combinations of them may make the spine unstable during ejection. Symptomatic conditions may cause distracting backache during flight.

WAIVER: Scoliosis over 20 degrees is disqualifying with no waiver for applicants, but can be waived in designated personnel. Kyphosis over 40 degrees is CD, but can be waived up to 45 degrees in designated personnel. Waiver is not normally recommended when there is pain or interference with function or when the condition is progressive.

INFORMATION REQUIRED:

1. Orthopedic consultation with measurement of any scoliosis by the Cobb method. Films should be taken in a standing position, and the measurements made by the radiologist or orthopedist.
2. Cardiology consultation may be required to exclude pulmonary hypertension in those cases where right axis deviation is seen on EKG.

TREATMENT: Scoliosis, if caused by an anatomical short leg, may be improved with a trial of a heel lift on the affected side. OMT/Manual medicine and/or heel lift therapy when successful is NCD. Surgical treatment is disqualifying.

DISCUSSION: Curvature beyond 30 degrees poses risk for ejection injury. 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 bending movement 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 waiver is possible for designated aircrew, there is little point in considering a waiver for applicants as initial training will involve ejection seat aircraft. The long term outcome in cases of scoliosis up to 30 degrees is very favorable, but above 30 degrees is uncertain. Note that there is a 3-5 degree error in measurements taken by the Cobb method. Consideration to disproportional leg lengths and/or pelvic torsion as an insult to cause symptomatic excessive spinal curvature should be considered. OMT/Manual medicine with an experienced physician may provide greater spinal normalization and relief of symptoms.

ICD-9 CODES:
737 Abnormal Spinal Curvature
737.0 Kyphosis
737.2 Lordosis
737.3 Kyphoscoliosis
737.31 Scoliosis, within standards

13.2 ANKYLOSING SPONDYLITIS

AEROMEDICAL CONCERNS: Cramped cockpit conditions for prolonged periods may exacerbate the eventual disability. Spinal rigidity in advanced cases is incompatible with ejection, may interfere with emergency ground egress, and can cause restriction in peripheral scan by impairing mobility. Concomitant iritis occurs in between 10 and 25% of cases.

WAIVER: An established diagnosis with symptoms is CD. Waiver is possible in early cases with normal mobility and no complications.

INFORMATION REQUIRED:

1. Orthopedic or rheumatology evaluation

TREATMENT: The cornerstone of treatment while continuing a flying career is a regular exercise routine which the patient must follow scrupulously. Physical rehabilitation may be necessary following flare-ups. Long term maintenance therapy with non-steroidal anti-inflammatory drugs is usually not considered for waiver.

DISCUSSION: Sacroiliitis is often the earliest manifestation of the disease, and can be noted on an AP view of the pelvis. The HLA-B27 gene is present in 90% of Caucasians and 50% of African Americans with ankylosing spondylitis. The ESR and C-reactive protein are usually elevated. Clinical diagnosis should be suspected with a history of chronic back pain, loss of motion of lumbar spine, limited chest expansion, and radiographic evidence of sacroiliitis. Complications include cardiac conduction defects, aortic incompetence, uremia arising from amyloidosis, and chest rigidity giving rise to ventilation/perfusion abnormalities. Spinal cord damage can arise from fractures of the rigid cervical spine, and spontaneous subluxation at the atlantoaxial joint with quadriplegia has been described.

ICD-9 CODE:
720.0 Ankylosing Spondylitis

13.3 CHRONIC BACKACHE

AEROMEDICAL CONCERNS: Chronic back pain, somatic dysfunction, and/or osteoarthritis of the spine and/or pelvis can make it difficult to remain seated for long periods and can hamper performance. If symptoms are chronic and/or recurrent, if the member has required hospitalization, or if the member requires regular medication beyond occasional FS approved NSAIDs, then the condition is CD.

WAIVER: Waiver may be recommended when the pain is controlled by conservative, non pharmacologic means, and is not associated with an organic cause. Designated personnel with osteoarthritis requiring low dose NSAIDs who can maintain close supervision by a Flight Surgeon may be considered for waiver on a case by case basis. Somatic dysfunction which is amenable to OMT/Manual medicine, unless persistent, is NCD.

INFORMATION REQUIRED:

1. Exclude specific causes of back pain such as prolapsed intervertebral disc, metabolic bone disease, metastatic bony deposits, myeloma, ankylosing spondylitis, rheumatoid arthritis, infection, structural defects, somatic dysfunction, and/or injury.
2. Reports of any imaging studies or lab work obtained.
3. Orthopedic, rheumatological and/or OMT/Manual medicine consult are also required if obtained.

TREATMENT: Simple conservative measures such as early mobility with remedial exercises or physiotherapy may be beneficial. Bed rest greater than 2 days is rarely of assistance. OMT/Manual medicine with a physician may be beneficial in reducing or alleviating mechanical pelvic-spinal pain. Occasional use of FS prescribed NSAIDs and/or acetaminophen may be used provided there are no subjective side effects and daily use does not exceed 10 days. Drug treatment for the pain of arthritis is not usually waiverable.

DISCUSSION: Ninety five percent of back pain is caused by biomechanical derangement of the spine and/or sacroiliac joints when harder tissue encroaches on soft nerve tissue causing symptoms of pain, spasms, and numbness. This is also known as somatic dysfunction that can often be reduced or alleviated by physicians with training in OMT/Manual medicine. Muscular weakness is not generally found in the diagnosis of somatic dysfunction. The incidence of backache only occurring during flight has been reported to be 13% in pilots. Helicopter pilots reported a higher incidence than fixed-wing pilots. Degenerative changes in the cervical spine are common over the age of 30 years. Many mechanical back injuries are preventable, and it should be the flight surgeon's responsibility to educate his squadron members on how to avoid these problems.

ICD-9 CODES:
721.9 Chronic Backache
739.1 Somatic Dysfunction, C-spine region
739.2 Somatic Dysfunction, T-spine region
739.3 Somatic Dysfunction, L-spine region

739.4 Somatic Dysfunction, Sacroiliac region
739.8 Somatic Dysfunction, Rib cage

13.4 INTERVERTEBRAL DISC DISEASE

AEROMEDICAL CONCERNS: Discomfort or pain can degrade flying performance, and the forces of ejection, excess G forces, catapult launches and arrested landings can exacerbate the condition. One case of acute quadriplegia under G stress has been reported.

WAIVER:

Applicants: A history of symptomatic HNP with or without surgery is disqualifying. Waivers may be considered on a case by case basis.

Designated Personnel: In designated personnel who are currently asymptomatic, the condition is CD but is usually considered for a waiver. Students already under instruction may also be considered for a waiver. All dispositions and waiver requests must be based upon the following criteria, defined by region:

Cervical:

1. **Without radicular symptoms:** Clinical presentation is neck pain, occasional spasms, and/or occasional crepitus. Radiographs show narrowing, osteophytes, or are normal. Treatment is symptomatic with NSAIDs, analgesics and cervical traction. OMT/Manual medicine by an experienced physician may also be helpful. Condition is typically seen in the 4th decade of life. **Aeromedical disposition is NCD**
2. **With radicular symptoms:** Clinical presentation is as above but with motor, sensory, and/or DTR changes consistent with radiculopathy. Levels usually are C-4/5, C-5/6 (most common) C-6/7, or C-7/T-1. Radiographs/MRI may show hard disks, foraminal narrowing, and/or disk space narrowing. Treatment is same as above. Soft cervical collar may also be helpful. Failure to respond to conservative therapy and/or progressive symptoms may necessitate neurosurgical consultation. Surgeries are generally anterior cervical fusion (ACF) and occasionally posterior cervical laminectomy. ACF may be performed with graft only, or with graft plus internal fixation.

Aeromedical disposition:

a. **Symptomatic patient without surgery: NPQ Waiver Not Recommended (NPQ WNR)**
b. **Surgically treated:**
    i. One level corrected by ACF, 6 months post op, pain free, and with no radicular symptoms. Radiographs demonstrate healing with no instability in flexion and extension views. **NPQ, WR *including rotary wing and ejection seat aircraft.***
    ii. TWO levels corrected by ACF, 6 months post op, pain free, and with no radicular symptoms. Radiographs demonstrate healing with no

instability in flexion and extension views. **NPQ, WR *excluding rotary wing and ejection seat aircraft.***

Note: With one cervical level fused, expect a 5 degree loss of rotation and a 15 degree loss with two levels fused. Flexion/extension is generally not compromised.

Lumbosacral:

1. **Without radicular symptoms:** Also see section 13.3 above, titled CHRONIC BACK PAIN. Clinical presentation is low back and/or sacroiliac joint area pain with occasional spasms. Sacroiliac joint dysfunction may have subjective symptoms of radicular-like symptoms in the pelvic girdle and/or lower lumbar spine area but symptoms generally do not extend below the knee. Clinically, no neurological deficits are demonstrated. Radiographs upon initial presentation without recent trauma are rarely helpful. Radiographs may show narrowing of disk spaces and/or osteophytes or be normal. Treatment is symptomatic with NSAIDs, analgesics, and traction. OMT/Manual medicine by experienced physician may be helpful. **Aeromedical disposition is NCD.**
2. **With radicular symptoms:** Presentation is as noted above, but with the presence of radiculopathy. Neurological examination demonstrates motor, sensory, or DTR changes and/or positive straight leg raise. MRI or myleogram demonstrates HNP with nerve root impingement consistent with the observed neurological deficit. All patients should undergo a period of symptomatic treatment.

Aeromedical disposition:

a. **Symptomatic patient without surgery; NPQ Waiver Not Recommended (NPQ WNR)**
b. **Asymptomatic patient with radicular history over the previous year (treated either operatively or non-operatively): NPQ WR *including rotary wing and ejection seat aircraft.***

Notes: An MRI diagnosis of "HNP" at any level of the spine, in the absence of clinical findings, is meaningless. 20-30% of ASYMPTOMATIC people have herniated disks by MRI. Spinal strengthening and range of motion routines with non-impact aerobic training are to be initiated as soon as allowed by the operating surgeon. Following successful surgical or conservative treatment, waiver is possible at six weeks if the following conditions are met:

1. Essentially pain free with no medications other than Flight Surgeon approved NSAIDs and/or acetaminophen.
2. Good flexibility and range of motion.
3. Can pass USN PRT (minus sit ups for lumbar patients).
4. Released to full duty and flight status by the operating surgeon.
5. Recommended for waiver by Flight Surgeon or Local Board of Flight Surgeons.

With the exception of the above noted circumstances, **multi-level discectomies** will be considered to be permanently disqualifying. Waivers are not likely, but may be considered on a case-by-case basis.

INFORMATION REQUIRED:

1. Orthopedic or neurosurgical consult.
2. If surgically fused, post-operative lateral flexion and extension x-rays must also be submitted as evidence of stability.
3. Note documenting return to full duty from Orthopedic or Neurosurgical consult.
4. Documentation of the member's ability to pass a USN PRT.

TREATMENT: See above. Consider surgery after a reasonable course of failed conservative management. Adequate after-care is essential in maintaining strength and flexibility without symptoms for any treatment approach.

DISCUSSION: In 50% of cases of lumbar disc protrusion there is a history of trauma, straining, or lifting heavy weights. Cervical symptoms may arise as a result of high-G maneuvering, particularly in crew members other than the pilot in control of the aircraft. Conservative therapy yields a 20% cure rate, while the remainder of patients experiences some pain or discomfort. Surgical treatment of selected cases where root compression is symptomatic and progressive can yield complete relief from symptoms in up to 80% of cases. Operative vs. non-operative outcomes after five years have demonstrated essentially the same outcome. OMT/Manual medicine by an experienced physician may be helpful in providing a clinical diagnosis and reducing down time while improving patient satisfaction and reducing the number or required diagnostic tests. Acute onset of a neurological deficit requires prompt orthopedic or neurosurgical assessment.

ICD-9 CODES:
722 .0 HNP without myelopathy, Cervical
722.11 HNP without myelopathy, Thoracic
722.10 HNP without myelopathy, Lumbar
722.71 HNP with myelopathy, Cervical
722.72 HNP with myelopathy, Thoracic
722.73 HNP with myelopathy, Lumbar
722.4 Degenerative disc disease, Cervical
722.51 Degenerative disc disease, Thoracic
722.52 Degenerative disc disease, Lumbosacral
P80.5 Discectomy
P80.51 Discectomy by laminectomy
P80.59 Intervertebral disc destruction, NEC
P81.00 Spinal fusion, unspecified
P81.02 Anterior cervical fusion
P81.03 Posterior cervical fusion
P81.06 Anterior lumbar fusion
P81.08 Posterior lumbar/lumbosacral fusion

13.5 KNEES - LIGAMENT/MENISCAL TEARS

AEROMEDICAL CONCERNS: An unstable knee is a safety factor during rudder/ brake pedal operations, emergency egress, or water and land survival (both training and real life scenarios).

WAIVER: Meniscal injuries that are surgically repaired do not require a waiver (NCD). Anterior cruciate ligament injuries in designated personnel that are treated surgically OR conservatively require a one-time waiver with follow-up exams (CD/WR). Applicant personnel who have had surgical ACL repair are eligible for a one-time waiver with follow-up exams (CD/WR). **Conservatively treated ACL injuries (no surgery) shall not be recommended for a waiver.** A knee that is found to have a torn ligament is CD until a repair is performed.

INFORMATION REQUIRED:

1. A complete picture of the patient's level of physical activity, limitations, and "normal" documentation.
2. Orthopedic consult must state that the knee is asymptomatic, stable, and if surgery was performed, the successful outcome of the surgery.
3. The patient must not require medication to control pain.
4. Documentation of the patient's ability to pass a USN PRT (swim or run).
5. Normal physical exam of the knee, which must document anterior drawer test, McMurray's test, medial and lateral stability, absence of swelling or effusion, absence of tenderness, and full range of motion.

TREATMENT: Surgically repaired ACL's are CD but will be considered for a waiver when asymptomatic and functionally stable. Conservatively treated ACL tears are CD but may be considered for waiver after completion of rehabilitation if patient is symptom free and functionally stable as defined above. Particularly with non-surgical treatment, a careful determination of stability, level of function, and symptoms are crucial for waiver determination.

DISCUSSION: Anterior cruciate ligament tears are usually accompanied by associated damage to medial and often the lateral complexes as well. These result from forced flexion or hyperextension injuries in combination with a valgus or varus stress. A positive "anterior drawer sign" is evident on physical exam, usually with findings of medial ligamentous instability as well. Avulsion fracture of the anterior tibial spine may be found on x-ray. Following surgical repair, intensive quadriceps building is required to prevent recurrent injury.

ICD-9 CODES:
717.3 Medial Meniscal derangement
717.40 Lateral Meniscal derangement
717.7 Chondromalacia of the patella (patello-femoral pain syndrome)
717.83 Knees - Ligament/Meniscal Tears
717.83 Anterior Cruciate Ligament disruption, old
717.84 Posterior Cruciate Ligament disruption, old
P80.26 Knee Arthroscopy

13.6 ORTHOPEDIC HARDWARE, RETAINED

AEROMEDICAL CONCERNS: Discomfort due to retained hardware and risk of refracture are safety of flight and mission completion concerns.

WAIVER: Retained hardware in the upper and lower extremities is NCD provided there has been resolution of the underlying orthopedic problem, that the hardware is not subject to trauma, is intact and in the intended location, and does not weaken the bony structure. Retained hardware in the spine is CD in applicants, no waiver. Designated personnel may be considered strictly on a case-by-case basis.

INFORMATION REQUIRED:

1. Orthopedic consultation
2. X-rays (actual films are required, not just reports)

TREATMENT: Removal may be a consideration when the retained hardware is associated with the problems noted above.

DISCUSSION: Often the underlying orthopedic condition is disqualifying and of greater concern. Retained bioelectric devices (implanted bone stimulators) imply the persistence of a disqualifying condition and are CD, no waiver. If the device has been "curative" then it is no longer required and should be removed. Hardware implanted as a component of a prosthetic joint (arthroplasty) is CD. Most implanted hardware (screws, plates, staples, wires) are used as part of an open reduction and internal fixation of a fracture. After the fracture has healed, the hardware has done its job, and should be removed if it causes discomfort, is easily accessible, and there is minimal morbidity associated with the removal. Some types of hardware are used to affix soft tissue to bone (i.e. knee ligament and rotator cuff repair, shoulder capsulorraphy). Removal of these is generally not indicated. Pedicle screws, Harrington rods, circlage wires, and fixation plates too frequently become broken as a result of metal fatigue over time, often with disastrous neurological consequences.

ICD-9 CODE:
V54.90 Orthopedic Hardware, Retained

13.7 RECURRENT SHOULDER DISLOCATION

AEROMEDICAL CONCERNS: Dislocation of the shoulder in flight could lead to disastrous consequences.

WAIVER: More than one episode of dislocation is CD for both applicants and designated personnel. The condition, or history thereof, is CD regardless of interval since repair, but may be considered for a waiver. If a unilateral condition has been corrected surgically and heals without complications and full range of motion, the aviator may request a waiver.

INFORMATION REQUIRED:

1. Orthopedic consult
2. Physical therapy consult documenting full range of motion

TREATMENT: Surgical correction and rehabilitation. Member should also be taught a method for self reduction.

DISCUSSION: The aeromedical concerns are obvious. Initially, annual submission will be required to document the absence of symptoms and recurrence. If the shoulder remains stable for more than one year post-op, less frequent submission may be requested.

ICD-9 CODES:
718.31 Recurrent Shoulder Dislocation
P81.82 Repair of Recurrent Shoulder Dislocation

13.8 SPINAL FRACTURES

AEROMEDICAL CONCERNS: An unstable spine can result in sudden spinal cord injury. Spinal fractures may be associated with spinal cord, nerve root, or plexus injuries. There are significant clinical implications related to whether the fractures occur in the cervical, thoracic, or lumbar spine. Statistically, compression fractures cluster at the thoraco-lumbar junction with T12 being the most common vertebral body involved, followed by L1 and T11.

WAIVER:

Cervical: Cervical fractures are CD and require waiver, regardless of extent. **Spinous process fractures not involving the lamina, pedicle, or vertebral body are NCD.** A 6 month period of grounding is required for patients with small anterior chip fracture or compression fractures of less than 25%. At 6 months, if the patient is pain-free, has full ROM, no instability on lateral views, and has no radicular symptoms, he will be considered for a waiver for non-ejection-seat aircraft only. At 12 months, if all the above criteria are still met, waiver will be considered for ejection-seat aircraft. Cervical spine fractures with more than 25% compression, with evidence of instability on lateral views, or with radicular symptoms will only be considered on a case by case basis.

Thoracic: A three month period of grounding for a single compression fracture with less than 50% compression or a single wedge fracture with no scoliosis on AP views. At 3 months, if the patient is pain free and with no instability, a waiver will be considered for non-ejection seat aircraft only. At 12 months, waiver will be considered for ejection-seat aircraft if all of the above criteria are still met. Thoracic spine fractures with more than 50% compression, with evidence of scoliosis, or more than one compression fracture are NPQ with a waiver considered on a case by case basis.

Lumbar: A three month period of grounding is required for a single compression fracture of less than 50% or a single wedge fracture with no scoliosis on an AP view. After a 3 month period of grounding, a waiver will be considered for non-ejection seat aircraft only providing the patient is pain free, no instability, no spondylolysis or spondylolisthesis, and no radicular pain. At 12 months, waiver will be considered for ejection-seat aircraft providinga all of the above criteria are still met. If more than 50% compression, instability present on x-ray, radicular symptoms are present, or there is an associated HNP, then the patient is NPQ with waiver possible only on case by case basis.

INFORMATION REQUIRED:

1. Orthopedic or neurosurgical consultation
2. All X-rays
3. MRI scan of regional neuroanatomical structures may also be required.

TREATMENT: Stable fractures without neurological injury respond well to conservative management. Those injuries requiring surgical decompression and/or stabilization usually leave the member with permanent disabilities incompatible with return to DIFOPS.

DISCUSSION: In C-spine injuries, the key element in determining aeromedical disposition is stability of the spine. Often times, the bony injuries heal with no residual instability. Ligamentous injuries, in contrast, may heal with various degrees of instability. Early on, instability is detectable by obtaining lateral views in flexion and extension of the C-spine. Chronic instability results in degenerative changes such as disc space narrowing and asymmetry. Also, osteophytic changes and foraminal narrowing are seen in the oblique views. The common wedge or chip fracture, often seen at the C4-6 level with no instability noted, has an excellent prognosis. Lumbar compression/wedge fractures generally heal with no instability. Purely ligamentous injuries of the L-spine are uncommon, however, there is potential for degenerative disc disease which could lead to herniation. Spinal compression fractures are a common ejection injury (20 - 30% of ejections), with most fractures occurring between T9 and L1. For this reason, all survivors of ejections should undergo complete spine x-rays. Finding a compression fracture on x-ray often raises the question of the age of the fracture. Widening of the paraspinous line on x-ray and symptoms appropriate to the location of the identified fracture are indicative of an acute injury. A radioisotope bone scan may remain "hot" for up to two years post compression fracture. Once healed, the damaged area does not appear to be unduly susceptible to repeat fracture. The USAF has records of six pilots with compression fractures who ejected a second time without suffering injury. One aviator ejected four times without subsequent injury. Patients with persistent pain after fracture healing and no other radiological evidence of disease or trauma may benefit from OMT/Manual medicine consultation. C-spine treatment and evaluation should only be undertaken by the most experienced physicians. Somatic Dysfunction with traumatic fractures occurs frequently. C-spine treatment and evaluation should only be undertaken by the most experienced physicians.

ICD-9 CODES:
805 Spinal Fractures
805.0 Fracture of Cervical spine, closed, without spinal injury
805.2 Fracture of Thoracic spine, closed
805.4 Fracture of Lumbar spine, closed

13.9 SPONDYLOLYSIS

AEROMEDICAL CONCERNS: This condition can be a cause of low back pain, but may also cause instability leading to spondylolisthesis. Often time patients are asymptomatic and the condition is noted as an incidental finding. Distracting pain and nerve root impairment are incompatible with safe flight operations.

WAIVER: CD with no waiver for non-designated personnel. For designated personnel, a waiver may be considered on an individual basis.

INFORMATION REQUIRED:

1. Orthopedic, neurological or neurosurgical consultation.
2. X-rays.
3. CT and MRI scans may also be required in patients with radicular symptoms.

TREATMENT: Conservative treatment may achieve temporary relief of symptoms, however upon resumption of vigorous physical activities symptoms usually return.

DISCUSSION: The defect in the pars interarticularis (neck of the "Scotty dog") may be acquired from acute trauma, or more commonly, may result from chronic stress (stress fracture). Rarely is it of congenital origin. These occur primarily at L5-S1 and somewhat less at L4-L5. There is an inherited proclivity for the condition (dominant transmission) with an incidence that increases with age up to the end of the fourth decade. It exists in about 5% of the general population, but is much higher in certain races (Japanese, Eskimo) where it may be as high as 45%. Instability of the posterior spinal elements is associated with the development of spondylolisthesis, which is frequently progressive. This condition is likely to be accelerated by the physiological stressors of military flight activities.

ICD-9 CODE:
721.9 Spondylolysis

13.10 SPONDYLOLISTHESIS

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.

WAIVER: CD with no waiver for non-designated personnel. For designated personnel, asymptomatic grade I spondylolisthesis is CD but may be considered for a waiver. Higher grades of spondylolisthesis or symptomatic grade I sponylolisthesis are also CD, but waivers may be considered on an individual basis. Patients who have had successful surgery and are currently asymptomatic may also be considered for waiver on a case by case basis.

INFORMATION REQUIRED:

1. Orthopedic consult
2. Neurology consult
3. Rheumatology consult
4. OMT/Manual medicine consult (if available)

TREATMENT: Treatment includes education in proper body mechanics and use of the back, along with a program of daily back exercises.

DISCUSSION: Aircrew who has frequent symptoms should not continue to fly. Further slipping of the vertebra (usually L5) can occur with exposure to excessive gravitational forces, ejection, or even during normal activities on the ground. Aviators with infrequent symptoms who do not require surgery may still be restricted from ejection seat aircraft or carrier catapult launches and traps.

ICD-9 CODES:
738.4 Acquired spondylolisthesis
756.12 Congenital spondylolisthesis
756.18 Traumatic spondylolisthesis

14.0 PSYCHIATRY

14.1 ADJUSTMENT DISORDERS

AEROMEDICAL CONCERNS: Adjustment disorders are often associated with decreased concentration, depression, anxiety, impairment of occupational or social functioning, inattention, indecisiveness, fatigue, and insomnia, all of which are incompatible with aviation duties. This is one of the most common psychiatric diagnoses among aviators.

WAIVER: Adjustment disorder is temporarily considered disqualifying (CD) for aviation until resolved. Once fully resolved, the patient is PQ with no waiver required.

INFORMATION REQUIRED: Upon return to an up status, FS must submit:

1. A brief summary of pertinent symptoms and treatment
2. All any mental health records or Medical Board reports (if applicable)

TREATMENT: Psychotherapy during the symptomatic period is not compatible with aviation duties.

FOLLOW-UP REQUIREMENTS: Psychiatric follow-up is at the discretion of the mental health provider. *Adjustment disorders diagnosed by mental health personnel are not considered resolved until a mental health provider makes that statement in the patient's health record.*

DISCUSSION: The subjective distress or impairment in functioning associated with adjustment disorders is frequently manifested as decreased performance at work or school and temporary changes in social relationships. Adjustment disorders are also associated with an increased risk of suicide attempts and suicide.

14.2 ALCOHOL ABUSE OR DEPENDENCE

AEROMEDICAL CONCERNS: Alcohol has both acute and chronic effects on cognitive and physical performance. Cognitive effects include impairment of short-term memory, degradation of reasoning and decision-making, and inattentiveness. Psychomotor dysfunction includes an increase in reaction time and procedural errors. These damaging effects can occur at low blood alcohol levels (0.02 mg/dl). In addition, after moderate alcohol consumption, these effects can persist for many hours even after the blood alcohol level has returned to zero. Alcohol can also cause problems with visual acuity, oculovestibular dysfunction (positional alcohol nystagmus), and vertigo. This susceptibility exists long into the "hangover" period. In addition, alcohol reduces Gz tolerance by 0.1-0.4 G. Acute alcohol intoxication can also produce ataxia, vertigo, nausea, and dysrhythmias that usually disappear quickly but can leave moderate conduction delays for up to one week (the "holiday heart" syndrome). Acute alcohol intoxication is implicated in about 16% of general aviation fatal accidents.

HISTORY OF ALCOHOL ABUSE OR DEPENDENCE TREATMENT: To properly identify and follow all aviation personnel with a history of alcohol abuse or dependence, all aviation physical exams shall include the following question on the appropriate medical history questionnaire (DD2807 or 6120/2): *"Have you ever been diagnosed or had any level of treatment for alcohol abuse or dependence?"* Treatment must have been provided at an Alcohol Treatment Facility (ATF), Alcohol Rehabilitation Department (ARD), Alcohol Rehabilitation Center (ARC), Counseling and Assistance Center (CAAC), or other free-standing facility authorized to provide such treatment to USN personnel. Waiver requests documenting treatment other than that described will be reviewed on a case by case basis to assess standard of care. Civilian education programs, shipboard aftercare programs and IMPACT/PREVENT education programs are inadequate treatment for aviation personnel diagnosed with alcohol abuse/dependence requesting a waiver.

- **Former** Treatment Levels
  Level I - PREVENT/IMPACT for an alcohol related incident or prevention.
  Level II - OUTPATIENT for a diagnosis of alcohol abuse.
  Level III - INPATIENT for a diagnosis of alcohol dependence.

- **Current** Treatment Levels
  Level 0.5 -IMPACT for an alcohol related illness or mild alcohol abuse.*****
  Level 1 - OUTPATIENT for a diagnosis of alcohol abuse.
  Level 2 - INTENSIVE OUTPATIENT for a diagnosis of alcohol dependence.
  Level 3 - DORMITORY for junior enlisted assigned to a barracks with a "buddy" system will attend level 1 or 2 outpatient treatment and live in the barracks at night.
  Level 4 - INPATIENT (medical ward) for those at risk for withdrawal prior to treatment.

** Please note Level 0.5 IMPACT is NOT adequate treatment for aviation personnel diagnosed with alcohol abuse requesting a waiver. They MUST receive at least OUTPATIENT treatment for alcohol abuse.*

An alcohol related incident is not considered disqualifying (NCD). Alcohol abuse and/or dependence are considered disqualifying (CD) and require a waiver.

PREVIOUS DIAGNOSIS OF ALCOHOL ABUSE OR DEPENDENCE: If the member has a previous diagnosis of alcohol abuse or dependence and a waiver has not been granted, follow the guidelines for New Diagnosis of Alcohol Abuse or Dependence. If the member has a previous diagnosis of alcohol abuse or dependence and has been granted a waiver, follow the guidelines for Annual Waiver Continuance Process (outlined below).
Applicants to the aviation programs for duty involving flight will be evaluated in accordance with these standards. Diagnosis of either alcohol abuse or alcohol dependence will require treatment. Records of court-ordered "counseling/treatment/education" programs for alcohol-related incidents should be obtained and reviewed to assess whether a substance use or any other psychiatric diagnosis was made that would require waiver.

ABSTINENCE: Abstinence is required of all aeronautically designated personnel or students (aviators, aircrew, air traffic controllers, hypobaric chamber inside observers, and instructors) diagnosed with alcohol dependence or abuse per BUMEDINST 5300.8 as follows:

- Navy/Marine Corps active/reserve serving in a flying status involving operational or training flights (DIFOT)
- Duty in a flying status not involving flying (DIFDEN) orders
- Personnel serving as hypobaric chamber inside observers
- Instructors under hazardous duty incentive pay (HDIP) orders
- Civilian DON employees including nonappropriated fund employees and contract employees involved with frequent aerial flights or air traffic control duties

NEW DIAGNOSIS OF ALCOHOL ABUSE OR DEPENDENCE: Flight Surgeon must submit grounding physical upon diagnosis to NAMI Code 342. Waiver is possible 90 days after the patient has:

1. Successfully completed OUTPATIENT or INTENSIVE OUTPATIENT treatment.
2. Maintained a positive attitude and an unqualified acknowledgment of his alcohol disorder.
3. Remained abstinent without the need for Antabuse-type medications.
4. Complied with aftercare requirements post-treatment during the 90 days (see below).

AFTERCARE REQUIREMENTS: The member must document participation in an organized alcohol recovery program (Alcoholics Anonymous (AA)), and meet with designated professionals for the following specified timeframes:

Aftercare Timeframe

Professional /Meetings	**First Year**	**Second/Third Year**	**Fourth Year**
Flight Surgeon	Monthly	Quarterly	Annually
DAPA /SACO	Monthly	Monthly	N/A
Psychiatrist/Psychologist	Annually	Annually	N/A
Alcoholics Anonymous	3x weekly	1x weekly	recommended not required

INITIAL WAIVER PROCESS: As with any other waiver, the member should initiate the request. *In the waiver request letter, the member must acknowledge the specific aftercare requirements listed above.* Further, the member must provide specific evidence of current compliance. This will avoid claims that the member was never advised of all the requirements for requesting and maintaining an alcohol-related waiver. The following paragraph must be included in the member's request:

"I have read and received a copy of BUMEDINST 5300.8 series. I understand that I must remain abstinent. I must meet with my flight surgeon monthly for the first year, then quarterly for the next two years of aftercare. I must meet with the DAPA monthly and receive an annual mental health evaluation for the first three years of aftercare. And I must document required attendance at alcoholics anonymous (AA)."

Information required:

1. Complete flight physical, including Mental Status Exam (DD2807/2808 or 6120/2).
2. Flight Surgeon's narrative (Flight Surgeon's waiver endorsement) to include:
   a. Detailed review of all factors pertaining to the diagnosis, including events preceding and after the initial clinical presentation.
   b. Statements concerning safety of flight, performance of duties, potential for recovery, and any symptoms of comorbid diseases or significant stressors.
   c. Documentation of compliance with aftercare requirements including abstinence and AA attendance.
3. Outpatient/Intensive Outpatient treatment summary.
4. DAPA's statement documenting aftercare including AA attendance.
5. Psychiatric evaluation by a privileged psychiatrist or clinical psychologist. (SECNAVINST 6320.24 (Boxer Law) does not apply in these cases)
6. Internal Medicine evaluation (if indicated).
7. Command endorsement
8. ***Local Board of Flight Surgeons is not appropriate since the member has been grounded by PERS/CMC.***

ANNUAL WAIVER CONTINUANCE PROCESS:

1. During first three years of aftercare

   a. Complete long-form flight physical (DD2807/2808).
   b. Flight Surgeon's statement (must address the following)
      i. Safety of flight, performance of duties, potential for sustained recovery, and any symptoms of comorbid diseases
      ii. Documentation of compliance with aftercare requirements including abstinence and AA attendance.
   c. DAPA's statement documenting aftercare including AA attendance.
   d. Psychiatric evaluation by a privileged psychiatrist or clinical psychologist (SECNAVINST 6320.24 (Boxer Law) does not apply in these cases).

2. After three years of aftercare
    a. Short-form flight physical (NAVMED 6410/10)
    b. Flight Surgeon's statement (must address the following)
        i. Safety of flight, performance of duties, potential for sustained recovery, and any symptoms of comorbid diseases.
        ii. Documentation of member's continued abstinence

NONCOMPLIANCE OR AFTERCARE FAILURE: The following pertain to any member in denial of an alcohol problem, failing to abstain, or not compliant with all aftercare requirements of BUMEDINST 5300.8 series. These member's are to be considered NPQ and the following actions shall be performed:

1. Ground the member immediately! Grounding period is a minimum of 6-12 months.
2. Submit grounding physical to NAMI Code 342 (MED-236).
3. Re-evaluation by Flight Surgeon, DAPA, and Alcohol Treatment Facility to determine potential for re-treatment.

NOTE: The member's command must recommend a revocation of the current waiver in accordance with BUMEDINST 5300.8 series. If member requests waiver after the 6-12 month grounding period, please follow the Initial Waiver Process (above). Please discuss these waiver requests with NAMI Psychiatry Department Code-321 before submission. NAMI will review these waiver requests only on a case by case basis.

DISCUSSION: Use the current American Psychiatric Association's Diagnostic Statistics Manual (DSM-IV-TR) criteria to diagnose alcohol-related disorders. No difference exists in the waiver process or aftercare requirements for a member diagnosed with alcohol abuse versus alcohol dependence. The evidenced-based aftercare requirements (above) will help a member diagnosed with alcohol dependence maintain long-term sobriety/abstinence. According to Fiorentine 1999, weekly or more frequent AA participation is associated with drug and alcohol abstinence. Also, less than weekly AA participation is not associated with favorable drug and alcohol outcomes. According to Trent 1998, in his study of the Navy's alcohol treatment programs, the single best predictor of success at one-year is the number of months of aftercare participation. In addition, the best predictor of long-term success is one-year of sobriety/abstinence. Physicians often do not recognize the disease or ignore it. Alcohol related disorders should be considered in any patient with trauma, mood disorders, anxiety, sexual dysfunction, hypertension, gastritis, or current infections. In the United States, there are at least 12 million alcoholics and 76 million adults who have been exposed to alcoholism in the family. 64% of high school seniors have been drunk and alcohol is a factor in 41% of automobile fatalities and up to 50% of suicides. Surveys of United States pilots concerning use of alcohol reported that 22% would fly within one hour of drinking and 50% after 4 hours. In addition, a study in 1990 reported that 50% of pilots underestimate the deleterious effects of acute alcohol use.

REFERENCES

-BUMED INSTRUCTION 5300.8 (20 Mar 92) DISPOSITION OF REHABILITATED ALCOHOL DEPENDENT OR ABUSER AIRCREW, AIR CONTROLLERS, HYPOBARIC CHAMBER INSIDE OBSERVERS AND INSTRUCTORS with 2 MSG changes/updates **(see below)**

Paragraph 6b:
-MSG 1813002 JAN 94 (Aviation personnel diagnosed as alcohol dependent prior to 1987 or as alcohol abusers prior to 20 MAR 92 need to be identified and shall be subject to this instruction.

Paragraph 6g:
-MSG 021300Z FEB 94 (Submit grounding P.E. upon diagnosis of alcohol dependence or abuse. A complete P.E. should be submitted with initial waiver request. Thereafter P.E. for endorsement is required annually for continuance.

DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS Fourth Edition TEXT REVISION (DSM-IV-TR)

ICD-9 CODES
303.90 Alcohol Dependence (specify either with Psychological Dependence or without psychological dependence)

NOTE: May Specify **Early Partial Remission** Between 1 and 12 months if 1 or more criteria for abuse/dependence are met, but not all criteria for dependence; **Early Full Remission** Between 1 and 12 months, no criteria for abuse/dependence met; **Sustained Partial Remission** 12 months or longer with 1 or more criteria for abuse/dependence met, but not full criteria for dependence; **Sustained Full Remission** 12 months or longer with no criteria for abuse/dependence met
305.00 Alcohol Abuse

14.3 ANXIETY DISORDERS

AEROMEDICAL CONCERNS: The symptoms may produce distraction in flight with autonomic symptoms as well. Panic attacks can produce sudden incapacitation.

WAIVER:

- **Panic Disorder**
- **PTSD**
- **Generalized Anxiety Disorder**
- **Obsessive Compulsive Disorder**
- **Acute Stress Disorder**

The above diagnoses are all CD for aviation. Treatment should occur under the auspices of a Limited Duty Medical Board. Waiver may be requested when the member is asymptomatic, off medications, and out of active treatment for one year. A waiver may be considered for Acute Stress Disorder if the patient has remained asymptomatic and off medications for six months.

Specific Phobias: NPQ only if they impact on performance or flight safety. Refer package to NOMI for departmental review.

Social Phobias: NPQ if the behavior impacts on flight performance. Refer package to NOMI for departmental review.

INFORMATION REQUIRED:

1. Psychiatric evaluation and treatment summary
2. Medical Board reports (if indicated)

TREATMENT: The medications used to treat these disorders are incompatible with flying status. Behavioral therapy, including relaxation, biofeedback, and anxiety management, is permitted in a flying status if the symptoms are so mild that it does not meet the criteria for Panic Disorder, PTSD, Generalized Anxiety Disorder, or Obsessive Compulsive Disorder. Medication and behavioral therapy may certainly be used while the patient is on a Limited Duty Board.

FOLLOW-UP REQUIREMENTS: Psychiatric follow-up for the anxiety disorders is at the discretion of the treating mental health provider. Patients on Limited Duty status are generally seen at least monthly in follow-up. After one year off medications and symptom-free in a Full Duty status, the patient should receive a psychiatric evaluation to verify that there has been no recurrence. This evaluation must be included with the waiver request.

DISCUSSION: Patients with PTSD, Panic Disorder, and GAD may complain of palpitations, dizziness, headaches, shortness of breath, tremulousness, and impaired concentration and memory. OCD patients complain of obsessional thoughts and/or compulsive rituals which interfere with functioning. Long term prognosis is controversial, however over 50% may

recover within a year with appropriate treatment. Panic disorder has a high rate of recurrence, and is associated with increased mortality from cardiovascular disease and suicide.

ICD-9 CODES:
300 Anxiety Disorders
300.00 Anxiety Disorder NOS
300.01 Panic Disorder without Agoraphobia
300.02 Generalized Anxiety Disorder
300.21 Panic Disorder with Agoraphobia
300.23 Social Phobia
300.29 Specific Phobia
300.3 Obsessive Compulsive Disorder
309.81Post Traumatic Stress Disorder

14.4 ATTEMPTED SUICIDE

AEROMEDICAL CONCERNS: There is a risk that a person may make an attempt which would compromise the safety of others (pilots sometimes use their aircraft as the instrument of suicide).

WAIVER: "Suicide attempt" by itself is a behavior, not a DSM-IV psychiatric diagnosis. Waivers are based on the psychiatric diagnosis of which the suicide attempt is a manifestation. If the suicide attempt was the manifestation of a Personality Disorder, the patient is NAA. If the suicide attempt was a manifestation of an Adjustment Disorder, the patient would be PQ when the Adjustment Disorder is fully resolved. Recurrent suicide attempts, however, may be disqualifying regardless of the diagnosis.

INFORMATION REQUIRED:

1. Psychiatric evaluation
2. Psychiatric hospitalization (if warranted).
3. Submission of a brief summary of pertinent details and any available records

TREATMENT: Treatment is based on the individual's psychiatric diagnosis. However, suicide attempts associated with most Axis I and Axis II diagnoses other than Adjustment Disorder or V codes are incompatible with aviation duty.

FOLLOW-UP REQUIREMENTS: Follow-up psychiatric care is at the discretion of the treating mental health provider, and the frequency should be clearly stated in the psychiatric evaluation or hospital discharge summary.

DISCUSSION: Of those who make a suicidal gesture, 66% are involved in an acute personal crisis and many will have ingested alcohol within 6 hours of the attempt. Within one year, 20% will repeat the attempt and 2% will be successful. There is an underlying personality disorder in 20-25% of cases.

ICD-9 CODE:
958.9 Attempted Suicide

14.5 EATING DISORDERS

AEROMEDICAL CONCERNS. Eating disorders can cause potentially life-threatening metabolic alkalosis, hypochloremia, and hypokalemia, which can have drastic implications for aviation safety. Anxiety and depressive symptoms are common, and suicide is also a risk.

WAIVER: Eating Disorders (Anorexia, Bulimia, and Eating Disorders NOS) are CD for aviation. Currently these cases are handled by Administrative Separation if the symptoms interfere with duty. These cases may be treated under the auspices of a Medical Board if the member has another primary psychiatric diagnosis, such as depression or dysthymia. 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 NOMI Psychiatry evaluation is required prior to waiver consideration. These patients must meet the minimum aviation weight standards.

INFORMATION REQUIRED:

1. Psychiatric evaluation
2. Copy of Medical Board (if applicable)
3. Flight surgeon's narrative (Aeromedical Summary) outlining any social, occupational, administrative, or legal problems of the patient

TREATMENT: Treatment is very difficult and involves intensive long term therapy, group therapy, and possibly pharmacotherapy, all of which are incompatible with aviation duty.

FOLLOW-UP REQUIREMENTS: Follow-up psychiatric care for those patients retained on Limited Duty is at the discretion of the treating mental health provider, but should involve at least monthly follow-up.

DISCUSSION: Relapse rate is high. In long term follow-up of anorexia, 40% recover, 30% improve, and 30% are chronic. Anorexia is potentially fatal in 5-12% of cases. Bulimia is often associated with alcohol abuse.

ICD-9 CODES:
307.50 Eating Disorder NOS
307.51 Bulimia
307.1 Anorexia Nervosa

14.6 IMPULSE CONTROL DISORDERS

AEROMEDICAL CONCERNS: Stereotyped or impulsive behavior may lead to aviation safety problems. These disorders involve an inability to resist acting on an impulse that is dangerous to the patient or others, and that is characterized by a sense of pleasure when gratified.

WAIVER: Impulse Control Disorders (intermittent explosive disorder, kleptomania, pathological gambling, pyromania, trichotillomania) are CD for aviation. Waiver requests are handled on a case-by-case basis, and questions should be referred to NOMI Psychiatry via telephone consultation or referral for formal evaluation.

INFORMATION REQUIRED:

1. Psychiatric evaluation
2. Flight surgeon's narrative (Aeromedical Summary) outlining any social, occupational, administrative, or legal problems of the patient.

TREATMENT: Psychotropic medications used with Intermittent Explosive Disorder and trichotillomania are incompatible with aviation duty. Pathological gambling and kleptomania are generally treated with behavior therapy.

FOLLOW-UP REQUIREMENTS: Follow-up psychiatric care is at the discretion of the mental health provider in those cases in which it is deemed necessary.

DISCUSSION: Differential diagnosis should include substance abuse, temporal lobe epilepsy, head trauma, bipolar disorder (manic), and antisocial personality disorder. The diagnosis is usually not made if the behavior occurs only in the context of another Axis I or Axis II disorder such as schizophrenia, bipolar disorder, or adjustment disorder.

ICD-9 CODES:
312.3 Impulse Control Disorder, NOS
312.31 Pathological Gambling
312.32 Kleptomania
312.33 Pyromania
312.34 Intermittent Explosive Disorder
312.39 Trichotillomania

14.7 LEARNING DISORDERS/ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

AEROMEDICAL CONCERNS: Learning disorders may be associated with underlying abnormalities in cognitive processes, including deficits in visual perception, attention, memory, or linguistic processes. Depending on the severity of the disorder, these deficits could pose both safety and mission execution problems in the fast-paced aviation environment. Attention Deficit/Hyperactivity Disorder (ADD or ADHD) involves a persistent pattern since early childhood of inattention and/or hyperactivity/impulsivity. Depending on the severity of the disorder, there may be difficulties with sustained attention, concentration, distractibility, impatience, and impulsiveness that would have a negative impact within the aviation environment.

WAIVER:

Learning Disorder: History of a learning disorder is not necessarily disqualifying. The severity and nature of the disorder should be documented. Any residual problems or history of a persistent learning disorder requires a neuropsychological evaluation. Depending on the results, the member may be found NPQ.

Attention Deficit/Hyperactivity Disorder: A diagnosis of ADD/ADHD meeting DSM criteria is considered disqualifying. Applicants or designated aircrew with ADD/ADHD who have not taken medication for 12 months and who remain symptom free may be considered for waiver.

NOTE: If a flight surgeon reviewing all available medical records determines that the diagnosis of ADHD was erroneous or does not meet DSM criteria, the flight surgeon's interview reveals no persistent ADHD features, there has been no medication use for at least 12 months, and there is evidence of satisfactory academic performance, the record may be referred to NAMI Psychiatry for consultation to recommend a waiver or to find the candidate physically qualified.

INFORMATION REQUIRED:

1. All prior medical and mental health records documenting how the diagnosis of ADHD was initially determined and any subsequent assessments. Records should encompass all periods of medication use.
2. Flight surgeon narrative summary (Aeromedical Summary) documenting all prior symptoms, absence of persistent features, when medication was discontinued, and evidence of current academic performance.
3. Current neuropsychological evaluation (obtained after discontinuing all ADHD medications)

TREATMENT: Stimulant medication to maintain attention and decrease hyperactivity is incompatible with aviation duty.

FOLLOW UP REQUIREMENTS: None

DISCUSSION: Many studies suggest the diagnosis of ADHD is frequently assigned inappropriately and that ADHD medication is frequently prescribed to children and adolescents who do not satisfy DSM criteria for ADHD. Recent research of ADHD suggests that 30-70% of children diagnosed with ADHD continue to exhibit symptoms into adulthood. Children with ADHD frequently outgrow impulsivity and hyperactivity, but often have problems with inattention and distractibility throughout adulthood.

References:

Silver, L.B. Attention-deficit disorder in adult life. Child and Adolescent Psychiatric Clinics of North America, 2000(9)3: 411-523.

ICD-9 CODES:
314.00 Attention deficit disorder without hyperactivity
314.01 Attention deficit disorder with hyperactivity

14.8 MOOD DISORDERS (DEPRESSION, MANIA)

AEROMEDICAL CONCERNS: Mood disorders are associated with decreased concentration, inattention, indecisiveness, fatigue, insomnia, agitation, and psychosis, all of which are incompatible with aviation duties. Risk of suicide is 15%, the highest of all mental disorders. There is a strong association with substance abuse.

WAIVER:

- Major Depression
- Dysthymia
- Depressive disorder NOS

The above diagnoses are disqualifying for aviation. Treatment should be considered under the auspices of a Limited Duty Medical Evaluation Board. Waiver may be requested when the member has been completely asymptomatic in a "Fit for Full Duty" status for a minimum of six months after completion of all treatment, including both medication and psychotherapy. A current psychiatric evaluation is required to document complete, sustained remission of all symptoms, and shall be included with the waiver request. Further recurrences are CD, waiver not recommend.

- Bipolar Disorder:

The above diagnosis is disqualifying for aviation, and the member is not eligible for a waiver. The member should be referred to central Physical Evaluation Board for determination of fitness for general duty/retention.

INFORMATION REQUIRED.

1. Psychiatric evaluation and treatment summary
2. Medical Board reports (if applicable)

TREATMENT: Psychotropic medications and psychotherapy for depressive/manic symptoms are not compatible with aviation duties.

FOLLOW-UP REQUIREMENTS: Psychiatric follow-up is at the discretion of the mental health provider. Mood disorders are generally seen at least monthly early in therapy or while on limited duty. After the member has been completely asymptomatic in a "Fit for Full Duty" status for a minimum of six months after completion of all treatment, including both medication and psychotherapy, a waiver can be requested. A current psychiatric evaluation is required to document complete, sustained remission of all symptoms and shall be included with the waiver request.

DISCUSSION: 15% of depressed patients eventually commit suicide. 50-75% of affected patients have a recurrent episode. Acute major depression is treatable in 80% of patients. 20-30% of dysthymic patients develop subsequent depression or mania.

ICD-9 CODES:
296.2 Major Depressive Disorder, Single Episode
296.3 Major Depressive Disorder, Recurrent
296.0 Bipolar Disorder
300.4 Dysthymic Disorder
311 Depressive Disorder, not otherwise specified

14.9 PERSONALITY DISORDERS

AEROMEDICAL CONCERNS: Maladaptive personality traits may lead to flight safety problems. Aeronautical adaptability involves a person's coping mechanisms, personality style, and defense mechanisms. These may impact on the member's ability to undergo training, safety in aviation environments, and the ability to interact in a harmonious way with other crew members. Certain personality traits may produce thrill seeking behavior, conflicts with authority, emotional lability, questionable judgment and poor impulse control, or inflexibility incompatible with the rigors of aviation duty.

WAIVER: Personality disorders result in the member being found to be NAA. Maladaptive traits which impact on aeronautical performance also result in the member being found to be NAA. Once an individual is found NAA, it is unlikely that they will be found AA at a later date. Therefore, no waivers can be considered for aeronautical adaptability. If, however, the patient demonstrates over a period of 2-3 years a substantial personality maturation in terms of their ability to sustain the stressors of the aviation environment, work in harmony with other members, and stabilize their personal life and turmoil, they may then be considered for reevaluation by a Psychiatrist or Psychologist. This evaluation shall preferably be done at NAMI Psychiatry provided both the patient and his/her command have a strong desire to return to flight status. Questions regarding the aeronautical adaptation of designated aviation personnel should be referred to NAMI Psychiatry by telephone consultation. Designated pilots and NFOs should be referred to NAMI Psychiatry for evaluation.

INFORMATION REQUIRED:

1. Psychiatric evaluation (must also clarify suitability for general and special duty)

TREATMENT: Treatment of personality disorders requires long term intensive psychotherapy, which is incompatible with aviation duty.

DISCUSSION: The diagnosis is largely based on the history of pervasive behaviors or traits that are characteristic of the person's recent and long term functioning (since early adulthood) which cause social or occupational impairment or subjective distress. Psychometric testing such as the MMPI may be abnormal in Class 2 personnel, but is frequently normal in SG I and SG II personnel. The stress of military life frequently exacerbates maladaptive behavior and the diagnosis becomes apparent in the operational environment.

ICD-9 CODES:
301.0 Paranoid PD
301.20 Schizoid PD
301.22 Schizotypal PD
301.83 Borderline PD
301.81 Narcissistic PD
301.50 Histrionic PD
301.60 Dependent PD

301.7 Antisocial PD
301.82 Avoidant PD
301.40 Obsessive Compulsive PD
301.9 Personality Disorder NOS

14.10 PSYCHOTIC DISORDERS

AEROMEDICAL CONCERNS: Symptoms of aeromedical concern include eccentric behavior, illogical thinking, hallucinations, social withdrawal, and the risk of suicide. Recurrence is abrupt, unpredictable and incapacitating in aviation.

WAIVER:

- Schizophrenia
- Schizophreniform Disorder
- Schizoaffective Disorder
- Delusional Disorder
- Brief Psychotic Disorder Without Marked Stressors
- Psychotic Disorder NOS

The above diagnoses are CD for aviation, with no waiver considered. Patients should be referred to Central Physical Evaluation Board for determination of fitness for general duty/retention.

- **Brief Psychotic Disorder with Marked Stressors (Brief Reactive Psychosis):** CD for aviation. Treatment should occur under the auspices of a Limited Duty Board. Waiver may be requested when the member is asymptomatic and off medications for one year in a full duty status. These cases are handled on a case-by-case basis depending on the prognostic factors of the case.
- **Substance-Induced Psychotic Disorder:** Substance-induced Psychotic Disorder with clear evidence from the history, physical examination, or laboratory findings that the disturbance is etiologically related to medication use is PQ when resolved, as long as the "substance" inducing psychosis was not alcohol or illicit drugs. Submit a summary of pertinent details and appropriate records to NAMI for review.
- **Psychotic Disorder Due To General Medical Condition:** NCD when resolved if the precipitating organic factors are identified and considered not likely to recur. Submit a summary of pertinent details and appropriate records to NAMI for review. Physical illness or other disorders causing persistent delirium are permanently disqualifying and should be referred to a medical board.

INFORMATION REQUIRED:

1. Psychiatric evaluation
2. Copy of Medical Board (if applicable)

TREATMENT: Antipsychotic medications and close psychiatric follow-up care are incompatible with aviation duty.

FOLLOW-UP REQUIREMENTS: Psychiatric follow-up is at the discretion of the treating psychiatrist. The majority of these disorders require Physical Evaluation Boards due to their incompatibility with general duty.

DISCUSSION: Increased vulnerability to stress is considered lifelong in these disorders. In schizophrenia, 1/3 will lead somewhat normal lives, 1/3 will continue to have significant symptoms, and 1/3 require frequent hospitalization and chronic care. 50% of schizophrenics make a suicide attempt, and 10% will succeed.

ICD-9 CODES
295.40 Schizophreniform Disorder
295.70 Schizoaffective Disorder
296.24 Major Depressive Disorder, single episode, with psychotic features
297.1 Delusional Disorder
298.8 Brief Psychotic Disorder
298.9 Psychotic Disorder NOS

14.11 SEXUAL DISORDERS

AEROMEDICAL CONCERNS: Generally, sexual dysfunctions such as sexual desire/arousal/orgasm disorders do not impact on a person's aviation performance. The paraphilias, however, such as exhibitionism and transvestic fetishism, may impact aviation performance. Such patients exhibit compulsive behavior and poor impulse control, and certain legal ramifications may cause the person to be inattentive to detail and a safety risk.

WAIVER: Paraphilias are generally CD. Waiver requests are handled on a case-by-case basis by NAMI Psychiatry after the patient has completed treatment and been asymptomatic for one year. Factors that will be considered in waiver requests include the type of paraphilia, duration and frequency, type of treatment required, and the adequacy of follow-up care. However, many cases are handled by administrative disposition due to the legal implications and impact on good order and discipline. Sexual Dysfunctions may be NCD if they do not impact aviation performance.

INFORMATION REQUIRED:

1. Psychiatric evaluation and treatment summary
2. Flight surgeon statement (aeromedical summary) documenting any social, occupational, administrative, or legal problems of the patient.

TREATMENT: The treatment of sexual desire/aversion/arousal/pain/orgasm disorders generally involves behavioral techniques which should not preclude aviation duty. Use of medication is incompatible with aviation duty. Treatment of paraphilias is less successful and generally requires intensive long-term treatment.

FOLLOW-UP REQUIREMENTS: Psychiatric follow-up is at the discretion of the mental health provider in those cases in which treatment is deemed necessary.

DISCUSSION: Paraphilic activity often has a compulsive/impulsive quality. Patients may repeatedly engage in risk-taking behavior, and this behavior increases when the patient feels stressed, anxious, or depressed. The legal consequences generally preclude treatment within the military.

ICD-9 CODES:
302 Sexual Disorders
302.4 Exhibitionism
302.2 Pedophilia
302.9 Paraphilia NOS
302.81 Fetishism
302.89 Frotteurism

14.12 SOMATOFORM AND FACTITIOUS DISORDERS

AEROMEDICAL CONCERNS: These disorders have a chronic course and patients make repeated visits to physicians due to multiple physical or somatic complaints. Patients with factitious disorders may seriously injure themselves (injecting feces, swallowing ground glass, injecting insulin) and are at extreme risk in the aviation environment

WAIVER: These disorders are CD. They should be referred to a Medical Board for treatment. Waivers may be considered for those rare cases that are successfully treated on a Limited Duty Board and remain asymptomatic and off medications for one year in a full duty status

INFORMATION REQUIRED:

1. Psychiatric evaluation
2. Copy of Medical Board (if applicable)
3. Flight surgeon's narrative (aeromedical summary) outlining any social, occupational, administrative, or legal problems of the patient.

TREATMENT: Treatment offers little hope of return to flight status in factitious disorders. These patients are rarely motivated for psychotherapy, and generally change physicians when confronted. The psychotropic medications used in somatoform disorders are incompatible with aviation status

FOLLOW-UP REQUIREMENTS: Follow-up psychiatric care is at the discretion of the treating mental health provider. Patients are generally seen at least monthly while on Limited Duty

DISCUSSION: 15-30% of patients with hypochondriacal disorders have physical problems. 30% of conversion disorder patients have associated physical illness. Patients with factitious disorders also have a high risk of substance abuse over time.

ICD-9 CODES:
300.16 Factitious illness with psychiatric symptoms
300.19 Other/unspecified factitious illness
301.51 Chronic factitious illness with physical symptoms
300.11 Conversion Disorder
300.7 Hypochondriasis
300.81 Somatization Disorder

15.0 RESPIRATORY

15.1 ASTHMA

AEROMEDICAL CONCERNS: Asthma symptoms can rapidly progress from minimal to totally disabling. Exposure to smoke or fumes can provoke attacks in susceptible individuals. Positive pressure breathing, breathing dry air, and +Gz exposure can stimulate bronchospasm in individuals with hyperreactive airways.

WAIVER: A history of asthma is considered disqualifying (CD) for aviation duties and training, even if the disease is very mild.

APPLICANTS: Waivers for applicants may be considered if all of the following are true:

1. The individual has been asymptomatic for a minimum of five years without medication.
2. Baseline pulmonary function testing (PFT) is normal
3. Methacholine challenge test is negative.

DESIGNATED PERSONNEL: Asthma is CD for designated aviation personnel. Waivers may be considered based on severity of disease and evidence of adherence to the proper components of care. Moderate and severe asthma will not be waived. A Local Board of Flight Surgeons may not used to provide temporary flight clearance for asthma.

INFORMATION REQUIRED:

1. Aeromedical Summary (AMS) addressing the four components of care (below)
2. Family practice (FP), Internal Medicine (IM), or Pulmonology evaluation
3. Results of pulmonary function testing
4. Results of allergen testing (e.g. skin testing, RAST testing) for personnel with persistent asthma.

RENEWAL REQUIREMENTS:

1. AMS addressing the four components and any interval changes
2. FP, IM, or Pulmonology evaluation with comments on stability.
3. Annual PFTs when clinically indicated or directed by waiver requirements.

Four Components of Asthma Care (AMS should address the

1. **Asthma Severity and Control:** The AMS must classify *severity* (i.e. intermittent, mild persistent, moderate persistent, or severe persistent) and comment on *impairment* (frequency of attacks, nighttime symptoms, and functional limitations to daily activities). The AMS should also note the level of control (lifetime history of hospitalizations, number of emergency room and clinic visits related to asthma in the past 12 months, and frequency of rescue inhaler usage).
2. **Patient Education:** The AMS must contain comments on patient education about both the asthma and the medications used to control it.

3. **Environmental Factors and Comorbid Conditions:** The AMS should comment on any work or home related stimuli affecting the member's asthma. It should also include results of allergen testing for those with persistent asthma. In addition, include measures taken to reduce the environmental allergen load
4. **Medications:** The AMS should include all medications (including those used "as needed") noting frequency of use of each medication. ***All aviation personnel with asthma must carry a rescue inhaler while flying.***

DISCUSSION: The diagnosis of asthma is based primarily on history, with the aid of the physical exam and pulmonary function testing (PFT). Methacholine challenge testing (MCT) is not routinely necessary. MCT is most useful when asthma is suspected, but the PFT is normal or borderline. In borderline cases, a negative MCT can help to rule out asthma.
When assessing severity, the clinician should use the patient's symptom history in untreated individuals. The classification does not "improve" with treatment, i.e. a patient with moderate asthma who has only intermittent symptoms *after* being treated is still classified as "moderate persistent." In patients currently managed on medication, the number and doses of these medications required to control the asthma may be used to determine severity. Please refer to pages 55-57 of the Asthma Guidelines (see references) for guidance in both cases. Note: Exercise Induced Asthma is a form of intermittent asthma.

Many drugs are available as asthma therapy, but in general, these fall into two groups: medications for quick relief of symptoms, and those for long-term control.
Quick-Relief Medications: Short-acting beta agonists (e.g. albuterol, levalbuterol, and pirbuterol) are the treatments of choice for relief of acute symptoms and prevention of exercise-induced asthma.
Long-Acting Medications: Inhaled corticosteroids (ICS) are the most effective single medication for the control of asthma and should be considered first-line therapy for persistent asthma. Alternatively, but not preferred medications include leukotriene receptor antagonists (LTRA) such as montelukast and zafirlukast, or mast cell stabilizers such as cromalyn sodium and nedocromil. For persistent asthma treated with ICS, the preferred adjunct (not monotherapy) is a long-acting beta-agonist (LABA) such as salmetrol or formoterol. Any of these medications may be waived within the context of overall severity and control.
Personnel requiring immunomodulators (omalizumab), methylxanthines (theophylline) or daily corticosteroids for control are NPQ with no waiver recommended. Herbal and alternative medications represent risk to the service member without proven benefit; as such, their use is discouraged and waivers are not recommended.

REFERENCE:
This document is heavily based on the Asthma Guidelines from the National Heart, Lung, and Blood Institute. The summary is recommended reading for anyone managing asthma, and is freely available at http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf.

ICD-9 CODES:
493.0 Extrinsic Asthma
493.1 Intrinsic Asthma
493.9 Asthma, Unspecified (use for Exercise Induced Asthma)

15.2 CHRONIC OBSTRUCTIVE PULMONARY DISEASE

AEROMEDICAL CONCERNS: Chronic obstructive pulmonary disease (COPD) results in a reduction in maximum oxygen uptake and exercise tolerance. Cerebral hypoxia can adversely affect psychomotor skills, memory, judgment and cognition. Decrements in judgment and the ability to perform complex tasks are also caused by carbon dioxide retention that can occur in COPD. Sudden incapacitation as a result of pneumothorax can occur if a bulla ruptures.

WAIVER: Waivers may be considered for designated aviators only on a case-by-case basis if there is no cardiovascular decompensation, exercise tolerance is unimpaired, the patient does not require any medications, and there are no bullae evident on radiographs. Pulmonary function testing should be normal. Aviation personnel meeting these criteria will be restricted from high-performance aircraft.

INFORMATION REQUIRED:

1. Internal medicine or pulmonology consultation
2. Chest x-ray and/or CT to exclude bullae
3. Complete PFT including bronchodilator challenge
4. Cardiology consultation (if there is evidence of RVH)

NOTE: Severe COPD should be referred to a medical board. The use of steroid inhalers either alone or in concert with beta agonists or cholinergic antagonists is CD, with no waiver recommended.

TREATMENT: Treatment of reversible airway obstruction by immunotherapy or cromolyn sodium is CD. Annual influenza immunization, pneumovax, and treatment aimed at smoking cessation and weight loss (if overweight) are encouraged.

DISCUSSION: The lower limit of oxygenation needed to permit adequate cerebral oxygenation is a PaO2>65 mm Hg at sea level. The corresponding lower limits for successive 1000 ft increments to 8000 ft are 61, 58, 55, 52, 50, 48, 46 and 45 mm Hg. Obesity or tight fitting clothing can reduce lung volumes leading to hypoventilation and ventilation/perfusion imbalance. Patients with COPD are also at increased risk of acute chest infections, further complicating care in the operational setting. Symptoms will be expected when the forced expiratory volume at 1 second (FEV1) reaches 50% of that predicted by sex and age. While the normal FEV1 declines at about 30 ml/year, the reduction in smokers can reach 90 ml/year. Of all patients, up to 50% will have persistent, productive cough, up to 25% will be moderately disabled with recurrent chest infections and increasing absences from work, and up to 25% will be severely disabled within 10 years.

ICD-9 CODE:
496 Chronic Obstructive Pulmonary Disease

15.3 PNEUMOTHORAX (September 2009)

AEROMEDICAL CONCERNS: Acute pneumothorax may cause acute chest pain and dyspnea during flight, worsening as ambient pressure falls. Tension pneumothorax is a life threatening condition that, although rare, will cause hypoxia arising from ventilation/perfusion imbalance and cardiovascular compromise.

WAIVER:

Traumatic Pneumothorax: Traumatic or surgical pneumothorax during the preceding year is CD. Waivers are considered on a case by case basis during the first year following the injury after complete healing and when the member is determined to be fit for full duty by the pulmonologist or surgeon. After one year, the condition may be considered NCD when the same consultation criteria are met. If a waiver is requested and granted, during the first year following the event, another AMS must be submitted to NAMI for subsequent consideration of removing the waiver to a PQ/AA status when appropriate.

Spontaneous Pneumothorax: Primary spontaneous pneumothorax is CD. A waiver can be considered based upon the guidelines below. A subsequent occurrence of spontaneous pneumothorax is CD. No waiver will be recommended unless surgical or chemical pleurodesis has been performed.

Applicants:

- ***Single episode of spontaneous pneumothorax:*** The applicant may be considered for waiver of standards one year after the resolution of the pneumothorax if treated solely with chest tube reinflation. High resolution CT scan must prove no pathology (blebs or underlying parenchymal disease) and pulmonary function tests must be within normal limits. If treated surgically or chemically, a waiver may be considered six months following resolution, provided the required studies are normal. All applicants must first be granted a waiver for commissioning before an aviation waiver can be considered. The commissioning waiver document must be submitted to NAMI with the aviation waiver request. Altitude chamber runs are not required for disposition and/or waiver recommendation.
- ***Recurrent spontaneous pneumothorax:*** Permanently disqualifying. No waivers will be recommended unless chemical or surgical pleurodesis has been performed resulting in a normal high-resolution chest CT scan and normal Pulmonary Function Testing (PFT).

Designated:

- ***Single episode of spontaneous pneumothorax:*** A waiver request may be submitted three months after resolution of the condition. The submission must include the required information. For designated personnel who undergo chemical or surgical pleurodesis, a waiver request may be submitted three months after resolution of the condition. An altitude chamber run is not required for disposition and/or waiver recommendation.

- ***Recurrent spontaneous pneumothorax:*** CD, waiver not recommended. Waivers may be considered only after definitive treatment (chemical or surgical pleurodesis) to prevent recurrence. Designated personnel who undergo chemical or surgical pleurodesis may be returned to flying status after three months

INFORMATION REQUIRED:

1. Thin cut, high-resolution chest CT scan demonstrating full lung expansion and no pathology that could predispose to recurrence
2. Normal Pulmonary Function Test results
3. Thoracic surgery consultation (in recurrent cases, or in cases with structural abnormalities)

FOLLOWUP: None required.

TREATMENT: All recognized forms of treatment (chemical or surgical pleurodesis) are acceptable for waiver consideration. Recurrence rate after chemical pleurodesis is higher than after thoracotomy and pleural abrasion.

DISCUSSION: Over 90% of patients presenting with spontaneous pneumothorax are under 40 years old, with 75% being younger than 25. In women, there is often a relationship to menstruation. Onset of spontaneous pneumothorax is accompanied by chest pain in 90% of cases and by dyspnea in 89%. Tension pneumothorax develops in 5% and hemopneumothorax in 2.5%. Recurrence rates in patients who have not had definitive treatment have been reported to be from 28% for PSP and 43% for SSP. In one series of patients followed for 10 years without surgery, ipsilateral recurrence followed in 50% of the patients, with 62% happening in the first 2 years. A study published in JAMA 1990 found that most recurrences occur within the first six months. Another study reported a recurrence rate of 30% after a first spontaneous pneumothorax, 50% after a second episode, and 80% after a third. The contralateral risk was reported as 5.2% to 14.6%. Recurrence depends on the procedure used for treatment. Thoracoscopic pleurodesis has recurrence rates less than 7% while chemical pleurodesis has been reported to have a recurrence rate of 9% to 12% depending on the agent used. Thoracotomy with pleural abrasion has rates ranging from 1 to 3.6%. The U.S. Air Force has reviewed patients exposed to chamber flight before return to flying duties. Their analysis revealed that no episodes were eliminated and there was no value in predicting later recurrence. Of note, they required a much longer grounding period before testing, so their data may not be directly comparable to our requirements.

ICD-9 CODES:
512.8 Pneumothorax
860 Any Traumatic or Iatrogenic pneumothorax

15.4 SARCOIDOSIS

AEROMEDICAL CONCERNS: The protean manifestations of sarcoidosis can involve almost any organ system. Cardiac sarcoidosis, while uncommon, is associated with a restrictive cardiomyopathy and sudden death from arrhythmias. Patients with pulmonary infiltration may have symptoms of restrictive lung disease, which may be distracting in flight. Uveitis can cause permanent visual damage. Nervous system involvement can also occur. Hypercalcemia can predispose the aircrew member to renal stones.

WAIVER:

Applicants: CD, wavier not recommended.

Designated personnel: CD, wavier not recommended for at least 2 years of remaining asymptomatic off medications.

INFORMATION REQUIRED:

1. Pulmonary, Internal Medicine, or Family Practice consult
2. Ophthalmology consult
3. Pulmonary function tests
   a. Spirometry
   b. Lung volume
   c. Diffusion
   d. Exercise PFT
4. Serum calcium
5. 24hr urine calcium
6. Thallium stress testing
7. ECG
8. Echocardiogram

FOLLOW-UP: Annual submission to include:

1. Chest X-ray
2. PFT's
3. ECG
4. Serum calcium

DISCUSSION: The incidence is highest in the 20-35 age group. Up to 50% present with abnormal radiographic findings (usually bilateral enlargement of hilar nodes) or nonspecific respiratory symptoms. Between 10 and 50% will have erythema nodosum, which is more commonly seen in females. Uveitis can be seen in 15 to 25% of patients, and superficial node enlargement is seen in about 30% of Europeans with sarcoidosis and up to 80% of African Americans. The spleen is palpable in 10 to 25% of patients, with massive splenomegaly present in 3%. Up to 30% of cases with acute sarcoidosis will have abnormal thallium scans suggesting

myocardial involvement. Liver biopsy will show sarcoid granulomas in 70% of cases without evidence of altered liver function. Nervous system involvement is demonstrable in 10% but may be subclinical in a greater percentage. Osteolytic or osteosclerotic bone lesions are also present in 10% of cases. Most cases (80%) with hilar adenopathy resolve spontaneously within 2 years, but there is a 5-10% chance of developing progressive pulmonary fibrosis and a 6-7% eventual mortality in those with radiologically evident pulmonary sarcoidosis. The presence of ocular involvement or chronic tonsillitis has been reported to be associated with a poorer prognosis. High levels of serum interferon-gamma (IFNg) before treatment are associated with a more favorable prognosis. Healed myocardial granulomas may lead to arrhythmias, and patients in remission who have had myocardial involvement remain at risk for sudden death. MRI scan may eventually prove to be the method of choice for identifying cardiac sarcoid granulomas.

ICD-9 CODE:
135 Sarcoidosis

16.0 UROLOGY

16.1 CONGENITAL ABNORMALITIES OF THE KIDNEYS

AEROMEDICAL CONCERNS: Polycystic disease may be associated with hypertension, berry aneurysms of the cerebral arteries, renal stones, infection or hematuria. Simple retention cysts in the renal cortex may be susceptible to trauma. Medullary sponge kidneys can be associated with hematuria and formation of calculi. Large polycystic kidneys are not compatible with high performance flying because G forces cause the kidney to pull on the pedicle that may result in bleeding.

WAIVER: A waiver is possible if renal function is normal and the aviator remains asymptomatic.

INFORMATION REQUIRED:

1. Nephrology consultation is required, together with confirmation by CT scan or MRI that there is no coexisting berry aneurysm.
2. Annual submission with 24 hour urine collection for determination of creatinine clearance is required.

TREATMENT: N/A.

DISCUSSION: The majority of patients with polycystic disease present with evidence of impaired renal function after the age of 30. Over a period of 10 years, one third of men and two thirds of women with polycystic disease of the kidneys will experience urinary tract infection. Approximately one third will also have hepatic cysts and renal stones occur in 10%. Intracranial hemorrhage from rupture of a Berry aneurysm causes death in 10% of cases of polycystic disease of the kidneys. Medullary sponge kidneys rarely give rise to significant disability.

ICD-9 CODE:
753.1 Cystic Disease of the kidney
753.17 Medullary Sponge kidney

16.2 HEMATURIA

AEROMEDICAL CONCERNS: Hematuria may be a sign of significant underlying renal and/or urinary system disease.

WAIVER: Renal function impairment, significant polycystic kidney disease, or anemia secondary to hematuria is disqualifying. Service group restriction may be necessary for those aviators who have recurrent, microscopic hematuria precipitated by exposure to high Gz.

INFORMATION REQUIRED:

1. Waiver is not required for adequately investigated microscopic hematuria with less then 5 red cells per high power field.
2. Adequate investigation includes:
   a. CT scan with renal protocol
   b. Urology or Nephrology consultation (if CT scan abnormal) with further diagnostic testing as indicated.
   c. Call NOMI Internal Medicine for guidance if needed
3. Male aviators whose urinalysis consistently (more than 50%) shows more than 3-5 rbc/hpf or female aviators consistently showing more than 8-10 rbc/hpf require a urology or nephrology consult.
4. An exercise history may be all that is needed to identify cases of "march hematuria".
5. Urological consultation may be required to exclude serious conditions including neoplasia and to identify easily treatable conditions.

TREATMENT: As appropriate for the condition found.

DISCUSSION: One study reported the results of renal biopsy in a large number of cases of asymptomatic hematuria as follows: glomerulonephritis 77%, pyelonephritis 1%, normal kidney 20%. Of those patients who have a membranoproliferative glomerulonephritis with mesangial deposits of IgA, 60% will have raised serum IgA levels. Patients with IgA glomerulonephritis will need regular follow-up as 5-8% develops progressive disease leading to renal failure.

ICD-9 CODE:
599.7 Hematuria

16.3 PROSTATITIS

AEROMEDICAL CONCERNS: The symptoms of acute prostatitis, which include severe perineal discomfort, backache, urgency and frequency of micturition can be extremely distracting in the cockpit. Similarly, the backache from chronic prostatitis can be an irritant in flight. The side effects of some forms of medication are not compatible with flying.

WAIVER: Patients with acute prostatitis should be grounded. Waiver is possible for patients with chronic prostatitis provided they are asymptomatic.

INFORMATION REQUIRED:

1. Urology consultation.

TREATMENT: Waivers have been recommended and granted for patients on trimethoprim/sulfamethoxazole, carbenicillin, erythromycin, nitrofurantoin and ciprofloxacin.

DISCUSSION: Some patients with prostatitis are very sensitive to the effects of alcohol although the mechanism for this is unclear. Aviators should be warned to restrict their alcohol intake while on treatment. Of patients with chronic prostatitis, 25% are asymptomatic and up to 35% have urinary symptoms. The side effects of nitrofurantoin relevant to aviation can include an acute pulmonary reaction with cough, dyspnea and chest pain, a chronic reaction with similar symptoms but with a more insidious onset and, occasionally nystagmus, vertigo or drowsiness. Trimethoprim can rarely cause hallucinations, ataxia, vertigo, apathy or depression. There is not as much experience in military aviation with the newest drug, ciprofloxacin, but it has been reported to cause the same side effects as other quinolones, such as tremor, light headedness, confusion, lethargy, drowsiness, insomnia, blurred vision, changes in color perception and headache. The reported incidence of headache is 1.2% with other CNS effects arising in 0.4% of cases.

ICD-9 CODE:

600 Benign Prostatic Hypertrophy
601.0 Acute Prostatitis
601.1 Chronic Prostatitis

16.4 REITER'S DISEASE

AEROMEDICAL CONCERNS: The arthritis and conjunctivitis can be distracting in flight. There is a risk of cardiac arrhythmias, myocarditis, pericarditis and central or peripheral nervous system symptoms.

WAIVER: Aviators with recurrent disease or significant disability are NPQ. Waiver recommendations will depend on disease activity and the degree of any residual effects present.

INFORMATION REQUIRED:

1. The information required depends on the presenting symptoms.
2. The HLA B27 titer can give some indication of the susceptibility to recurrence and the severity of sequelae.
3. Chlamydia, salmonella, shigella or yersinia titers can help to define the post-enteritis cases as opposed to sexually transmitted cases.
4. Gram stain of urethral discharge may be necessary to exclude gonorrhea.
5. A current ECG is necessary to rule out cardiac complications.

TREATMENT: Treatment other than aspirin is CD for aviation.

DISCUSSION: The sexually transmitted form of Reiter's disease predominates in Caucasian populations while the postenteritic form is commoner in other races. Up to 88% of patients will have peripheral, migrating arthritis although 10% will have a persistent monarthritis. The lower spine is involved in 20% of cases with sacroiliitis in 5-10%. Ligamentous and cartilaginous attachments are inflamed in 22% giving rise to plantar fasciitis and Achilles tendinitis. Eye symptoms occur in 30-40% of patients but when sacroiliitis is present almost 50% have uveitis. Urinary symptoms can range from unnoticeable to acute hemorrhagic cystitis or prostatitis. Keratoderma blennorrhagica affects the skin of the palms and soles in 20% and causes painless balanitis in 26%. The ECG is abnormal in 5-13% of cases with conduction defects occurring in 4% and aortic valve complications in 2%. Thrombophlebitis of the calf occurs in 5% of cases. Other rarer complications include myocarditis, pericarditis, aortitis, peripheral neuropathy, meningoencephalitis and transient hemiplegia. A higher level of HLA B27 seems to be associated with a higher risk of developing Reiter's disease and its sequelae. The overall mortality from Reiter's disease is <1% but can rise to 22% in those cases who develop serious cardiovascular complications. The majority of cases are self-limiting, with 70% resolved within 6 months. However, 15% will have symptoms for more than 1 year. Chronic heel pain gives a poorer prognosis and 15-26% of such patients will eventually develop ankylosing spondylitis. The risk of recurrence is 15% annually; in a 10-year follow-up, 63% of patients had more than 1 attack. At 20 years, almost 50% had some disability (usually deformity of the foot) sufficient to interfere with work or leisure activity; 18% were unable to work.

ICD-9 CODE:
099.3 Reiter's Disease

16.5 RENAL STONES

AEROMEDICAL CONCERNS: In-flight incapacitation secondary to the pain of renal colic is the major concern. There has been one USAF case of renal colic that contributed to a mishap. The majority of renal stones is causally related to dehydration and occurs as single episodes.

WAIVER: Many causes of, or associated conditions seen with nephrolithiasis are treatable and are frequently waived. Certain conditions are considered more problematic in the aviation arena such as:

1. Recurrent stones (2 stones in one year)
2. Cysteine stones
3. Hypercalcuria (absorptive, type one and type three)
4. Retained stones in the collecting system

These conditions are considered disqualifying and a **waiver is not recommended in applicants.** Waiver is **generally not recommended in designated aviation personnel, but considerations are made on a case-by-case basis.**

Waiver **is generally recommended for designated aviation personnel with:**

1. Calcium Oxalate, Calcium Phosphate, Uric Acid, and Struvite stones
2. Retained stones in the renal parenchyma
3. Recurrent stones greater than 12 months apart

INFORMATION REQUIRED:
Applicants: An applicant with a history of a single renal stone or renal stones greater than 60 months apart may apply for aeromedical waiver consideration. The applicant must be **stone free for one year prior to application.** The waiver submission requires:

1. Urinalysis
2. Blood chemistries. See Metabolic Workup Worksheet
3. 24 hour urine metabolic workup. See Metabolic Workup Worksheet.
4. Stone analysis (if stone obtained)
5. Urology consult
6. IVP or imaging study
7. KUB is required at the time of application to an aviation training program

Designated:
Any member diagnosed with a primary or recurrent renal stone requires the following workup:

1. Urinalysis.
2. Blood chemistries. See Metabolic Workup Worksheet for required labs.
3. IVP or imaging study
4. 24 hour urine metabolic workup. See Metabolic Workup Worksheet for required labs and normal values. *Note that member must meet normal values on this worksheet regardless of local laboratory norms.*
5. Stone analysis (if available).

The condition is NCD and the member may be found PQ if ALL of the following conditions are met:

1. This is the member's first renal stone or more than 60 months have passed since the last stone
2. The stone is a single stone
3. The member is completely stone free (no retained stones), as confirmed by imaging study
4. All labs required by the Metabolic Workup Worksheet are normal
6. Member must be grounded for:
   a. 2 weeks after spontaneous passage
   b. 4 weeks following stone manipulation/lithotripsy
   c. 12 weeks following open surgery and must be found fit for full duty by urology

The following conditions are CD and require a waiver:

1. Recurrent stones (less than 60 months apart)
2. Cysteine stones
3. Hypercalcuria (absorptive, type one and type three)
4. Multiple stones
5. Retained stones (regardless of location)
6. Any abnormality noted on the Metabolic Workup Worksheet

Waivers are considered on a case by case basis. Waiver submission must include:

1. Renal stone workup as noted above
2. Urology Consult
3. Any metabolic abnormalities should be evaluated and/or treated as indicated prior to waiver submission

TREATMENT: Conservative management aimed at encouraging natural elimination of the stone, surgery or extracorporeal shock-wave lithotripsy will necessitate grounding until elimination of the stone and complete recovery. Metabolic abnormalities should be treated according to current guidelines. Urology consult is essential in determining the best treatment modality and counseling the member on measures to reduce recurrence.

DISCUSSION: The peak incidence of renal stones occurs in males at age 35. Dehydration is one of the key contributing factors. There is usually a gradual onset of flank, abdominal or back pain over an hour or more before acute colic. The risk of stone recurrence ranges from 20 to 50% over 10 years. A lifetime recurrence rate of 70% has been reported. The reported recurrence in patients who have required lithotomy approaches 80%.

ICD-9 CODES:
592.0 Renal Stones
592.1 Ureteral Calculus
592.03 Retained renal calculus
592.04 Recurrent renal calculus
P59.96 Lithotripsy

16.6 RENAL STONE METABOLIC WORKUP WORKSHEET

RENAL STONE METABOLIC WORKUP

All Blanks Must Be Filled In!

NAME	**DATE**
RANK/RATE	**SSN**

URINALYSIS	**Microscopic**	
	Protein	
	pH	
	Culture & Sensitivity	

BLOOD CHEMISTRIES			**#1**	**#2**	**#3**
	Calcium	**8.5-10.5**			
	Creatinine	**< 1.5 mg/dl**			
	Electrolytes	**normal limits**			
	Phosphate	**2.1-4.1 mg/dl**			
	Uric Acid	**3.0-8.5**			

- **For initial waiver request, submit 3 sets of blood chemistries drawn over one to two week asymptomatic period.**

24 HOUR URINE CHEMISTRIES	**Calcium**	**M < 300 ,F < 250 mg/24h**	
	Creatinine	**M > 1, F >0.6 g/24h**	
	Phosphate	**< 1 g/24h**	
	Citrate	**> 320 mg/24h**	
	Oxalate	**<45 mg/24h**	
	Uric Acid	**M<800, F<750 mg**	
	Total Volume	**1 liter minimum**	

IVP or imaging RESULTS:

STONE ANALYSIS:

16.7 PROTEINURIA

AEROMEDICAL CONCERNS: The underlying processes that cause proteinuria can lead to renal insufficiency or failure presenting with signs and symptoms that may include fatigue, susceptibility to infection, edema, and electrolyte disturbances. The underlying processes that cause proteinuria may render the member unfit for military aviation duties.

CLINICAL APPROACH:

1. Screen with dipstick.
2. If positive, ensure no exercise for 24 hours and member is well-hydrated, then repeat.
3. If repeat is positive, perform microscopic analysis to rule out false-positive conditions.
4. Refer or consult with nephrologist for additional testing (24 hour urine collection, creatinine clearance, and other studies to rule out systemic disease) and assistance with diagnosis and treatment.

WAIVER: Benign proteinuria is a condition that generally meets the criteria of the waiver principles. Serious proteinuria is a condition with a more uncertain outcome that may not always be suitable for waiver and requires a case-by-case approach for evaluation.

Waiver may be considered for both **Applicant and Designated** personnel if:

1. Protein excretion < 1 gram/day
2. Normal renal function
3. No systemic disease (including hypertension)

Waiver for proteinuria may be considered for **Designated** personnel on a case-by case basis with:

1. Hypertension that is well controlled
2. Daily protein excretion of up to 2 grams

Protein excretion rate greater than 2 grams/day is CD and WNR due to high likelihood of progression to renal failure

INFORMATION REQUIRED:

Initial waiver:

1. 24 hour urine studies for total protein and creatinine
2. Serum chemistries
3. Internal medicine and/or nephrology consult
   a. Rule out systemic disease and treat any underlying cause if discovered
4. Supporting labs, imaging studies, and renal biopsy as indicated

Follow-up:

1. 24 hour urine studies for total protein and creatinine clearance every 6 months until stable
2. Annual submission once stable
3. Re-evaluate waiver if:
   a. Protein excretion exceeds 1 gram/day

b. Renal function declines
c. Related systemic disease becomes apparent

TREATMENT: Treatment as dictated by Internist or Nephrologist (may utilize medications such as ACEI or ARB, or recommend salt and protein restriction) for persistent (non-orthostatic) benign proteinuria or serious proteinuria..

DISCUSSION:
Definition: Normal adults may excrete up to 150 mg/day of total protein in the urine (may consist of 5-15 mg/day of albumin). Proteinuria is defined as total protein excretion exceeding 150 mg/day. Proteinuria is a sign, not a diagnosis.

Epidemiology: Proteinuria can be found by dipstick in as much as 17% of the adult population. Four population-based studies have found that fewer than 2% of those with positive dipstick results for proteinuria have serious and treatable urinary tract disorders (the positive predictive value is low).

Measurement: Screening is normally accomplished using a urine analyzer or "dipstick" during a scheduled physical examination. These random samples measure the concentration rather than the total amount of protein and are therefore influenced by the degree of urine dilution.
More accurate tests include a 24 hour urine collection or a spot urinary protein to creatinine ratio (normal < 0.2). Urinalysis dipstick has a sensitivity of ~88% and specificity of ~96%.

Additional Dipstick Facts:
1. Causes for false positive readings
   a. Alkaline urine (pH > 7.5)
   b. Mucus, RBC's, WBC's, or semen in the urine
   c. Dipstick immersed too long in the urine
   d. Concentrated urine
2. Cause for false negative readings
   a. Dilute urine

Pathophysiological Mechanisms for proteinuria:
1. Glomerular damage (most common for proteinuria of > 2 grams/day)
2. Tubular damage
3. Overflow (tubules unable to reabsorb an excessive filtered load of protein)

Underlying Causes and Diagnoses:
1. "Benign" proteinuria (asymptomatic with protein excretion of < 1 gram/day)
   a. Inflammatory process
   b. Intense activity or exercise
   c. Dehydration
   d. Transient proteinuria (idiopathic)
   e. Orthostatic (postural) proteinuria
   f. Persistent (non-orthostatic) proteinuria caused by mild forms of more serious disease

2. "Serious" proteinuria (protein excretion of > 1 gram/day and possibly symptomatic)
    a. Diabetes
    b. Hypertension
    c. HIV/AIDS
    d. Chronic glomerulonephritis
    e. Multiple myeloma
    f. Lupus nephritis
    g. Nephrosclerosis
    h. Nephrotic syndrome

Prognosis: The prognosis for conditions with high levels of proteinuria are much more likely to lead to renal failure (PARADE and REIN studies). Prognosis with impaired renal function and/or systemic disease (especially diabetes or HTN) is worse than if these conditions are absent. Prognosis for conditions causing benign (asymptomatic with protein excretion of < 1 gram/day) proteinuria in the absence of systemic disease, and with normal renal function, is favorable. When systemic disease (e.g. diabetes, hypertension, etc.) is present or renal function is abnormal (Cr clearance > 1.4 mg/dl in men or > 1.2 mg/dl in women), there is a higher risk for loss of kidney function and cardiovascular complications (MI and CVA) even with benign levels of proteinuria.

ICD-9 CODE:
719.0 Proteinuria

17.0 MISCELLANEOUS CONDITIONS

17.1 ALLERGIC REACTIONS TO INSECTS

AEROMEDICAL CONCERNS: Local or systemic reactions to insect bites or stings may lead to incapacitation in as little as three to five minutes. This type of rapid incapacitation is incompatible with aviation duty without successful diagnosis and treatment.

WAIVER: Any history of systemic or anaphylactic reaction is considered CD for all DIF. The decision for waiver will be made on a case by case basis after review of all the available documentation. Applicants with a history of cutaneous or mild systemic reactions must have received VIT and be on a stable maintenance dose prior to submitting an application for a waiver. Applicants with severe allergic reactions will not be considered for waiver until they have completed a minimum of three years of VIT and have demonstrated a documented negative repeat skin test.

INFORMATION REQUIRED:

1. A thorough summary of all allergy history and symptoms
2. Allergy consultation confirming the diagnosis and documenting the treatment plan
3. Medical records of previous treatments may also be required

TREATMENT: Venom Specific Immunotherapy (VIT) is required for all adult individuals experiencing systemic or anaphylactic reactions. Cutaneous systemic reactions prior to the age of 16 do not require treatment with VIT and do not require a waiver. These individuals have a minimal risk of systemic reaction as an adult (approximately 10%). However, anaphylactic reactions in individuals less than 16 years of age require allergy/immunology consult and skin testing. If positive, VIT is required for a career in aviation. Carrying an Emergency Anaphylactic kit (adrenaline) does not preclude a member from consideration for a waiver. In fact, treatment with adrenaline is paramount in reducing morbidity and mortality from allergic reactions to insect stings and bites. In some instances it may be required to carry in the performance of aviation duty. The requirement to carry an emergency anaphylactic kit will be based on the severity of the reaction and the recommendation of the Allergy/Immunology specialist.

DISCUSSION: A generalized reaction to 100 wasps is a normal response, which does not fulfill the criteria of the generalized reaction described above. Anaphylaxis from a single sting is different matter.

ICD-9 CODES:

989.5	**Insect Bite, unknown effect of venom**
V15.6C	**Insect Bite, Hx of, not resulting in generalized reaction**
V15.6F	**Insect Bites, Hx of, resulting in generalized reaction**
V07.10	**Allergy, currently taking desensitization shots**
V07.11	**Allergy, History of desensitization shots**

17.2 BREAST IMPLANTS

AEROMEDICAL CONCERNS: Possible shifting of the implants during high G flight causing pain and/or distraction to the pilot during flight.

WAIVER: Not considered disqualifying provided a minimum of six weeks has elapsed since the surgery.

INFORMATION REQUIRED:

1. Written clearance from surgeon to resume unlimited physical activity.

TREATMENT: Not Applicable

DISCUSSION: The Navy and Air Force have limited experience with aviators with breast implants, however, to date there have not been any reports of adverse events. There has been one report in the civilian literature of discomfort at altitude due to expansion of air in a saline implant.

ICD-9 CODE:
P85.54 Breast Implants

17.3 HEAT EXHAUSTION / HEAT STROKE

AEROMEDICAL CONCERNS: Recurrence of heat exhaustion/heat stroke in the aviation/operational environment.

WAIVER:

1. Heat Cramps, single or multiple episodes: NCD
2. Heat Exhaustion: NCD unless severe or recurrent
3. Heat Stroke: CD, waiver considered on a **case by case** basis. Waiver disposition may be favorable if the following conditions are met:
   a. No evidence of a congenital predisposing condition (i.e., anhidrosis)
   b. An identifiable situational stressor led to the episode, such as dehydration, coexisting infectious disease, medication effect, fatigue, sleep deprivation, or lack of acclimatization.
   c. No residual injury exists
   d. A minimum of three months have passed since the episode of heat stroke
   e. Evidence of normal heat tolerance after recovery from the heat stroke episode
   f. Individuals who fail to meet these criteria will remain NPQ with no waiver recommended. Recurrent episodes of heat stroke are CD, with waiver unlikely

INFORMATION REQUIRED:

1. Severe or recurrent heat exhaustion or one episode of heat stroke will require evaluation by NOMI Internal Medicine

TREATMENT: Prevention is the key. Encourage slow acclimatization to stressful environments and encourage liberal intake of fluids.

DISCUSSION: Heat stress continues to be a significant environmental hazard in military aviation. Exertional heat stroke (EH) is a state of extreme hyperthermia that occurs when excess heat generated by muscular exercise exceeds the body's ability to dissipate it. It should be remembered that an initial rectal temperature of less than 105 degrees does not preclude the diagnosis of heat stroke. Loss or significant alteration of consciousness in the circumstances of physical exertion in hot weather should be considered heat stroke unless another cause is obvious.

Studies show that exertional heat stroke in a young, healthy (military) individual result from situational factors; an intrinsic predisposition to heat intolerance is extremely rare. Dehydration, febrile or infectious illness, skin disorders, poor physical fitness and obesity are well-accepted factors predisposing to heat intolerance. Some of these factors may result in only temporary heat susceptibility while others can lead to permanent heat intolerance. In many of these individuals (10 of 10 in a controlled study), the heat intolerance is temporary and reversible. Aviators with a history of heat stroke should be evaluated on a case by case basis to determine their heat tolerance status. All individuals with heat stroke will require an evaluation at NOMI by the Internal Medicine Department prior to waiver recommendation.

Several controlled studies have recommended that all heat stroke patients be tested for heat tolerance 8-12 weeks after the episode in order to determine fitness for further heat-exercise exposure. Heat stroke patients secondary to dehydration usually respond normally to a heat-exercise tolerance test 6 weeks after the episode. In a case report in which an infectious disease was the predisposing factor, normal tolerance to a heat exercise test was regained 12 weeks after the heat stroke episode. A recent study of 10 prior exertional heat stroke patients showed that none were hereditarily heat intolerant; all had multiple predisposing situational factors. The authors concluded that heat intolerance, defined as inability to acclimate to heat, occurs in a very small percentage of prior heatstroke patients.

A heat tolerance test, used by Hubbard and his colleagues at the US Army Research Institute of Environmental Medicine, consists of a subject walking on a treadmill for 90 minutes at 45% of VO2max in a chamber maintained at 40° C and approximately 50% humidity. The test is terminated if the subject's heart rate exceeds 180 bpm or the rectal temperature exceeds 39.0 ° C.

ICD-9 CODES:
992 Heat Exhaustion / Heat Stroke
992.0 Heat Stroke
992.5 Heat Exhaustion

17.3A RHABDOMYOLYSIS

AEROMEDICAL CONCERNS: The physiologic changes that occur in rhabdomyolysis may be precipitated by and severely compounded in the aviation environment and related duties involving flight. Symptoms may include muscular pain, muscular weakness and fatigue. Decreased situational awareness and cockpit distraction are of major concern. Additionally, unrecognized rhabdomyolysis may progress to renal failure, shock, cardiac arrhythmias, and death.

WAIVER: The history of a single episode of uncomplicated rhabdomyolysis is CD for all aviation classes, including applicants, if the condition fully resolves within three months without sequelae. Waivers are usually granted, but an AMS must be submitted for waiver consideration.

Any history of prolonged, complicated or recurrent rhabdomyolysis is CD, and a waiver will be considered on a case by case basis in DESIGNATED Aviators only. Waivers are considered under the following conditions:

1. No evidence of a congenital predisposing condition (e.g., myophosphorylase deficiency, sickle cell trait).
2. An identifiable situational stressor led to the occurrence, such as extreme physical exertion, trauma or muscle compression, dehydration, electrolyte abnormality, coexisting infectious disease, toxin exposure, medication effect, or fatigue.
3. No residual organ injury or damage is present.
4. A minimum of three months has passed since the episode of rhabdomyolysis.

INFORMATION REQUIRED:

1. Internal Medicine consultation.
2. Glomerular filtration rate (GFR)
3. Blood urea nitrogen and creatinine
4. Glomerular filtration rate
5. Complete blood count
6. Liver function tests
7. Creatinine kinase
8. Complete metabolic panel

Note: Consider thyroid function testing

DISCUSSION: Rhabdomyolysis is a syndrome characterized by muscle necrosis and release of intracellular muscle constituents into the circulation. The disease process can range from mild, asymptomatic enzyme elevations to life-threatening cases involving cardiac arrhythmias, disseminated intravascular coagulation, acute renal failure, and death. The classic presentation of rhabdomyolysis includes myalgias, myoglobinuria causing reddish to brown urine, and elevated serum muscle enzymes. Diagnosis is based upon fractionated serum skeletal muscle creatine kinase levels, which may exceed 100,000 IU/L, and appropriate clinically correlated history. While no specific cutoff for creatine kinase level is used to diagnose rhabdomyolysis, a serum level 5 times greater than baseline is the generally accepted level. Germaine to the

aviation environment is the fact that rhabdomyolysis affects patients in a 3:1 male to female preponderance and is exacerbated by extreme heat and load-bearing activity, both of which persist as constant environmental hazards in military aviation. Additional predisposing conditions and causal factors include prolonged unconsciousness resulting in extended dorsal muscle compression, struggling against restraints, episodes of near drowning, burns, sepsis, torture victims, high-voltage electrical injuries, compartment syndrome, hyperthermia, hypothermia, prolonged tourniquet application, seizures, sporadic extreme physical exertion (i.e., ultra-marathoners), dehydration, inappropriate nutritional supplement use, and pre-existing electrolyte abnormalities. Prognosis is generally favorable provided a correctable condition or causative action is identified in those cases that do not progress to acute renal failure. There is concern, however, that multiple sub-clinical episodes of rhabdomyolysis and acute renal insufficiency may predispose patients to early onset chronic renal insufficiency later in life. Additionally, the causal and predisposing factors listed above are synergistic and the chances of developing rhabdomyolysis increase as the number of the risk factors increase.

ICD-9 CODES:
728.88 RHABDOMYOLYSIS
791.3 MYOGLOBINURIA

17.4 HIV INFECTION

AEROMEDICAL CONCERNS: Persons with HIV infection are at risk for multiple complications including HIV encephalopathy, opportunistic infections, and malignancies. Treatment of HIV infection requires the use of antiretroviral medications with multiple side effects and drug interactions. Mandatory restrictions on deployability preclude operational assignment.

WAIVER: NOMI does not recommend waivers for HIV infected personnel.

INFORMATION REQUIRED: The management of HIV seropositive individuals is covered under SECNAVINST 5300.30C. NOMI requires a grounding physical when the diagnosis of HIV infection is established.

TREATMENT: The adoption of highly active antiretroviral therapy (HAART) with three-drug regimens has resulted in much improvement in short-term survival rates. The recommended regimens involve the use of two nucleoside reverse transcriptase inhibitors (N-RTI) plus either a protease inhibitor (PI) or efavirenz, a non-nucleoside reverse transcriptase inhibitor (NN-RTI). Drug regimens involving less than three antiretroviral drugs are contraindicated. Some of the potential side effects of these regimens include anemia, leucopenia, thrombocytopenia, hepatitis, pancreatitis, peripheral neuropathy, lactic acidosis, rash, diarrhea, abdominal pain, nephrolithiasis, glucose intolerance, hyperlipidemia, etc. Non-adherence to HAART regimens (less than 95% compliance) greatly increases the risk of development of multi-drug resistant (MDR) HIV strains. No waivers are recommended for the use of HAART.

DISCUSSION: Some individuals, particularly civilian HIV authorities, view the military's policy of permanent disqualification for HIV infected aviators unfounded in fact, but NOMI's position has always been that, per the MANMED, untreated chronic infections are CD, no waivers recommended. Untreated HIV can also cause renal failure, anemia, leucopenia, and thrombocytopenia in addition to the opportunistic infections and malignancies. HIV encephalopathy results in cognitive and motor deficits that can impair the ability to fly high performance aircraft. An HIV-infected person is more likely (30%) to develop pulmonary tuberculosis in the first two years after initial infection with an annual rate of 5% thereafter. HIV-infected individuals are more likely to transmit tuberculosis to other people.

The mean incubation period between HIV-1 infection and symptomatic AIDS is 8-10 years. Estimates are that 100% of those infected with HIV but not treated with HAART will progress to AIDS given sufficient time. The indications for initiation of HAART can occur years before the development of symptomatic AIDS. Initiation of HAART is recommended when the CD4 lymphocyte count is less than 500 cells/mm^3 and/or the HIV viral load is greater than 20,000/mL copies by reverse transcriptase polymerase chain reaction (RT-PCR). Treatment with HAART improves survival in AIDS patients and may slow the onset to symptomatic AIDS (see above). However, the side effects associated with HAART severely limit its compatibility with duty involving flying.

AIDS-defining events have changed radically since the disease was first described. In someone whose HIV-1 status is known to be positive, the list of conditions defining the transition to AIDS is broad. Additions, reflecting an increased awareness of AIDS in women, include invasive cervical cancer and unresponsive or poorly responsive vulvovaginal candidiasis. The treatment and prophylaxis of AIDS-related opportunistic infections have improved. The prophylactic medications also have many side effects. Some antiretroviral agents, especially the PIs, have drug interactions with AIDS-related prophylactic medications and medications for non-HIV-related conditions.

ICD-9 CODE:
795.8 HIV Infection

17.5 LYME DISEASE

AEROMEDICAL CONCERNS: Early infection with Borrelia burgdorferi generally results in the characteristic cutaneous rash known as erythema migrans. Later in the course of the disease, chronic meningitis, polyneuropathy or Bell's palsy can develop. Months to years later, an arthritis can be the predominant feature. Note that all these conditions can appear in any order and at any time during the course of the infection. B. burgdorferi can also cause a myo/pericarditis, conjunctivitis, and retinal hemorrhage or detachment.

WAIVER: The protean manifestations of the condition and the variability of the presentations dictate an individualized approach to waiver recommendation. In general, adequately treated erythema migrans without signs of dissemination will be NCD.
Any case that is clinically suspicious for disseminated Lyme disease that is substantiated by appropriate serology (acute IgM titer, rising IgG titers) is CD. CNS findings will require complete resolution, and a period of observation before waiver recommendation will be considered.
Persistent abnormalities will be permanently disqualifying, with no waiver recommended.

INFORMATION REQUIRED:

1. NOMI evaluation is necessary for all cases of suspected disseminated Lyme disease
2. Uncomplicated erythema migrans in the appropriate clinical setting can be diagnosed and treated at the local level

TREATMENT: Many antibiotic regimens have been suggested, but treatment failures have occurred with all of them. Tetracycline (250 mg qid for 14-30 days) is generally advocated for early Lyme disease. Once systemic signs are apparent, intravenous ceftriaxone (2 gr IV qd for 14 days) is recommended. Other regimens can be used for patients allergic to the first line antibiotic.

DISCUSSION: The diagnosis is often made clinically, based on an exposure history in an area endemic for Lyme borreliosis. Serology studies can be misleading in that there are many false positive tests. The diagnosis should be made with caution if exposure occurred in an area that is not endemic for the arthropod hosts, as this will incur potentially significant costs to the patient and his/her career. The rationale for this is that even in an endemic area for the spirochete, only 15% of collected ticks were infected. Prophylactic antibiotics following a tick bite, even in an endemic area are not recommended, based on the low likelihood of contracting asymptomatic Lyme disease.

ICD-9 CODE:
088.81 Lyme Disease

17.6 MOTION SICKNESS / AIR SICKNESS

AEROMEDICAL CONCERNS: Symptoms can include sweating, nausea, drowsiness, lethargy, apathy, headache and vomiting. This spectrum can range from distraction to prostration in the air. The degradation in performance of trainees could be attributed incorrectly to lack of skill.

WAIVER: Aircrew with intractable airsickness are NPQ, no waiver. However, there is a Self-Paced Airsickness Desensitization (SPAD) program available at NOMI which is an option prior to permanent grounding.

I**NFORMATION REQUIRED:** If the airsickness interferes with performance in flight, the patient will be evaluated by the flight surgeon to rule out medical causes (neurovestibular) and then referred to NOMI if appropriate.

TREATMENT: The majority of aircrew become habituated to the stimuli and does not require treatment other than regular flying. Others may benefit from a combination of desensitization, biofeedback training, relaxation training and psychological counseling. Promethazine (Phenergan) 25mg combined with dextroamphetamine (DEXEDRINE) 5 mg taken 1 hour prior to flight is permitted for up to 3 flights during training, provided the patient is accompanied in flight by an instructor pilot. If symptoms recur following discontinuation of medication, this is the appropriate time for referral to the SPAD program at NOMI.

DISCUSSION: In the RAF, 39% of flying students have air sickness at some stage during their training and in 15% this is sufficiently severe to disrupt or abandon the flight. The USN experience is that 13.5% of all flights will lead to airsickness in non-pilot crews with vomiting occurring in 5.9%. Up to 63% of students were sick on their first flight, with only 15-30% not experiencing airsickness at all during their training. Females are almost twice as likely to suffer as males and the incidence declines with age. Treatment by biofeedback training, relaxation and psychological counseling achieves a success rate of 40%; when exposure to incremental Coriolis effect and flying is included, the success rate rises to 85%. All of the drugs used for motion sickness control have unacceptable side effects. Scopolamine and antihistamines act as central depressants; the former particularly degrades tasks that involve continuous attention and memory storage, as well as causing blurred vision, sedation and dizziness in some individuals. In flight conditions mild enough to cause airsickness in only 10% of the untreated population, 0.4mg of scopolamine will reduce that number to 2%. Similarly, in rough conditions causing airsickness in 50%, 1mg of the drug will reduce the incidence to 8% but with unacceptable side effects.

ICD-9 CODE:
994.6 Motion Sickness/ Air Sickness

17.7 MOTION SICKNESS QUESTIONNAIRE

MOTION SICKNESS QUESTIONNAIRE
During your physical examination, you marked *yes* on the SF93 (Report of Medical History) for the item concerning *Car, Train, Sea or Air Sickness*. Please answer the following questions fully:
Which mode of transportation gives you motion sickness?
How often do you get sick?
When was the last occurrence?
Do you ever go on rides at carnivals?
If yes, do you ever get sick?
If yes, which rides make you sick?
If no, what is the reason?
If you suffer from airsickness, which types of aircraft make you sick?
How often do you suffer from airsickness?
If you suffer from sea sickness, what type (size) ships or boats seem to bother you most?
How often do you get car sickness?
If you suffer from car sickness, do you ever do anything that makes this worse? (e.g. reading etc.)
What is the severity of your motion sickness?
Have you ever required any medication?
If yes, give name, dosage, and frequency.
If any item has been missed concerning your motion sickness, please explain in detail:
Applicant Signature & SSN Date:

17.8 BONE MARROW DONATION

AEROMEDICAL CONCERNS: Bone marrow donation is certainly one of the most altruistic forms of giving to another individual. However, there are significant donor concerns. Bone marrow donation will ground the aviator for at least 30 days and has the potential for complications that could restrict deployment or even end a flying career. Depending on how well the Human Leukocyte Antigens (HLA) are matched, up to 5% of the recipients will require a second donation that will further restrict the deployability of the aviator donor. If an aviator is contemplating a donation, the Flight Surgeon needs to counsel the donor regarding the risks involved and the Commanding Officer needs to be aware of the 30 day minimum grounding with the potential for longer grounding. CO approval for donation is required.

WAIVER: (Applicants and designated aviators). Not considered disqualifying and waiver not required, provided:

1. Minimum of 30 days has elapsed since the bone marrow donation
2. Post-donation symptoms have resolved
3. Hematocrit is greater than or equal to 38% for males, 35% for females
4. The remaining Complete Blood Count (CBC) with differential is within normal limits.

Post-donation CBC may take up to six months to return to normal. A waiver for designated aviators is required if post-donation symptoms persist or if CBC results do not return to normal after six months. Waivers will not be considered for applicants.

INFORMATION REQUIRED:

1. CBC with differential must be repeated at the aviator's next two flight physicals (long or short form)
2. If post-donation symptoms persist or serum lab values remain abnormal, the waiver information must include:
   a. Copy of the operative report
   b. Copies of follow-up visits
   c. Current medications
   d. CBC with differential
   e. TIBC
   f. Serum Iron
   g. Ferritin

TREATMENT: For bone marrow donation or peripheral blood stem cell (PBSC) donation iron therapy may be used before the donation and for up to six months post-donation without a waiver. After six months post-donation, a waiver is required. (Up to six months of post-donation iron therapy is for bone marrow and PBSC donation only; other reasons for taking iron therapy will require a waiver.)

DISCUSSION: Bone marrow transplant is used to treat more than 60 diseases including leukemia, aplastic anemia, thalassemias and Hodgkin's disease. The science of bone marrow transplant continues to evolve and the process is rapidly maturing; however, there are still numerous questions regarding the long-term effects on donors. Short-term effects have been

studied and donors report the following morbidity as a result of operative bone marrow harvesting:

1. Fatigue 75%
2. Pain at collection site 68%
3. Pain with walking 63%
4. Nausea/Vomiting 55%
5. Lower back pain 52%
6. Recovery >30 days 10%

Potential donor complications include:

1. Anemia requiring iron therapy 63%
2. Acute complications 6%
3. Allogeneic transfusion 0.6%
4. Life-threatening complications 0.06%

Peripheral blood stem cell (PBSC) harvesting is the relatively newer procedure being used to obtain bone marrow stem and progenitor cells. The procedure involves giving donors recombinant granulocyte colony stimulating factor (GCSF) for several days while monitoring daily CD34+ cells. When the CD34+ cells are highest, apheresis removes stem and progenitor cells. Typically, donors tolerated this procedure very well and prefer it to bone marrow harvest. Donors report myalgias/arthralgias (83%), fatigue (57%), headache (44%), fever/chills (27%), and nausea/vomiting (22%). Reported laboratory test abnormalities include a moderate, asymptomatic reversible neutropenia, lymphocytopenia, platelet depletion, and increased liver enzyme levels that typically return to baseline within weeks. Aviator donors are grounded when receiving GCSF and for 30 days post-apheresis. To return to flight status the aviator who donates by apheresis must meet the same criteria as for bone marrow donation.

Both bone marrow donation and PBSC apheresis have potential morbidity. Both procedures place the aviator at risk for a longer than 30 day recovery, and carry a slight risk of jeopardizing the aviator's future flying status. Because these risks can impact mission effectiveness, the unit CO must also be aware of the potential impact on the donor's flight status.
Flight Surgeons, after you return aviators to flight status, please contact NOMI, Code 42, with the length of grounding, length of symptoms, any complications encountered, and if iron therapy is being continued. NOMI can then expand its aviator-donor database to further refine waiver guidance.

The C. W. Bill Young Marrow Donor Recruitment and Research Program in Washington DC is the DOD donor registry for all active duty personnel, their dependents, DOD civilians employees, Reserves, National Guard, and the Coast Guard. The center supports donor recruitment, medical evaluation, and marrow collection for DOD volunteer marrow donors. For more information about the DOD marrow donation program or for general information about donation they may be reacted at 1-800-MARROW3 or visit their web site at www.nmri.nnmc.navy.mil.

This guidance pertains to bone marrow and PBSC donation only. Future harvesting procedures will be addressed as they mature.

17.9 MALARIA

AEROMEDICAL CONCERNS: It is estimated that up to 2.7 million people die each year of malaria and 41% of the world's population lives in regions where the disease is endemic. Although it is rare in the United States, it is of particular concern for the military member who may travel to endemic regions. In 2002, 1,337 cases of malaria were reported in the U.S. 86% reported symptom onset after returning the states and 80% reported development of symptoms within one month. Eight people died and 50% of those with the disease required hospitalization. Significantly, 60% of those who contracted the disease did not take any chemoprophylaxis and 20% were reported as compliant with a chemoprophylactic regimen.

Of primary concern for the military member and aviator is prevention of the disease. In addition to vector control and personal protective measures, chemoprophylaxis is indicated for areas with endemic malaria. The primary drugs used in the prophylaxis of malaria are chloroquine, doxycycline, hydroxychloroquine, mefloquine, primaquine, and atavaquone/proguanil (Malarone).

The following guidance applies only to Aeromedical disposition. Treatment of malaria should be accomplished under close supervision of infectious disease or other appropriate specialists as circumstances dictate. Proper chemoprophylaxis is determined by the appropriate fleet, force, or unit medical officer. If flight surgeons have questions regarding proper chemoprophylaxis they are encouraged to call the Navy Environmental and Preventive Medicine Unit (NEPMU) in their region or the Centers for Disease Control (CDC).

WAIVER: Active cases of malaria are clearly disqualifying and the member is down during the time of active disease and treatment. Appropriate supportive care and medication should be provided by the treating medical facility. Once the member has no signs of active disease, has completed the treatment course, and is been cleared for full duty, he may resume flight duties. No waiver is required. Active cases of malaria should be reported to appropriate BUMED authority, the CDC, and NAMI Code 342 for tracking purposes.

Primary chemoprophylaxis refers to the use of drugs taken to prevent symptoms associated with the blood stage infection. These drugs are taken before, during and after travel to an endemic area.

The following primary chemoprophylaxis drugs are authorized with the following guidelines:

Chloroquine - Primary prophylaxis only in areas with chloroquine-sensitive P. Falciparum. Given as 300 mg base (500 mg salt) orally once per week. Member should be grounded 48 hours after taking first dose. Members who have taken chloroquine previously without side effects do not require a grounding period.

Doxycycline – Primary prophylaxis in chloroquine resistant areas. Given as 100 mg oral daily dose. Member should be grounded 48 hours after taking first dose. The most common side effect is a gastritis that can result when taken on an empty stomach or before bedtime. Ensure that

doxycycline is taken with food to decrease this side effect and increase compliance. Members who have taken doxycycline previously without side effects do not require a grounding period.

Primaquine – Primary prophylaxis in special circumstances. This drug should only be used in special circumstances where chloroquine or doxycyline are clearly contraindicated. The most common reason for this would be drug allergy or adverse drug reaction. This drug is currently not FDA approved for primary prophylaxis and should only be given in close consultation with a malaria expert. Contact the CDC Malaria Hotline (770-488-7788) or regional NEPMU for additional guidance.

Primaquine is currently used as terminal prophylaxis and is given as a 30 mg daily dose taken for 14 days after leaving the endemic region. This drug is contraindicated in members with G6PD deficiency. Member should be grounded for 48 hours after taking first dose. Members who have taken primaquine previously without side effects do not require a grounding period.

Malarone (atavaquone/proguanil) – Primary prophylaxis for areas in chloroquine or mefloquine resistant areas. Given as one tablet taken daily. This medication shall only be used if the above drugs are clearly contraindicated or unavailable. If used, the commanding officer must provide written endorsement for its use with a clear explanation of why this medication is necessary. The flight surgeon must ensure the commanding officer is aware that this drug has not been approved for routine use in aviation personnel and little data is available on its use in aviators. A copy of the commanding officers endorsement and a brief AMS provided by the flight surgeon detailing the circumstances necessitating the use of Malarone shall be forwarded to NAMI Code 342. Upon completion of the Malarone Regiment, the flight surgeon shall update NAMI Code 342 regarding its success or failure and any side effects that developed. Malarone shows promise as an alternative drug in aviators who cannot take doxycycline, and it is instrumental that NAMI Code 342 is updated on its use in Naval Aviators to help develop clearer guidelines in the future.

The following drugs are **NOT** allowed for use in Aviation Personnel except for treating active cases during which period the aviator is not flying.

1. Mefloquine
2. Hydroxychloroquine (Plaquenil)

The recommendation for all medications is a 48 hour grounding period except in individuals who have previously taken the medication and had NO side effects. Certain operational circumstances may not allow for a 48 hour grounding period. In these circumstances it is the responsibility of the flight surgeon to inform the commanding officer of the possible side effects and complications that may result from using the medication without an observation period. Approval to use these medications without a 48 hour grounding period is made by written authorization by the commanding officer on the advice of the flight surgeon.

INFORMATION REQUIRED: Inform NAMI Code 342 of all active cases of Malaria and the use of Malarone as noted above.

DISPOSITION: Active cases of Malaria are disqualifying while the member has the disease. It is no longer disqualifying when all symptoms have resolved, the treatment course is complete, and the member is returned to full duty. Chemoprophylaxis is not disqualifying when it meets the requirements noted above.

Additional Resources:
www.cdc.gov/malaria
Malaria Pocket Reference Guide http://www-nehc.med.navy.mil/downloads/prevmed/Malaria2000.PDF
NEPMU-2, Norfolk, VA, 757-444-7671, DSN 564-
NEPMU-5, San Diego, CA, 619-556-7070, DSN 526-
NEPMU-6, Pearl Harbor, HI, 808-473-0555, DSN 315-473-0555
NEPMU-7, Sigonella, Sicily, Comm +39 095 86 9251, DSN 314-624-9251

18.0 MEDICATIONS (MARCH 2010)

Note: Any medication not listed in this section is not approved for aviation. Contact NAMI Code 342 if further guidance is needed.

18.1 NATOPS on Medications

General NATOPS (OPNAVINST 3710.7 series, chapter 8) includes the following statements on medications (Drugs):

Taking drugs prescribed by competent medical authority shall be considered sufficient cause for recommendation of grounding unless their use is specifically approved by a flight surgeon, or a waiver for specific drug use has been granted by CHNAVPERS or the Commandant of the Marine Corps. Consideration shall be given to the removal of ground support personnel from critical duties, for the duration of the drug effects, if appropriate. Medications such as antihistamines, antibiotics, tranquilizers, sleeping pills, etc., shall be discarded if all are not used during the period of medication.

Because of the possibility of adverse side effects and unpredictable reactions, the use of over-the-counter drugs by flight personnel is prohibited unless specifically approved by a flight surgeon. Ground support personnel shall be briefed on the hazards of self-medication and should be discouraged from using such drugs.

In general, all medications require temporary grounding unless specifically described here as NCD for flight duties.

18.2 ANTIMICROBIALS

All antibiotics *other than the following very specific exceptions* require grounding (CD). The listed exceptions do not forgive you from doing something obviously inadvisable such as allowing a sick person to fly.

Aviation personnel on the following approved antibiotics may be considered for an up chit prior to the completion of the course of therapy as long as the condition being treated has resolved in all significant aspects with no adverse reaction that might compromise safety of flight or mission completion.

ANTI-BACTERIAL MEDICATIONS:

ANTI-MALARIALS: Refer to Aeromedical Reference and Waiver Guide (ARWG) section on Malaria.

FLUOROQUINOLONES:

CIPROFLOXACIN: NCD.

ISONIAZID: No waiver needed when used for TB prophylaxis as long as the member remains under close evaluation by flight surgeon. This medication causes occasional liver damage, especially above age 35. All personnel are to be monitored in accordance with current preventive and occupational medicine guidelines.

MACROLIDES:

ERYTHROMYCIN: NCD- including long-term, low-dose use for acn**e.**

NITROFURANTOIN: CD. Waiver considered if under close observation of flight surgeon. Adverse effects include pneumonitis or peripheral neuropathy.

PENICILLINS:

AMPICILLIN, AMOXICILLIN, PENICILLIN VK, AUGMENTIN, DICLOXACILLIN: NCD.

SULFONAMIDES:

BACTRIM/SEPTRA: CD. Waivers will be considered for long term use.

TETRACYCLINES:

TETRACYCLINE, DOXYCYCLINE: NCD. (Including long-term use for acne).

MINOCYCLINE: CD. Prohibited due to possible vestibular side effects.

ANTI- FUNGAL MEDICATIONS:

GRISEOFULVIN: CD. Waivers are considered if under close observation by local flight surgeon. Watch for bone marrow suppression.

ITRACONAZOLE (SPORANOX): NCD. While not approved for chronic use, itraconazole has a safer profile than ketoconazole, and need not be used on a chronic basis to be effective. Recommended use in aviation personnel is to administer in week-long pulses each month for four to six cycles. Aviators should be grounded for the first 48 hours of each cycle. Since it is not administered chronically, such as griseofulvin, a waiver is not required. The recommended initial treatment is over a weekend to allow return to flight duties the following Monday, thus minimizing flight schedule loss.

TERBINAFINE (LAMISIL): N**CD. Requires a 72-hour grounding period.** Terbinafine has a safer profile than ketoconazole and has a lower relapse rate than itraconazole. The recommended use in aviation personnel is to administer daily for twelve weeks. Aviators should be grounded for the first 72 hours and a waiver is not required when no side-effects exist and appropriate monitoring is performed. The recommended initial treatment is over a weekend to allow return to flight duties the following Monday, thus minimizing flight schedule loss.

ANTI-VIRAL MEDICATIONS:

ACYCLOVIR, VALACYCLOVIR: CD for continuous therapy. Waivers are considered for suppressive/prophylactive therapy. Intermittent therapy does not require a waiver. The patient should be grounded and monitored for side effects for a minimum of 3 days during the initial treatment or upon initiation of suppressive therapy. The need for suppressive therapy should be reassessed on an annual basis. Topical acyclovir is NCD.

OSELTAMIVIR (TAMIFLU), ZANAMIVIR (RELENZA)- NCD, Requires a 72-hour grounding period. These medications are indicated for prophylaxis and treatment of influenza A and B viruses. They can decrease the severity, duration and complications of influenza illnesses. These medications require a 72-hour grounding period following initiation of treatment to assess for adverse side effects. In the absence of flu symptoms and adverse side effects from the medications, flight duties may resume following the 72 hour grounding period. Reducing the initial grounding period to 48 hours may be considered for operational requirements with NAMI consultation.

18.3 ANTI-HYPERLIPIDEMICS

EZETIMIBE (ZETIA): NCD. A waiver is not required. An initial grounding period for 72 hours is required to assess for idiosyncratic reactions. If used in combination with HMG-CoA reductase inhibitors, refer to the waiver guide section on Hyperlipidemia for additional guidance.

FIBRIC ACIDS:

FENOFIBRATE (TRICOR); GEMFIBROZIL (LOPID): CD. Fenofibrate (Tricor) and gemfibrozil (Lopid) are both considered disqualifying. A waiver may be considered after a 14-day ground trial of the medication without side-effects. Fenofibrate is preferred over gemfibrozil due to fewer side effects. Prior to initiating treatment, baseline lab studies must be obtained to include: lipid panel, liver function testing (ALT/AST/ALK PHOS), CBC, FBS, and CPK. These tests are to be repeated at three months, six months and then annually if the values remain stable. Evaluate for muscle aches (myalgias) at follow-up exams and measure CPK levels if clinically indicated. If fibric acid is used in combination with an HMG-CoA reductase inhibitor, refer to the waiver guide section on Hyperlipidemia for further guidance.

NIACIN: CD. No waiver.

RESINS:

CHOLESTYRAMINE: NCD if tolerated without side effects.

STATINS:

PRAVASTATIN, SIMVASTATIN, LOVASTATIN, ATORVASTATIN: NCD. HMG Co-A reductase inhibitors (pravastatin, simvastatin, lovastatin, atorvastatin, etc.) are all NCD and a waiver is not required. Refer to ARWG section on hypercholesterolemia for additional guidance. Lipid panel, liver function tests (ALT/AST/ALK PHOS), CBC, and CPK are recommended at baseline, 3, and 6 months, then annually. Liver enzyme elevations above three times normal are disqualifying.

18.4 ANTI-HYPERTENSIVES

ACE INHIBITORS (ACE-I):

CD. The entire family (captopril, enalapril, lisinopril, etc.) is CD, but waiverable. The member must be grounded upon initiation of treatment. Waiver will be considered after 30 days of treatment if member's hypertension is controlled on a stable dosage of medication without evidence of side effects. If local pharmacy policy requires changing from one ACE-I to another, advise Code 342 of the change. Refer to ARWG section on hypertension for additional guidance.

ANGIOTENSIN RECEPTOR BLOCKERS (ARB):

CD. These agents may be used if member does not tolerate an ACE-I or has some other specific medical indication for its use. The same guidelines used for ACE-I appl**y.**

ANTIADRENERGIC AGENTS:

DOXAZOSIN, PRAZOSIN, others in class**:** CD. No Waiver. Call NAMI Code 342 for further guidance.

BETA BLOCKERS (for hypertension only):

CD. Beta blockers are not considered for waivers for Service Groups I or II personnel. Senior officers (LCDR and above) may be waived to Service Group 3 or Class II flying duties in non-tactical aircraft. All SG 1, SG 2, or tactical NFOs are considered NPQ, no waiver recommended. Designated Naval Aircrew will be considered for a waiver. Aviation personnel on beta blockers should not pull more than 2.5 Gs, so requests for waivers should state "transport/maritime/helo aircraft only." Air traffic controllers are usually waived. When beta blockers are used, preference shall be given to cardioselective agents such as atenolol.

CALCIUM CHANNEL BLOCKERS:

AMLODIPINE (NORVASC): CD. A second generation calcium channel blocker, AMLODIPINE may be considered for waiver for use in the control of hypertension only after failure to control the condition on other approved agents. These cases must be reviewed individually by NOMI prior to issuance of an Aeromedical Clearance notice. Local Board is not authorized to issue a clearance notice for AMLODIPINE use.

NIFEDIPINE (PROCARDIA): CD. No Waiver.

COMBINATION AGENTS:

CD. Combination agents may be used if the individual agents themselves are recommended for waiver. Follow the restrictions and guidelines outlined for each individual agent.

THIAZIDE DIURETICS:

HYDROCHLOROTHIAZIDE (For Hypertension): CD.
HYDROCHLOROTHIAZIDE (HCTZ), with or without triamterene or potassium replacement, can be used as a first line agent for treatment of hypertension in designated personnel. ACE inhibitors are preferred as they have a low incidence of aeromedically significant side effects and are generally well tolerated. See hypertension section of ARWG for waiver criteria and further guidance.

18.5 IMMUNIZATIONS

GROUNDING FOR VACCINATIONS:

OPNAVINST 3710.7 series requires a 12 hour grounding period following immunizations unless otherwise specified in this document. The specific guidelines and grounding periods for each vaccination are described below. As per MANMED Article 15-77, the administration of routine immunizations that require a temporary grounding, do not require issuance of an Aeromedical Grounding Notice. This is a "self-limited" grounding period allowed in the absence of adverse side effects.

VACCINE ADVERSE EVENT REPORTING SYSTEM (VAERS)

The Vaccine Adverse Event Reporting System (VAERS) is used to report adverse events or reactions to all vaccines. VAERS, the primary U.S. vaccine safety monitoring system, encourages reporting of any unexpected or serious event occurring after any vaccination as well as adverse events occurring in persons following close contact with a vaccine recipient. An adverse event is any clinically significant medical event that occurs following administration of a vaccine. A VAERS report should be submitted even if it is not certain that the event was caused by the vaccine. Web reporting is available at http://vaers.hhs.gov/.

ANTHRAX

BACKGROUND: Human anthrax vaccine was developed in England and the U.S. in the 1950s and early 1960s. The vaccine is U.S. Food and Drug Administration (FDA)-licensed and has been routinely given in the U.S. since 1970.

The vaccine has an excellent safety record. The most common side effects reported are mild discomfort (localized swelling and redness at the site of injection), joint aches, and in a few cases, nausea, loss of appetite, and headaches. There is no evidence from records at the Michigan Biologic Products Institute (which is the only U.S. producer of the vaccine) that the vaccine is associated with permanent local or systemic effects.

DOSAGE AND ADMINISTRATION: The current dose schedule for the U.S. vaccine consists of 6 shots given over an 18 month schedule and an annual booster thereafter.

Contraindications for use are sensitivity to vaccine components (formalin, aluminum hydroxide, benzethonium chloride) and/or history of clinical anthrax. Pregnant women should not receive this vaccine until after delivery. The vaccine should be stored at refrigerator temperature (not frozen).

A 12 hour grounding period is recommended for the anthrax vaccination.

CHOLERA

Sale of the only licensed cholera vaccine in the United States has been discontinued, and the CDC does not currently recommend the vaccine for travelers because of the brief and incomplete immunity it offers. In lieu of vaccination, proper hygiene and food and water precautions should be carefully emphasized.

DIPHTHERIA TETANUS (DT) AND TETANUS TOXOID

This vaccine is used to prevent bacterial elaboration of toxins resulting in muscular spasm/lockjaw, which is usually found in the setting of a contaminated wound. These vaccines are toxoids and are both known to be 95% efficacious. They are given every 10 years, however if a suspicious wound is encountered, the standard is to revaccinate if more than 5 years has elapsed since the last vaccination. The dose is 0.5 cc IM. Adverse events include frequent local reactions. Hypotonic, hyporesponsive episodes, seizures, and acute encephalopathy have been reported on rare occasions. A 12 hour grounding period is recommended for this vaccination.

HEPATITIS A

This is an inactivated virus vaccine which is given as a 1.0 cc dose IM, with a booster dose 6 to 12 months later. Protective levels of antibodies are detectable in 80 to 98% of recipients 15 days after the first dose, and in 96% after one month. Protection is expected to last 20 years. No significant adverse events have been reported, although some recipients experience local injection site soreness. Transient systemic symptoms are uncommon. In the USA, the presence of anti-HAV antibodies indicating past infection and probable immunity increases from about 10% in young children to about 75% in adults more than 50 years old. A 12 hour grounding period is recommended for this vaccination.

HEPATITIS B

This is an inactivated virus vaccine which is given as a 1.0 cc IM dose, with boosters at 1 and 6 months. Current CDC recommendations are to immunize everyone 18 years of age or younger and adults over 18 who are at risk. The at-risk population includes health care and public safety worker who might have contact with blood or body fluids, people who have more than one sex partner in six months, sex contacts of infected people, people who inject illegal drugs, hemodialysis patients, and household contacts of people with chronic HBV infection. Contraindications to vaccination include a history of allergic reaction to either baker's yeast or the hepatitis B vaccine. Mild soreness at the injection site is seen in approximately 1 out of 11 children and adolescents and 1 out of 4 adults, and mild to moderate fever is seen in up to 1 out of 14 children and 1 out of 100 adults. A 12 hour grounding period is recommended for this vaccination.

INFLUENZA

INJECTABLE INACTIVATED INFLUENZA VACCINE

This vaccine is composed of inactivated whole or disrupted influenza viruses and changed annually to reflect antigenic changes in the A and B strains of the virus that is in circulation. Immunity after the standard 0.5 cc IM dose lasts about six months, so annual administration is required, ideally before the start of flu season. The vaccine is indicated in the elderly (>65), residents of chronic care facilities, those with cardiac, pulmonary or immunosuppressive diseases such as cancer and DM, and close contacts of those at risk. All active duty Navy and Marine Corps personnel are required to have one dose of this vaccine each year. The only contraindication is a bona fide history of generalized allergic reaction to the vaccine, eggs, or egg components. Effectiveness varies with how closely vaccine strains match the strains in the community, generally about 60-85%. A mild local reaction is the most common adverse effect, although some individuals have a transient mild "viral syndrome." A 12 hour grounding period is recommended for this vaccination.

FLUMIST

All active duty Navy and Marine Corps personnel are required to have one dose of influenza vaccine (IM or intranasal spray) each year. FluMist® (Influenza Virus Vaccine Live, Intranasal), is composed of live, attenuated influenza virus (LAIV) that is administered by nasal spray. It is used for the prevention of Influenza A and B in healthy adults under age 50 who are not pregnant. The 0.5mL dose is given as a 0.25mL spray in each nostril.

The immunization is less effective in those with pre-existing nasal congestion. The dose should be repeated if the patient sneezes following administration. Immunity after the standard intranasal dose declines during the year, so annual administration is required—ideally, before the start of “flu season.” There appears to be an increase in protective antibodies over time with subsequent doses. Effectiveness varies according to how closely the strains used to make the vaccine match those in the community.

The onset of symptoms after immunization usually occurs within the first 24 hours, with most symptoms presenting by the third day. The duration of symptoms is typically 1-2 days. The most common adverse effects include:

- headache 40%
- sore throat 28%
- tiredness 26%
- myalgias 17%
- cough, nasal congestion, and rhinitis 9-45%
- Less common adverse effects include chills, abdominal pain, diarrhea, vomiting, and otitis media.

A “self-limited” grounding period of 72 hours after immunization is required to assess for symptom severity. Commanding officers may return aeronautically designated personnel to duty involving flight operations in less than 72 hours on the recommendation of a flight surgeon when

necessary to meet "real world" operational commitments. The presence and severity of symptoms may require the grounding of some personnel for greater than 72 hours.
To minimize operational impact, commands may elect to stagger the administration of the vaccine to their personnel. For example, a command might elect to vaccinate 50% of eligible personnel one week and the remaining personnel the following week. Another option would be to schedule immunizations immediately prior to a period when no flights are scheduled (e.g., just prior to a holiday weekend).

Additional information is available via the CDC website at,
http://www.cdc.gov/flu/professionals/vaccination/

ANTIVIRAL MEDICATIONS:

OSELTAMIVIR (TAMIFLU), ZANAMIVIR (RELENZA)-
NCD, Requires an initial 72-hour grounding period. See Antimicrobial Section 18.2.

JAPANESE ENCEPHALITIS (March 2010)

Japanese Encephalitis (JE), a mosquito-borne arboviral infection, is the leading cause of viral encephalitis in Asia with over 50,000 sporadic and epidemic cases reported annually. Two inactivated virus vaccines are currently available, JE-Vax, licensed in 1993, and Ixiaro, licensed in 2009.

JE-VAX. JE-Vax is administered as a 1.0 mL SC dose with an effectiveness of 80-90%. Intradermal dosing at two sites is as immunogenic as a single SC dose. Three doses during a 30 day period (days 0, 7, and 30) provides the longest immunogenic protection. A booster given at one year will significantly increase antibody titers, which may then persist for several years. An abbreviated schedule of immunizations given on days 0, 7, and 14 may be used if significant time constraints exist.

JE-Vax is associated with a moderate frequency of local and mild systemic side effects. About 20% of recipients experience local redness, swelling, or tenderness, and systemic side effects (fever, headache, malaise, and rash) have been reported in about 10% of vaccine recipients. An additional pattern of adverse reactions characterized by generalized urticaria and/or angioedema, and rarely respiratory distress or collapse, has been reported. These reactions occurred after a longer interval and usually after the first or second dose. The median time to onset of symptoms after the first dose is 12 hours, and 88% of reactions occur within 3 days. The interval after the second dose is longer, with a median time of 3 days and possibly as long as two weeks. After reviewing the experiences of I-MEF personnel during the first several years of use, the original 3-5-3 day grounding regimen appears excessive based upon the actual observed incidence of reactions. **A 24 hour grounding period is recommended after each dose providing that aviators are formally briefed about possible delayed reactions.** Individuals who have a past history of urticaria or hypersensitivity phenomena should remain under the previous guidelines (3-5-3 grounding).

JE-Vax is no longer produced. The DoD stockpile is projected to be exhausted in April 2010 and has an expiration date of May 2011. Ixiaro is an available alternative to JE-Vax.

Ixiaro. Ixiaro is administered as a 0.5 mL IM dose. Two doses are given 28 days apart (days 0 and 28). The protective antibody response is 95% at six months and 83.4% at 12 months. Ixiaro is associated with a moderate frequency of mild systemic and local side effects. About 20% of recipients experience headache, 15% experience myalgia, and 50% experience mild local reactions in rates comparable to placebo. **A 12 hour grounding period is recommended for this vaccination.**

Summary- Either JE-Vax or Ixiaro can be used for aviators as described above. JE-Vax will become unavailable by May 2011 unless a shelf-life extension is approved. Ixiaro is likely to have less serious adverse events than JE-Vax. Ixiaro requires only two doses, and requires a 12-hour grounding period instead of 24-hours for JE-Vax. Ixiaro is the preferred vaccine for aviation, especially when the duration of the grounding period impacts mission accomplishment.

MEASLES/MUMPS/RUBELLA (MMR)

This vaccine, composed of live, attenuated viruses, is indicated in adults born after 1956 without a history of documented measles or measles/mumps vaccination. Some people vaccinated before 1980, especially if before 14 months of age, may be inadequately protected and now require revaccination. Contraindications include pregnancy, immunosuppression (except HIV), recent IG administration, or anaphylactic reactions to the immunization, eggs, or neomycin. Efficacy is 95% for all three components. Serious adverse events are rare, but include acute encephalopathy, parotiditis, and orchitis. Transient arthralgias may occur in up to half of first-time recipients, but arthritis and arthropathy are rare. About 5-15% of vaccine recipients have fever up to 21 days post-vaccination and 5% may develop a rash. One study assessed the incidence of adverse events after revaccination. This study noted local injection site discomfort and flu-like symptoms amongst 6.6% and 3.4% of male and female students respectively. The 4% rate of joint related complaints after revaccination was less than that found after primary vaccination. A 12 hour grounding period is recommended for this vaccination.

MENINGOCOCCAL

Each year, approximately 2,600 people contract meningococcal disease. Of these, 10 to 15% die. Of those who live, another 11 to 19% lose their arms or legs, become deaf, have problems with their nervous system, become mentally retarded, or suffer from seizures or strokes. The meningococcal vaccine is a polysaccharide vaccine that can prevent 4 types of meningococcal disease including 2 of the 3 most common in the United States and a type that causes epidemics in Africa. It is administered as a 0.5 cc SC dose, and is recommended for all children at their preadolescent visit, military recruits, college freshman living in dormitories, microbiologists who might be exposed to the bacteria, anyone with an immune system disorder, asplenic patients, people who might have been exposed to meningitis during an outbreak, and anyone traveling to or living in a part of the world where meningococcal disease is common. Approximately half of vaccine recipients experience mild side effects, such as pain or redness at the injection site. A small percentage of patients also develop fever. Although rare, serious allergic reactions can develop within a few minutes to hours of vaccination. Of note, a few cases of Guillan-Barre syndrome have been reported among people who received the MCV4 vaccine, however there is

currently not enough information to determine if this was caused by the vaccine. A 12 hour grounding period is recommended for this vaccination.

PLAGUE

This vaccine is composed of a suspension of killed bacteria, and is given as a dose of 1.0 cc IM. It is used in laboratory workers and travelers to endemic areas. The vaccine is given as a series with a primary dose as above, then 0.2 cc IM doses at 4 weeks and 6 months. Boosters are given every 6 to 12 months as long as exposure continues. There is a 90 to 93% antibody response however efficacy is uncertain. Up to 10% of recipients will develop local reactions. Sterile abscesses and hypersensitivities have also been reported.

PNEUMOVAX (PPV23)

This vaccine was designed to decrease the risk of pneumococcal infection in susceptible individuals such as military recruits, asplenic patients, immunosuppresed individuals, and those over 65. This preparation consists of purified polysaccharide coats of 23 serotypes and is considered to be 60 to 80% efficacious, reducing serious sequelae of infection by about 50%. In asplenic patients it is about 13 -33% effective in producing a two-fold increase in antibody titer. The dose is 0.5 cc IM or SC, and a booster is recommended in high-risk (transplant, nephrotic syndrome, asplenic) individuals at 6 years. Pneumovax has been associated with a 50% local reaction rate, an arthus-like reaction with booster doses, and rarely, anaphylaxis. A 12 hour grounding period is recommended for this vaccination.

POLIO

The inactivated polio virus (IPV) is given as a dose of 0.5 cc IM or SC. The use of oral polio vaccine (OPV) is no longer recommended. Travelers to endemic areas who have received primary immunization during childhood should consider a single booster (IPV) in adulthood, while those who were never vaccinated should be vaccinated according to current CDC guidelines. A 12 hour grounding period is recommended for this vaccination.

SMALLPOX

BACKGROUND: The World Health Organization effectively used smallpox vaccine to eradicate natural smallpox from the planet however regimes hostile to the United States may possess strains of the smallpox virus for use as a biological weapon. While routine vaccination is not recommended for the general population, military and other personnel who serve in high risk parts of the world may receive smallpox vaccine to protect them from the disease in the event of a biological attack.

Expect more side effects within the vaccinated population than normally seen with other vaccines. One expert stated that approximately 10% of vaccine recipients may have side effects significant enough to cause possible distraction during flying activities. The time range for development of side effects varies from day 0 until day 14, with most occurring within 3 to7 days post-vaccination.

Grounding Period: In **view of the complications seen with the smallpox vaccination, a 24 hour grounding period is required.** It is recognized that complications from the immunization are most likely in the 3 to 7 day period post immunization. For this reason, close observation and follow-up is recommended by the Flight Surgeon or health care provider. Personnel should be specifically briefed to report any symptoms or complications during this 3 to 7 day period and to have them evaluated. Depending on the severity, the Flight Surgeon may ground the aviator until symptoms have resolved.

ADDITIONAL INFORMATION: Please review the attached "Smallpox Fact Sheet - Information for Clinicians" and visit the CDC web site and military smallpox website (http://www.smallpox.mil/) for additional information. Use the CDC Smallpox Adverse Event Reporting web site to report any adverse events resulting from the administration of the smallpox vaccination.

TYPHOID AND ORAL TYPHOID:

Vaccine is made of a killed suspension of the bacteria, or a new oral 4 dose preparation. The injection is a 0.5 cc IM dose at zero and four weeks with about 50-76% efficacy, and protection for travelers to endemic areas lasts only a few months. This is contrasted with the oral form, which is equally efficacious but confers immunity to the 21a strain that lasts for years (booster required at least every 4 years). It is given every other day before meals for a total of 4 doses, and must be kept refrigerated. Errors in compliance reached 30% of individuals in one study, so direct observation may be the way to go. Adverse reactions to typhoid injections include frequent fever, local swelling and pain, and consequently require a 12 hour downing period. There are no reactions reported to the oral typhoid, therefore no grounding is necessary.

YELLOW FEVER:

This vaccine is used to prevent infection with this flavivirus and its subsequent jaundice, hemorrhage, and albuminuria in travelers to endemic areas (e.g. South America and Africa). It is given as a 0.5 cc SC dose. Booster vaccinations are recommended every 10 years. Efficacy is noted to be high, but adverse side effects include encephalitis/encephalopathy (though fewer than 1 in a million cases), and anaphylaxis in those individuals allergic to eggs. A 12 hour grounding period is recommended for this vaccination.

COMBINED ADMINISTRATION OF VACCINATIONS:

A number of these vaccines can be given together. Generally, any live virus vaccine can be given with any killed agent or toxoid as long as they are given at the same time and in different anatomic locations. For example, typhoid may be given with either plague or yellow fever. Hepatitis A and yellow fever may be given in the same session. One exception to this is cholera and yellow fever. Administration of these vaccines within 3 weeks of one another results in a poor antibody response. Unless there is insufficient time, 3 to 4 weeks between live virus vaccinations should be sought for maximal antibody production. If possible, vaccines frequently associated with systemic side effects (cholera, typhoid and plague) should not be given

simultaneously so that toxicities will not overlap and that a causative agent can be determined should a reaction occur.

PREGNANCY AND VACCINATIONS:

Refer to specific immunization guidelines for vaccination recommendations and precautions during pregnancy.

GROUNDING FOR VACCINATIONS:

OPNAVINST 3710.7 series requires a 12 hour grounding period following immunizations unless otherwise specified in this document. The specific guidelines and grounding periods for each vaccination are described above. As per MANMED Article 15-77, the administration of routine immunizations that require a temporary grounding, do not require issuance of an Aeromedical Grounding Notice. This is a "self-limited" grounding period allowed in the absence of adverse side effects.

18.6 MISCELLANEOUS MEDICATIONS

ALLOPURINOL: CD. Waivers are recommended to SG3, Class II, or Class III. Re-evaluation for upgrade from SG3 to SG1 is considered in 3 months if member remains asymptomatic and on a stable dose of medication.

ANTIHISTAMINES (SEDATING):
CD. The member should be grounded for the duration of therapy.

ANTIHISTAMINES (NON-SEDATING):
NCD. Allegra and Claritin are NCD if given in accordance with the Allergic/Vasomotor Rhinitis section of the Waiver Guide. Refer to this section for additional restrictions and clarification. Zyrtec, although considered by some to be non-sedating, still has a moderate sedating effect and is therefore not approved (CD) for use in aviation personnel.

CLOMIPHENE (CLOMID): CD- No Waivers.

CONTRACEPTIVES:

DEPO-PROVERA : NCD. Any grounding period at discretion of the local Flight Surgeon to assure tolerance.

LEVONORGESTEROL (NORPLANT): NCD. Any grounding period at discretion of the local Flight Surgeon to assure tolerance.

PROGESTASERT IUD: NCD. Any grounding period at discretion of the local Flight Surgeon to assure tolerance.

DECONGESTANTS: CD. Requires temporary grounding while in use.

FINASTERIDE (PROPECIA/PROSCAR):
CD. A waiver can be considered after a two week grounding. If the patient remains asymptomatic, a LBFS may issue an up chit. **Finasteride** may be utilized for prostatic hypertrophy or alopecia. DoD pharmacy does not allow prescriptions of **finasteride** for hair loss.

H2 BLOCKERS:

RANITIDINE, CIMETIDINE, FAMOTIDINE: CD. A waiver is required for any chronic use. Refer to the Waiver Guide section on reflux esophagitis for additional information.

INHALED STEROIDS: CD. Decisions are individualized. Any chronic use requires a waiver. Call NAMI Code 342 for additional guidance.

ISOTRETINOIN (ACCUTANE, AMNESTEEM, CLARAVIS, SOTRET): CD. No waiver. Resumption of flight status is permitted after member is off medication for 3 months, has a normal slit lamp exam, and triglyceride levels are documented as normal. Cystic acne, if severe enough to need Accutane, may be disqualifying. The 3 month delay after cessation of treatment also allows for an evaluation of how the member does without the medication.

LEVOTHYROXINE (SYNTHROID): CD. A waiver may be requested when member is clinically and chemically euthyroid on stable dosage.

LINDANE (KWELL): NCD**.** Requires a 48-hour grounding period. Kwell can be absorbed in variable amounts and give some significant CNS side effects. Aviation personnel must be grounded for 48 hours after the compound is washed off.

MESALAMINE (ASACOL, ROWASA, ETC.): CD. A major advantage of mesalamine is that it avoids some side effects associated with the sulfapyridine moiety of sulfasalazine. Waiver will be considered after maintaining clinical remission for one month without evidence of side effects.

MINOXIDIL (TOPICAL): CD. No Waiver.

NEDOCROMIL (TILADE): CD. Tilade may be considered for waiver for in designated aviation personnel for the preventive treatment of mild to moderate asthma or cold-induced and exercise-induced bronchospasm. Member will be eligible for waiver consideration and return to flight status at a minimum two weeks after remaining symptom free on a stable dose of medication with demonstrated normal pulmonary function tests. Waivers are restricted to non-high performance aircraft.

NASAL STEROIDS :

FLONASE, NASONEX, RHINOCORT: NCD. Refer to the Allergic/Vasomotor Rhinitis section of the waiver guide for additional restrictions and clarification**.**

NICORETTE GUM:

NCD if the following conditions are met:

1. Enrolled in formal organized stop smoking program.
2. Close observation by flight surgeon.
3. No adverse effects.
4. Duration of use does not exceed three months.

NICOTINE TRANSDERMAL SYSTEM (NICODERM):

NCD. Aviators should be grounded for 48 hours following application of first patch.

NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS):

ASPIRIN: NCD for occasional analgesic use or at cardioprotective dosing. Other chronic use is CD and requires a waiver.

IBUPROFEN/NAPROXEN: NCD. Medication can be used for short term use under direct supervision of Flight Surgeon. Any chronic or high dose use is disqualifying. If recommending that an aviator continue to fly during treatment, consider the underlying reason for its use. It may be the condition which is disqualifying.

INDOCIN: CD. No waiver. Ground during medication use and for two weeks after medication is completed.

PHOSPHODIESTERASE INHIBITORS (PDI):

SILDENAFIL (VIAGRA), VARDENAFIL (LEVITRA), TADALAFIL (CIALIS):

A. Long-acting PDI, tadalafil (Cialis): CD. No Waivers

B. Short-acting PDI: sildenafil (Viagra), vardenafil (Levitra): CD. Waivers possible for:

1. Initial Applicants – considered on a case-by-case basis
2. Designated Personnel – may request waiver after evaluation for the cause of ED.

C. Information Required:

1. AMS – history, physical, lab, prior treatment course, side effect.
2. Consultation – Urology, Internal or Family Medicine – Must evaluate causes of ED including co-morbid conditions such as cardiovascular (hypertension, atherosclerosis, or hyperlipidemia), diabetes mellitus, depression and alcoholism
3. An exercise stress test should be completed prior to waiver submission whenever indicated. If test is not performed, reasons should be substantiated in AMS or by consultants.

D Follow-up: annual – to assess efficacy, side effects, and significant changes in health status including medications

E. Treatment:

1. Must be free of side-effect for 2 doses after beginning medication before returning to flying duty
2. No flying duties within 12 hours of last dose (medicine use to briefing time)

F. Links:

1. Diagnostic evaluation: **Link to diagnostic evaluation** **(**http://www.aafp.org/afp/20000101/95.html)
2. Precautions**:** **Link to precautions** (http://www.aafp.org/afp/990915ap/1159.html)
3. Medications: sildenafil (**Viagra®)** , vardenafil (**Levitra®**)

PROBENECID:

CD. Waiver is required for any long term treatment.

PROTON PUMP INHIBITORS:

OMEPRAZOLE, LANSOPRAZOLE, RABEPRAZOLE: CD. Waiver required for chronic use. Refer to the Waiver Guide section on reflux esophagitis for additional information.

SUCRALFATE (CARAFATE):

NCD when used in dosages of 1 gm bid or less. However, the diagnosis of peptic ulcer disease is certainly CD and requires a waiver.

SULFASALAZINE (AZULFIDINE):

CD. Waiver considered after maintaining clinical remission for one month without evidence of side effects.

TAMOXIFEN: CD. No Waiver.

TOPICAL COMPOUNDS:

As a general rule, medications applied to the surface of the body which are not absorbed to any significant extent are NCD. However, please see notes on Kwell. The recommended initial treatment is over a weekend to allow return to flight duties the following Monday, thus minimizing flight schedule loss.

Miscellaneous Pharmaco-active Substances and Nutritional Supplements: Education and Policy for Aircrew members

Daniel T. Johnston, MD, MPH
Flight Surgeon, Aerospace Medicine Resident

GENERAL DIETARY SUPPLEMENTAL ADVICE

Congress defined the term "dietary supplement" in the Dietary Supplement Health and Education Act (DSHEA) of 1994. A dietary supplement is a product taken by mouth that contains a "dietary ingredient" intended to supplement the diet. The "dietary ingredients" in these products may include vitamins, minerals, herbs or other botanicals, amino acids, and substances such as enzymes, organ tissues, glandular extracts, and metabolites. Dietary supplements can also be extracts or concentrates, and may be found in many forms such as tablets, capsules, softgels, gelcaps, liquids, or powders. They can also be in other forms, such as a bar, but if they are, information on their label must not represent the product as a conventional food or a sole item of a meal or diet. Whatever their form may be, DSHEA places dietary supplements in a special category under the general umbrella of "foods," not drugs, and requires that every supplement be labeled a dietary supplement. ***This Act, passed during the Clinton administration, shifted the burden to the FDA to prove that dietary supplements pose a significant or unreasonable risk rather than have the manufacturers bear the responsibility to establish the safety of the products they sell. A dangerous loophole considering many of the "supplements" have known pharmacoactive properties and the fact the FDA often has few or inadequate date to evaluate, unless a group of investigators decides to independently conduct studies. Dr. Kessler from the Yale University School of Medicine has said, "Without a systematic review of safety and an adequate data base on safety, the American public remains at risk."***

Points to Remember:

- Harmful effects often associated with use in very high doses or in non-standard manner
- The U.S.P. notation indicated that a manufacturer has followed standards established by the US Pharmacopoeia, and without it one is essentially playing "Russian Roulette" with respect to bottle contents
- Just because it might be "natural" doesn't mean it is safe
- Many may have beneficial effects in some users when used in moderation
- No method to test for most substances by urine or blood tests
- Flight Surgeons and other medical providers must be armed with "tools" to make informed decisions
- Aviators must be confident of accurate and informed counsel
- This list will require revision at least annually
- Must compel flight surgeons to discuss and document use of supplements at least annually. ****Should be specific questions about nutritional supplements on SF/medical history form.**
- **Forms referring to "Medication" should be revised to read "medications *or supplements"***
- Education
- Flight Surgeons, dietitians, and healthcare providers engaged in care of special operational personnel should be offered educational blocks covering dietary supplements
- Possible venues include:
  - Flight Surgeon Primary Course
  - Entry level training

    - Continuing Education
- Studies may include performance enhancement qualities, specific aerospace effects (e.g. effects on G-tolerance), or literature base study of overall health effects
- As no current venue for aeromedical research into this area currently exists, cooperative study with civil and sister services may be considered
- FDA desires to have many recommendations regarding supplements by 2010.

Resources that may be helpful:
-U.S. Army Center for Health Promotion and Preventive Medicine
http://chppm-www.apgea.army.mil/dhpw
-The Center for Food Safety and Applied Nutrition
http://vm.cfsan.fda.gov
-Office of Dietary Supplements: http://ods.od.nih.gov
-US Air Force http://www.brooks.af.mil/af/altmed/HOMEFRAME.htm

POLICY FOR SUPPLEMENTS AND VARIOUS PHARMACO-ACTIVE OTC ITEMS: CLASS A, B, and C

CLASS A Substances for Class I, II, and III personnel (Use requires only documentation at annual physical)

Substances for which there is strong evidence of safety and/or efficacy. Limitations on quantity and type of supplement shall be discussed ***and documented*** at time of annual physical according to the below.

1. Sports drinks without creatine, ephedra, herbal supplements:

Background: Sport drinks not containing any of the compounds listed in Class B or Class C (i.e. ephedra, herbal compounds, glycerol, and creatine) and containing only a mixture of carbohydrates, vitamins, and minerals, are allowed. These have been shown to help performance of continuous activity lasting longer than 90 minutes. However, they are not necessary if water is available. They are absorbed faster than water because of the added sugar and electrolytes and have added sodium, which stimulates thirst, stimulates drinking, and helps retain water.
Educating the aircrew member about the type of safe and allowable sports drinks is essential. ***Many sports drinks found at fitness centers and nutrition stores contain ephedra alkaloids (Class C) which have been strongly associated with adverse cardiovascular and central nervous system events including:***

- Seizures
- Strokes
- Hypertension
- Arrhythmias
- Myocardial infarction
- Death

Sports drinks containing caffeine are allowed, but should be strongly discouraged for their propensity to dehydrate and increase blood pressure and heart rate to potentially dangerous levels during exercise.

> **Use in Aircrew*:*** ***Sport drinks found in nutritional stores, gyms and other sources containing only carbohydrates, various mixtures of proteins, minerals/electrolytes and no compounds in Class B or C are allowed.***

2. Protein Supplementation (form of shakes, capsules, nutrition bars):

Background: A considerable amount of research has evaluated dietary protein needs of athletes. Although there is some debate, most studies indicate that in order to maintain protein balance during intense resistance and/or endurance training, athletes should ingest approximately 1.3 to 1.8 g protein per kg body mass per day. Athletes training at high-altitude may need as much as 2.2 g protein per kg per day in order to maintain protein balance. This protein intake is about 1.5 to 2 times the recommended dietary allowance (RDA) for the normal adult. In most instances an iso-energetic diet

can provide the required protein, but athletes who maintain hypo-energetic diets do not ingest enough quality protein in their diet, and/or train at altitude where they may be susceptible to protein malnutrition. In theory, this state could slow tissue growth and/or recovery from training.

On the other hand, ingesting more protein than necessary to maintain protein balance during training (e.g., > 1.8 g/kg/d) does not promote greater gains in strength or fat-free mass. These findings indicate that athletes typically do not need to supplement their normal diets with protein, provided they ingest enough quality protein to maintain protein balance. ***Excessive amounts of protein intake can cause nausea, vomiting, and ultimately death in adults.***

> **Use in Aircrew:** ***Aircrew may supplement their diet with supplemental protein in the form of protein shakes, protein bars, or capsules, provided that the protein supplement does not contain supplements listed under Class C (creatine, ephedra, herbals, steroids) and the TOTAL amount of protein the aircrew member consumes does not exceed 2 times the RDA value (1.58g/kg or .72 g/lb per day). Physicians must take into account the amount of protein coming from normal dietary sources (usually 12-15% of total calories comes from protein).***

3. Vitamins/Minerals:

Background: "Healthy adult men and healthy adult non-pregnant, non-lactating women consuming a usual, varied diet do not need vitamin supplements. Infants may need dietary supplements at given times, as may pregnant and lactating women. Occasionally, vitamin supplements may be useful for people with unusual lifestyles or modified diets, including certain weight reduction regimens and strict vegetarian diets."-*The American Medical Association.* Healthy children and adults should obtain adequate nutrient intakes from dietary sources. ***Meeting nutrient needs by choosing a variety of foods in moderation, rather than supplementation, reduces the potential risk of both nutrient deficiencies and nutrient excesses.*** Individual recommendations regarding supplements and diets should come from physicians and registered dietitians. Nutrients are potentially toxic when ingested in sufficiently large amounts. Safe intake levels vary widely from nutrient to nutrient and may vary with age and health of the individual. In addition, high dosage vitamin and mineral supplements can interfere with normal metabolism of other nutrients and with the therapeutic effects of certain drugs. The Recommended Daily Allowances represent the best currently available assessment of safe and adequate intakes, and serve as the basis for the U.S. Recommended Daily Allowances shown on many product labels. There are no demonstrated benefits of self supplementation beyond these allowances." *The American Institute of Nutrition, The American Society for Clinical Nutrition, The American Dietetic Association, and The National Council Against Health Fraud.* "A large percentage of people in the United States take dietary supplements, but not necessarily because of nutrient needs. The adverse effects of large doses of certain nutrients (e.g., vitamin A) are well documented. There are no documented reports that daily multiple vitamin-mineral supplements equaling no more than the RDA for a particular nutrient are either beneficial or harmful for the general population. The potential risks or benefits of the long-term use of small doses of supplements have not been systematically examined." *Committee on Diet and Health, National Academy of Sciences, National Research Council.*

NOTE: **The best advice is to obtain vitamins and minerals by eating a wide variety of foods. If an individual chooses to take a multivitamin-multimineral supplement, a balanced diet also should be consumed. This is because there is inadequate knowledge as to all of the essential nutrients needed by adults — all required nutrients may not be present in the supplement. Many multivitamin-multimineral supplements containing 100 percent U.S. RDA levels are on the market. The consumption of this level of supplement will not be harmful to health and may or may not be helpful. Taking high doses (1gram) of Vitamin C does not appear to prevent URI's in healthy subjects but may shorten the duration of the common cold to a small extent.**

> **Use in Aircrew***: Educate the aircrew member. If a healthy adult wants to take a vitamin/mineral supplement, that supplement shall be a once-a-day multivitamin-multimineral from a USP labeled bottle.*

4. Tonic Water:

Background: Cinchonism is the well-known syndrome of quinine overdose involving disturbances of vision, hearing, and balance, which has occasional importance in aviation pathology, usually related to ingestion of tonic water. Ordinary social drinking of tonic water may lead to appreciable amounts of quinine in the body, although the levels are far lower than those commonly used in the treatment of malaria. The Armed Forces Institute of Pathology (AFIP) in Washington, DC, found levels of 0.2mg/L in pilots in 3 fatal accidents in which positional cues seemed to be important. AFIP results show that commercial tonic water can contain 5.5-6.8 mg/dl. In the late eighties and early nineties, the Surgeon General of the Army medically restricted regular users of tonic water from flying and advised all aviators not to use it. Army aircrew members were restricted from flying for 72 hours after ingestion of tonic water. It has been suggested that a chronic low-dose intake of quinine may accumulate in the endolymph of the human vestibular system and this accumulation could produce vestibular effects equivalent to a unilateral labyrinthectomy (see "The Bite of Jesuits' Bark", Aviation Space and Environmental Medicine, July, 1989).

> **Use in Aircrew:** ***Educate the aircrew member about the risks associated with drinking tonic water regularly. Drinking more than three 12oz drinks per day (36 oz total) of tonic water is not authorized. Because tonic water is not classified as a supplement, it is important to ask at annual physical examinations if the aircrew member drinks tonic water.***

CLASS B Supplements for Class I, II, III (Use Not prohibited but information required)
These are substances for which evidence of risk is minimal.

For all Class B supplements: Use requires consultation with flight surgeon and documentation of use in medical record. In addition, must have documented in medical record that specific guidelines of dosages, risks, benefits, and side effects were discussed with the aircrew member. Supplements with the "USP" label are highly encouraged. Additional documentation needed is listed below for various supplements. Overall, the importance of educating the aircrew member with some of the background information given below cannot be overstated.

1. Glucosamine with or without chondroitin:

Background: Glucosamine (with or without chondroitin) may have some beneficial effect on osteoarthritis, and studies up to 3 yrs in duration have found no more adverse effects than with placebo, but most physicians are skeptical. Whether glucosamine offers any advantages over better-established drugs such as acetaminophen, traditional NSAIDS, or selective COX-2 inhibitors remains to be determined. As with other dietary supplements, the quality and purity of the ingredients may vary (The Medical Letter, Vol. 43, Dec 20, 2001). American college of Rheumatology states it is too early to recommend its usage for osteoarthritis**.** NIH-sponsored randomized controlled trial (www.clinicaltrials.gov) is currently in progress. Because of concerns regarding infectious contamination of chondroitin (a derivative of shark cartilage), glucosamine sulfate or glucosamine hydrochloride is recommended over glucosamine/chondroitin combinations.

> **Use in Aircrew**: ***Aircrew member must be evaluated by the flight surgeon and diagnosis of osteoarthritis established. Educate the aircrew member about the questions regarding the efficacy of these compounds vs. traditional anti-inflammatories and the lack of evidence demonstrating a structural modifying relationship. Dosage must not exceed 1500mg per day.***
> **Grounding: 24 hour local grounding after first dose.**
> **Waiver: Not required**

2. Saw Palmetto (*Serenoa repens*):

Background: A standardized liposterolic (fat-soluble) saw palmetto berry extract has demonstrated numerous pharmacological effects relating to is primary clinical application in the treatment of benign prostatic hyperplasia (BPH), a disorder caused by accumulation of testosterone in the prostate where a conversion to dihydrotestosterone (DHT) takes place. The primary therapeutic action of saw palmetto extract in the treatment of BPH in thought to be a result of inhibition in the intraprostatic conversion of testosterone to DHT and inhibition of its intracellular binding and transport. However, more recent research has suggested other mechanisms including anti-estrogenic and receptor site-binding effects. In the United States, between 50 to 60% of men between the ages of 40 and 59 years have BPH. This disorder is characterized by increased urinary frequency, nighttime awakening to empty the bladder, and reduced force and caliber of urination. These major symptoms have been shown to be significantly improved in over a dozen double blind, placebo-controlled clinical trials. In one of the larger studies involving 110 patients with BPH, impressive clinical results were reported. Nocturia

decreased by over 45%, flow rate (ml/s) increased by over 50%, and post-micturition residue (ml) decreased by 42% in the group receiving the serenoa extract. In contrast, those on placebo showed no significant improvement in nocturia or flow rate, and post-micturition residual actually worsened. Significant improvements were also noted in self-rating by the patients and global rating by the physicians. Of the 50 treated subjects completing the 30-day study, physicians rated 14 greatly improved, 31 improved, and only five unchanged or worsened. In contrast, no subjects in the placebo group had greatly improved, 16 showed some improvement, and 28 remained unchanged or worsened. No significant side-effects have been reported in the clinical trials of the saw palmetto berry extract or with saw palmetto berry ingestion. Long-term studies (3 years) have also failed to show any significant adverse effects other than gastric irritation.

Use in Aircrew: ***Provided the aircrew member has been evaluated by the urologist who recommends the use of saw palmetto, the dosage for the liposterolic extract of saw palmetto berries (containing 85–95% fatty acids and sterols) is 160 mg twice daily. A similar dose using fluid extracts and tinctures is not authorized.***
Grounding: 24 hours after first dose
Waiver: Not required.

CLASS C Supplements (Not authorized for use by any aviation personnel)

Dietary supplements, nutritional supplements, and other preparations ***containing*** the following incapacitating/dangerous substances shall not be used by aviation personnel. Many of these substances have either (1) proven to be hazardous or (2) have not been proven to be safe with no clear proven benefit

- Personnel taking these substances should be removed from aviation duty for a minimum of 24 hours after the last dose of the substance.

Herbal Supplements:

- **Aconitum napellus (wolfsbane)**
- Adonis vernalis (Pheasant's eye)
- Atropa belladonna (Deadly Nightshade)*
- Cantharanthus roseum (Periwinkle)
- Chelidonium majus (Celandine)
- Conum maculatum (Hemlock)
- Convallaria majalis (Lilly of the Valley)
- Corynanthe yohimbe (Yohimbe bark)
- Cystisus scoparius (Broom)
- Datura stramonium (Jimson weed)*
- Datura stramonium (Thorn Apple)
- Digitalis lanata (Yellow foxglove)
- Digitalis purpura (Purple Foxglove)
- Ephedra species (Ephedra)
- Exchscholzia californiica (California Poppy)
- GHB (Gamma Hydroxy Butyrate) or GBL (Gamma-Butyrolactone) (may be known as Renewtirent, Revivarant, Blue Nitro, GH Revitalizer, Gamma G, Remforce)
- Humulus lupulus (Hops)
- Hyoscyamus niger (Henbane)*
- Hypericum Perforatum (St. Johns Wort)
- Lactuca virosa (Wild lettuce)
- Lycopodium serratum (Jin Bu Huan)
- Mandragora officinarum (Mandrake)
- Myristica fragrans (Nutmeg)in large quantities
- Papaver somniferum (Opium poppy)
- Passiflora incarnata (Passion flower)
- Piper methysticum (Kava-Kava)
- Psilocybe semilanceata (magic mushrooms)
- Rauwolfia serpentina (Indian snakeroot)
- Rauwolfia serpentina (Indian Snakeroot)
- Scilla maritima (White Squill)
- Scopolia carniolica (Scopolia)*

- Scutellaria laterfoloia (Skullcap)
- Strophanthus kombe (Strophanthus)
- Urginea maritima (Squill)
- Valeriana officinalis (Valerian)

Dietary Supplements, Nutritional Supplements, and other preparations ***containing*** the following *potentially* harmful substances shall not be used by personnel in above categories.

- Personnel taking these substances should be removed from aviation duty for a minimum of 24 hours after the last dose of the substance.

Anabolic Steroids:

- ***Zeranol**
- *Testosterone (Malogen, Malogex, Delatestryl)
- *Stanozolol (Winstrol, Stromba)
- *Oxymetholone (Anadrol, Anapolon 50, Adroyd)
- *Oxandrololone (Anavar)
- *Norethandrolone (Nilevar)
- *Nandrolone (Durabolin, Deca-Durabolin, Kabolin, Nandrobolic)
- *Methyltestosterone (Android, Estratest, Metandren, Virilon, Oreton Methyl, Testred)
- *Methandrostenolone (Dianabol)
- *Metenolone (Primobolan, Primonabol-Depot)
- *Metandienone (Danabol, Dianabol)
- *Mesterolone (Androviron, Proviron)
- *Human Chorionic Gonadotrophin
- *Growth Hormone
- *Fluoxymesterone (Android F, Halotestin, Ora-Testryl and Ultradren)
- *Dihydrotestosterone (Stanolone)
- *DHEA
- *Dehydrochlormethyl Testosterone (Turinabol)
- *Danocrine
- *Danazol
- *Clostebol (Steranobol)
- *Clenbuterol
- *Boldenone (Equipoise)
- *Bolasterone (Vebonol)
- *Androstendione (Androsten and others)

Glandular Extracts:

- **Teucrium spp. (Germander)**
- Testicular extracts

- Symphytum officinale (Comfrey)
- Senecio spp (thread leafed groundsel and Life root)
- Larria tridentata (chaparral)
- Aortic extracts
- Adrenal Extract

Other Compounds:

- **Pangamic Acid (Vitamin B15)**
- Echinacea species
- Creatine
- Amino Acid Supplements (Anabolic and Branched Chain), Beta-Hydroxy-Beta Methylbutyrate (HMB)
- Coenzyme Q (CoQ10), Choline, L-Carnitine, Chromium Picolinate, Phosphate salts, vanadyl sulfate
- Glycerol
- -- Any supplement not listed in this policy in considered Class C, until further research indicates otherwise

<u>Background on Class C Supplements</u>

Plant Products (Herbs)

- *Psychiatric effects*
  - **Sedation**
    - Some substances used in "medicinal" doses (exceeding sprinkled on spices) are known to have sedative properties.
    - Their effects may be additive with other over the counter or prescription agents with sedative properties.
    - The duration of action is unpredictable
    - Research into their effects on specific areas of concentration and tracking tasks is lacking.
    - **Plant products known or likely to be sedatives:**
      - *Valeriana officinalis (Valerian)*
      - *Rauwolfia serpentina (Indian snakeroot)*
      - *Atropa belladonna (Deadly Nightshade)**
      - *Chelidonium majus (Celandine)*
      - *Humulus lupulus (Hops)*
      - *Conum maculatum (Hemlock)*
      - *Lycopodium serratum (Jin Bu Huan)*
      - *Papaver somniferum (Opium poppy)*
      - *Passiflora incarnata (Passion flower)*
      - *Scutellaria laterfoloia (Skullcap)*
      - *Lactuca virosa (Wild lettuce)*
      - *Aconitum napellus (wolfsbane)*
      - *Hyoscyamus niger (Henbane)**

- *Datura stramonium (Jimson weed)**
- *Scopolia carniolica (Scopolia)**
  - *anticholinergic actions
- **Synthetic Agents known or likely to be sedatives**

  - GHB (Gamma Hydroxy Butyrate)

  -Renewtirent, Revivarant, Blue Nitro, GH Revitalizer, Gamma G, Remforce

  - Is a CNS depressant associated with several deaths especially if used with ETOH
    - Pure form experimentally used for some sleep disturbances (controlled drug)
  - Marketed as agent to enhance fitness, reduce stress and enhance sex drive
    - Precursor agents (GBL) marketed openly (although illegally in most states)
  - FDA has issued do not use warnings.

— **Hallucinations**
- Some plants, sometimes smoked to release high concentrations of volatile oils, are capable of causing hallucinations or altered sensorium
- These are not widely marketed by mainstream companies, but are often available through other sources
- **Plant products known or suspected to cause hallucinations or altered sensorium:**
  - *Psilocybe semilanceata (magic mushrooms)*
  - *Exchscholzia californiica (California Poppy)*
  - *Piper methysticum (Kava-Kava)*
  - *Mandragora officinarum (Mandrake)*
  - *Myristica fragrans (Nutmeg)in large quantities*
  - *Cantharanthus roseum (Periwinkle)*
  - *Datura stramonium (Thorn Apple)*
  - *Corynanthe yohimbe (Yohimbe bark)*

– ***Cardiovascular effects***

— **Cardiac glycosides**

— Cardiac glycosides may precipitate dysrhythmias; especially when found in association with electrolyte abnormalities such as would occur with poor hydration status (digitalis family).

— **Plant products known to contain cardiac glycosides or cardioactive substances**
- *Digitalis purpura (Purple Foxglove)*
- *Urginea maritima (Squill)*
- *Cystisus scoparius (Broom)*
- *Convallaria majalis (Lilly of the Valley)*
- *Adonis vernalis (Pheasant's eye)*
- *Strophanthus kombe (Strophanthus)*
- *Scilla maritima (White Squill)*
- *Digitalis lanata (Yellow foxglove)*

– ***Vasoactive substances***

— **Stimulant (s)**

- Contain powerful sympathomimetic agents that directly stimulate the heart and blood vessels.
- Have been implicated in deaths due to stroke or heart attack attributed to massive increases in pulse and blood pressure, and have been responsible for mission failure due to palpitations.
- **Substances known to be potent cardiovascular stimulants**
  - *Ephedra species (Ephedra)*
- **Hypotensive Agent(s)**
- These plants elaborate substances that relax blood vessels lowering blood pressure.
  - Such products would potentially affect Gz tolerance
- Plant products known to contain substances with cardiovascular activity:
  - *Rauwolfia serpentina (Indian Snakeroot)*

- **Specific Therapies Felt To Pose A Risk to Overall Health:**

- **Liver Toxins**
  - **Pyrollizidine Alkaloids**
    - A number of plants elaborate pyrollizidine alkaloids, known to cause harm to the liver
    - Such damage is often irreversible, and may result in permanent disability or death.
    - Reaction to these alkaloids is poorly understood, and may not be totally dependent on dose
    - **Substances known or believed to be toxic to the liver**
      - *Senecio spp (thread leafed groundsel and Life root)*
      - *Larria tridentata (chaparral)*
      - *Symphytum officinale (Comfrey)*
      - *Teucrium spp. (Germander)*

- **Anabolic Steroids-**
  - Many synthetic agents are currently available as dietary supplements. Most are steroids marketed for body builders. Adverse effects of anabolic steroid use include behavioral changes, testicular atrophy and reduced sperm production, gynecomastia, and baldness.
  - Long-term effects include increased atherogenesis; increased risk of stroke or heart attack due to increased platelet aggregation, and direct damage to the heart and liver

- **Glandular Extracts**
  - Background: A wide variety of animal tissues have been processed to provide various health effects primarily related to their retained hormone effects.
    - Content of these extracts may be lost during digestion
    - Some appear to retain their biological activity although to what degree is unpredictable
    - All carry with them some risk of infectious transmission (especially prions and viruses)
    - **Commonly used glandular extracts include**
      - *Adrenal Extracts*
      - *Testicular extracts*
      - *Aortic extracts*

- **Other Compounds (Pangamic Acid or Vitamin B15)**

Background: Although claiming to be a vitamin, this is not a true vitamin and is a mixture of a calcium compound and gluconate. It may contain a variety of compounds. There is no evidence to support the claim that it improves endurance and several of the compounds marketed under this name are potentially hazardous.

- **Echinacea products**
  Background: Several well-documented reports of allergic skin reactions and anaphylaxis are associated with these plant products. There is no convincing evidence that echinacea decreases the severity or shortens the duration of upper respiratory infections and the purity and potency is highly variable as with other dietary supplements. In the studies where a significant effect was seen, there are several concerns over the method in which the studies were conducted.

- **Creatine**
  Background: Although creatine came onto the scene as a performance promoter for the physically active individual, there are **several questions about performance gains and safety that preclude it being authorized for general use in aircrew at this time.** The benefits of supplementation on performance are limited to specific types of activities. Preliminary information suggests that high-intensity, short duration activities may benefit from creatine supplementation. Some examples include weight training, baseball, sprinting, throwing, jumping, football, and soccer. However, only people with low levels of muscle creatine will benefit from creatine supplementation. Testimonial reports imply that creatine supplementation can cause nausea, vomiting, diarrhea, kidney and liver problems, high blood pressure, and muscle cramps/strains/pulls, and no safety for long-term use has been shown. As a testimony to its medicinal properties, creatine supplementation has been carefully prescribed in the medical community and used with success in various mitochondrial and neuromuscular disorders to increase muscle function and strength.

  France actually forbids the sale of any products containing creatine, and Italy allows its use but only under the strict supervision of a physician and only for certain pathological conditions. Furthermore, because of poor manufacturing processes and lack of stringent quality control here in the US, various contaminants present in creatine products (such as dicyandiamide, creatinine, etc.) may pose a health risk and also preclude recommendation at this time. **Creatine should always be avoided by those who seek to lose weight while exercising heavily in hot and humid conditions**. Preliminary findings indicate that creatine supplements may selectively reduce plasma volume, which impairs the capacity to sweat and thus decrease the ability to maintain a normal body temperature during exercise in hot, steamy conditions. **In contrast to high-intensity or anaerobic activities, creatine supplementation does not improve, and may even worsen, endurance performance**. One study found that marathon runners had poorer performances after creatine loading. There is one consistent side effect of creatine supplementation - a small weight gain, most likely from water accumulation, and the effect of this in the aviation environment has not been studied. Future studies need to address some practical issues. These issues include development of safe and effective programs to maximize muscle creatine accumulation and to maintain elevated creatine stores, determination of long term side effects of creatine supplementation, and assessment of its effects in women and the elderly. In time, as more studies focus on long term safety issues and quality issues are addressed by the FDA, a safe

recommendation on use and dosages might be possible. As mentioned above, the one promising area at this time is the use of creatine supplementation to restore muscle function in patients with muscle loss and specific types of nerve and muscle diseases. Creatine "loading" (20-30 grams/day) has been a common practice among a variety of athletes. More recent research indicates, however, that much smaller doses of creatine (3 to 5 grams daily or 1 pound of beef) in excess of the usual intake of 2 grams are equally effective in elevating muscle creatine and phosphocreatine.

- **Amino Acid Supplements (Anabolic and Branched Chain), Beta-Hydroxy-Beta Methylbutyrate (HMB)**

  Background: There is some evidence from clinical populations that certain amino acids (e.g., arginine, histidine, lysine, methionine, ornithine, and phenylalanine) may stimulate the release of growth hormone, insulin, and/or glucocorticoids and thereby promote anabolic processes. However, there is little evidence that supplementation of these amino acids provides ergogenic benefit for athletes. Branched-chain amino acids and glutamine have been hypothesized to affect central fatigue and exercise-induced immune suppression, but their ergogenic value during prolonged exercise is equivocal at present. Furthermore, published studies of safety have not fully taken account of chronic consumption by healthy subjects of all age groups. Side effects seen with intake of individual amino acids were mostly neurological in nature.

  Because glutamine is metabolized to glutamate and ammonia, both of which have neurological effects, psychological and behavioral testing may be appropriate if adverse effects are suspected in any patient. Human studies are inconclusive about the effectiveness of HMB, a breakdown of leucine, and more research is needed.

- **Coenzyme Q (CoQ10), Choline, L-Carnitine, Chromium Picolinate, Phosphate salts, vanadyl sulfate**

  Background: Carnitine is involved in the metabolism of fats and is prevalent in a variety of animal products. It is claimed to increase aerobic power and energy level as well as decrease body fat. Some performance benefit is seen with repeated, very intense exercise, but there is no evidence it decreases body fat. The body generally makes adequate amounts. Choline is a constituent of cell membranes and is promoted to decrease body fat, delay fatigue and promote faster recovery. There is NO evidence it improves performance or reduces body fat. Supplements may cause diarrhea, foul smelling intestinal gas, and may cause a "fishy" body odor. Choline is found in egg yolks and meats, and deficiencies are very uncommon. Coenzyme Q, or CoQ10, is an enzyme component found in the mitochondria of cells. It is a potent anti-oxidant and is claimed to increase energy and cardiac performance. NO benefits have been reported in athletes. It has been used with therapeutic success in patients with heart disease to increase oxygen utilization and exercise performance and has also been shown to increase submaximal and maximal exercise capacities in sedentary men. With regards to chromium picolinate, phosphate salts, and vanadyl sulfate, research is either ambiguous or inadequate to support performance enhancement. Long term safety cannot be assumed or expected. Because of this, and the lack of proven benefits, they are not authorized at this time.

  - **Glycerol**

Background: Some studies have shown glycerol to be an effective ergogenic aid. Most of these have methodological problems. Data and reviews from USARIEM (US Army Research Institute of Environmental Medicine) do not support the use of glycerol as an ergogenic aid (see Latzka and Sawka, Can J Appl Physiol, 25 (6): 536-545, 2000). More importantly, the clinical use of oral glycerol in reducing intraocular pressure and other medical anomalies (0.25-2g/kg) is effective because, although acute glycerol administration results in increased total body water (hyperhydration), it then turns into a potent osmotic dehydrating agent. This can be potentially dangerous in the post-exertion period as diuresis coupled with exercise dehydration could produce volume/ electrolyte abnormalities. Also, at doses around 1g/kg, many people experience nausea/vomiting from glycerol.