



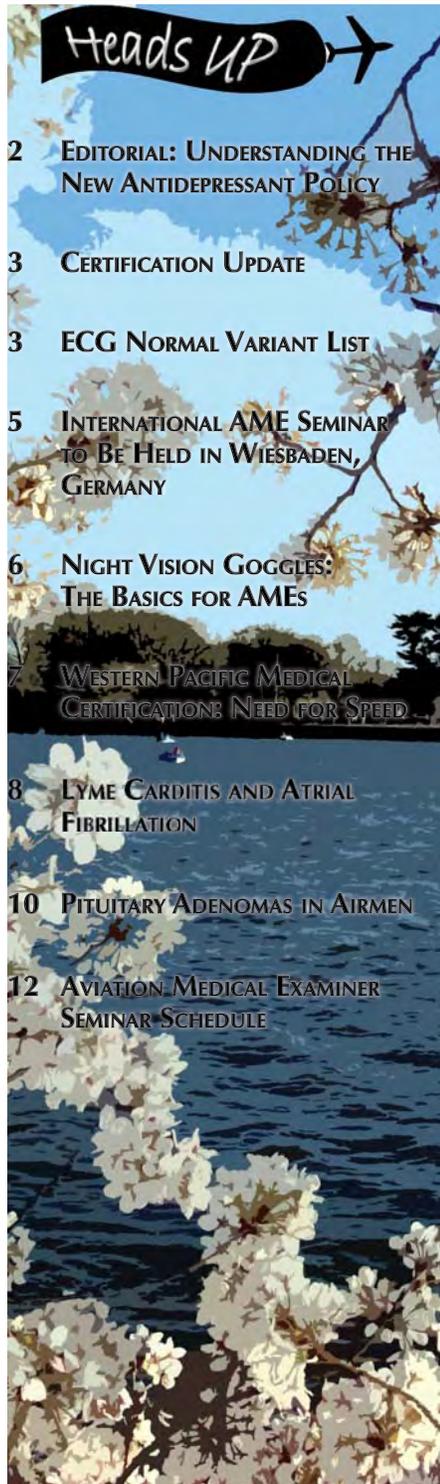
Federal Air Surgeon's Medical Bulletin



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Aviation Safety Through Aerospace Medicine
For FAA Aviation Medical Examiners, Office of Aerospace Medicine Personnel,
Flight Standards Inspectors, and Other Aviation Professionals.

U.S. Department of Transportation
Federal Aviation Administration



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New SSRI Certification Guidelines In Place

A positive step forward that will be a benefit to aviation safety

By Michael A. Berry, MD

A new policy regarding medical certification of airmen with a history of depression treated with selective serotonin reuptake inhibitor (SSRI) antidepressant medication went into effect on April 5, 2010. As Dr. **Tilton** mentions in his article (page 2), this change has been in the works for a long time.

The Office of Aerospace Medicine has been researching the safety aspects of taking this action for a number of years. We are very pleased with this new policy, believe it to be a positive step forward that will, in the end, be a benefit to aviation safety.

As with any new policy, "the devil is in the details." We have put together guidelines for HIMS- (Human Intervention Motivation Study) trained aviation medical examiners to follow, since these are not necessarily obvious from the Notice in the Federal Register (see Web documents <http://edocket.access.gpo.gov/2010/pdf/2010-7527.pdf>; and <http://edocket.access.gpo.gov/2010/pdf/2010-7658.pdf>).

Please read the Federal Register notice as an introduction to this article. I recommend that all AMEs become aware of both the general policy and these guidelines to advise your airmen, even though the HIMS AMEs will be the physicians intimately involved in the process.

Rationale

Our rationale for using HIMS AMEs was two-fold. HIMS AMEs are familiar with the initial evaluation and

monitoring process that will be utilized for the SSRIs because the new policy is modeled on the process used for airmen with substance abuse and dependence diagnoses.

Second, HIMS AMEs have training and experience in evaluating airmen from a psychological perspective. This new policy has increased our need for additional HIMS AMEs. We are always looking for senior AMEs willing to participate in the extremely important work of the HIMS Program.

With the new antidepressant medication policy applying to holders of first-, second-, and third-class medical certificates, we can use both senior and

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AMED Manager Selected

Brian Pinkston, MD, MPH, is to be the new manager of the Aerospace Medical Education Division, according to an announcement by the Civil Aerospace Medical Institute Director, Dr. **Melchor J. Antunano**. Dr. Pinkston replaces Dr. **Richard Jones**, who retired last December.



Dr. Pinkston's current assignment is as Chief of Aerospace Medicine Operations, Air Force Medical Support Agency at the Office of the Air Force Surgeon General.

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Understanding the New Antidepressant Policy

Happy spring, everyone.

BY NOW, you should have heard that we have changed our policy with respect to antidepressant use by airmen. On April 5, 2010, the FAA published two notices in the Federal Register, Volume 75, No. 64. The first notice is entitled "Special Issuance of Airman Medical Certificates to Applicants Being Treated with Certain Antidepressant Medications," and the second is entitled "Compliance and Enforcement Bulletin No. 2010-1." The Internet links to the announcements are:

<http://edocket.access.gpo.gov/2010/pdf/2010-7527.pdf>; and
<http://edocket.access.gpo.gov/2010/pdf/2010-7658.pdf>

On a case-by-case basis, we have

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The Federal Air Surgeon's Column



By Fred Tilton, MD

begun to consider special issuance of medical certificates to pilots with mild-to-moderate depression who have been treated for at least 12 months on one of four antidepressant medications: fluoxetine, sertraline, citalopram, or escitalopram. This change in policy is consistent with recommendations from the Aerospace Medical Association, the Aircraft Owners and Pilots Association, The Air Line Pilots Association, and the International Civil Aviation Organization. The Civil Aviation Authority of Australia, Transport Canada, and the U.S. Army already allow some pilots to fly while using antidepressant medications. Pilots in all three classes that meet our requirements will be granted a special issuance for 6 to 12 months, depending upon their age and class.

We have been considering this policy change for quite a while. We are aware there are pilots who are depressed and flying without proper treatment. We are also aware that there are pilots who have been using these medications and falsifying their medical applications. These policy change announcements will encourage the first group to seek proper treatment for

their conditions and allow the second group to come forward without fear of civil enforcement action. We are confident these changes will enhance our ability to make the airspace safer for everyone. See the article by Dr. **Michael Berry** on page 1 of this bulletin for full details.

AMCS Security

And now, switching gears, I need to go back one more time to the subject of security and the Aerospace Medical Certification Subsystem (AMCS). In September you should have received a letter asking you to validate the list of your staff members who are authorized access to AMCS. In December you should have received an E-Mail again asking you to validate the list not later than January 31. As of April 5, less than 40 percent of you have responded. If you have updated your list, thank you very much, and remember, it is your responsibility to notify us whenever you lose a staff member. If you have not validated your list, please do so immediately. The security of our systems is extremely important, and we need your help to assure our airmen of their privacy.

If you did not receive the letter, the E-Mail, or both, please take a moment to make sure that you have provided us with the correct address information. It is really important that we have this information so that we can keep you up-to-date.

Thanks so much for being one of our aviation medical examiners. We greatly appreciate your service, and we could not do it without you!!

—Fred

Certification Update

Information About Current Issues



By Warren S. Silberman, DO, MPH

Dr. William Fors is our new cardiology consultant hired to interpret first-class electrocardiograms. An Oklahoma City cardiologist, he reads graphs several days each week. (For those of you who are not senior AMEs, a first-class airman must have an ECG at age 35 and then each year, beginning at age 40.)

Of the more than 77,000 electrocardiograms we receive each year, we generally discuss abnormal and interesting electrocardiograms each day. The graphs are initially reviewed by our **Shirley Scott** and her fine employees. I have assumed the responsibility of reviewing the workups that Dr. Fors has requested.

Some senior aviation medical examiners are obviously not reviewing the airman ECGs performed in their offices. If they did, then there would not be as many requested workups, because they would be done prior to our having to request them from here. As an AME, you should not dismiss a first-class airman in whom you perform required yearly ECGs prior to an over-read. In 2006, we published a list of normal variants that do not require an aeromedical workup. Even if you have the graph performed at your local hospital or at a local cardiologist's office, you are responsible for the initial interpretation (see list). I would place this list of normal variants where you perform the electrocardiograms, and give copies to the alternate sites that you may use to have your graphs done.

COMMON ABNORMALITIES

Let's review common abnormalities and what we expect from applicants with such abnormalities. Some of this information is basic, but I want to be certain we cover all relevant aspects.

First, you always need to compare the current graph with prior ones, even if

you need to have applicants get copies from treating physicians or even from their military files. If you provide us with prior graphs that demonstrate similar findings, then there is no reason to have an applicant provide a workup, and you have saved them from much expense, aggravation, fear of losing

their medical, and us from extra work. Some common abnormalities:

1. A new complete RT Bundle Branch Block (BBB) requires a maximal nuclear stress test. An incomplete RT BBB that becomes a complete does not require an evaluation.
2. Two or more premature ventricular or atrial contractions require a maximal nuclear stress test. Please note that any time you request a stress test for a first- or second-class airman, that test should be a maximal nuclear stress test.
3. If you perform an ECG in the office and the heart rate is less than 50, you should have the airman exercise in place and repeat the graph. If the heart rate is then greater than 50, no workup is required. Note: A bradycardia can also result in a first-degree atrioventricular block (a p-to-R interval greater than or equal to 0.20 sec.). If you exercise

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ECG Normal Variant List

These are considered normal ECG variants and not reasons to defer the applicant

- Sinus bradycardia. Age 50 and younger — if the heart rate is 45 or greater; age 50 and older — if the heart rate is 49 or greater
- Wandering atrial pacemaker
- Low atrial rhythm
- Ectopic atrial rhythm
- Indeterminate axis
- First-degree AV (atrioventricular) block with PR interval less than 0.21 in age 50 and younger
- Mobitz Type I second degree AV (atrioventricular) block (Wenckebach phenomenon)
- One premature ventricular contraction or atrial contraction on a 12-lead ECG
- Incomplete RBBB (right bundle)
- Left atrial abnormality
- Short QT
- branch block)
- Intraventricular conduction delay
- Early repolarization
- Left ventricular hypertrophy by voltage criteria only
- Low voltage in limb leads (may be a sign of obesity or hypothyroidism)
- Left axis deviation, less than or equal to -30 degrees
- rSR' in leads VI or V2, ORS interval less than 0.12 msec R>S wave in VI without other evidence of right ventricular hypertrophy
- Sinus arrhythmia
- Sinus tachycardia: Any age — if the heart rate is less than 110

Note: If a first-class airman does not have a current resting ECG on file but we have any type of stress test (pharmaceutical stress, Bruce stress, nuclear stress, or stress echocardiogram) that was accomplished within the last year, we can

Dr. Silberman manages the Aerospace Medical Certification Division.

SSRI from page 1

regular AMEs. To participate, AMEs must first attend the annual HIMS training seminar in Denver, Colo. The exact dates in September 2010 for the seminar have not yet been finalized. Check for the dates and register to attend on the Web site, www.himsprogram.org.

POLICY

The FAA Office of Aerospace Medicine will consider Special Issuance medical certification for airmen requesting first-, second-, and third-class medical certificates, flying under FAR Parts 121,135, or 91 who are being treated with one of several specific antidepressant medications.

CRITERIA TO BE CONSIDERED

Diagnoses

Mild to moderate depressive disorders, such as

1. Major Depressive Disorder (mild to moderate) either single episode or recurrent episode
2. Dysthymic Disorder
3. Adjustment disorder with depressed mood

PHARMACOLOGIC AGENTS CONSIDERED (SINGLE-AGENT USE ONLY)

1. Fluoxetine (Prozac)
2. Sertraline (Zoloft)
3. Citalopram (Celexa)
4. Escitalopram (Lexapro)

SPECIFICALLY UNACCEPTABLE DIAGNOSES AND/OR SYMPTOMS

1. Psychosis
2. Suicidal ideation
3. History of electro convulsive therapy (ECT)
4. Treatment with multiple antidepressant medications concurrently
5. History of multiagent drug protocol use (prior use of other psychiatric drugs in conjunction with antidepressant medications)

PSYCHIATRIC STATUS

1. All symptoms of the psychiatric condition for which treatment is indicated must be ameliorated by the single medication, and the condition must be stable with no change in or exacerbation of symptoms for 12 months prior to certification.
2. Airman must be on a stable dosage of medication for a minimum of 12 months prior to certification.
3. Airman must have no aeromedically significant side effects of prescribed medication(s).

REQUIRED REPORTS AND CONSULTATIONS (INITIAL CONSIDERATION)

1. Current status report from treating psychiatrist attesting to diagnosis, length of treatment, and presence of any side effects.
2. Written statement from airman regarding his status.

3. Letter from airline management (Chief pilot or designee) attesting to pilot's observed mood on medication, if previously not flying, and in pilot's admitting previous non-disclosure, a report on prior competence, crew interaction, and mood while on medication (only for first- and second-class medical certificate holders flying under FAR Parts 121 or 135).
4. Report of results of neurocognitive psychological tests and provision of raw test data: include but not be limited to — COGSCREEN AE, Trails A/B; Stroop Test; CCPT, PASAT, Wisconsin Card Sorting Test.
5. Evaluation and written report from HIMS-trained AME as to current psychiatric status of airman, treatment, and recommendation for Special Issuance certificate.

PROCESS FOR SPECIAL ISSUANCE CERTIFICATION

1. Records package sent through Aerospace Medical Certification Division (AMCD) in Oklahoma City, Okla. to AAM-200 (Washington, D.C.) for review of first-time application and approval for Special Issuance of **6 month or 12-month time-limited medical certificate, depending on age of applicant** (reviewed by Chief Psychiatrist) for first-class medical certificates and pilots flying under FAR Parts 121 or 135, **12-month time-limited medical certificate** (reviewed by Chief Psychiatrist) for second- and third-class medical certificates.
2. Subsequent Special Issuance medical certificate issued directly by HIMS-trained AME if all required documentation (as listed below) is considered acceptable—or deferred to AAM-200, Chief FAA Psychiatrist, if there are concerns.
3. 8500-8 will be transmitted to the AMCD, and follow-up report with recommendation from the HIMS-trained AME will also be forwarded to the AMCD (as per the current HIMS model for substance dependence Special Issuance).

FOLLOW-UP EVALUATION REQUIREMENTS (ALL CLASSES OF MEDICAL CERTIFICATE)

The following materials will be forwarded to the HIMS-trained AME

1. Current status report from treating physician at the time of application for Special Issuance medical certificate.
2. Psychiatric consultation status report every 6 months for all classes of medical certificate holders.
3. Letter from airline management every 3 months for first- and second-class medical certificate holders flying under FAR Parts 121 or 135, forwarded to the HIMS AME.
After initial Special Issuance Authorization, psychometric testing will be required.
 1. Annually for first- and second-class medical certificate holders flying under FAR Parts 121 or 135.
 2. Every 2 years for third-class medical certificate holders.

Dr. Michael Berry is the Manager, Federal Aviation Administration Medical Specialties Division, in Washington, D.C. His E-mail address is Michael.Berry-MD@faa.gov.



Cert Update from page 3

the airman in place, this block can also diminish (or the interval shorten to normal range).

4. Type II Second-degree AV Block, or Mobitz Type II occurs when the p ORS complexes are occurring and there is a p wave with dropped QRS. This is a premonitory sign to complete heart block. These applicants should not be granted

Pinkston from page 1

During his Air Force career, he has held several leadership positions, including Chief of Aerospace Medicine at Hickam AFB, Chief of Aerospace Medicine at the Air National Guard Office of the Air Surgeon, Commander of the 42nd Aeromedical Squadron, and Chief of Aerospace Medicine at the 42nd Medical Group.

He received an undergraduate degree in Biology and Chemistry from Southern Methodist University, a medical degree from the Uniformed Services University of the Health Sciences, a Masters degree in Public Health from the Johns Hopkins Bloomberg School of Public Health, and he graduated from the United States Air Force School of Aerospace Medicine, where he completed his residency in Aerospace Medicine. Dr. Pinkston is board-certified in Aerospace Medicine, Occupational Medicine, and Family Medicine.

Dr. Antuñano stated that, "Dr. Pinkston is an exceptional choice based on the job requirements and the program needs of the Aerospace Medical Education Division."

"I am honored to have been selected to work with such an outstanding group of professionals, both within CAMI as well as the community we serve. Working in Aerospace Medical Education as well as with some of my Aerospace Medicine mentors is a dream come true," said Dr. Pinkston.

Dr. Pinkston will begin his duties at the Civil Aerospace Medical Institute in early July 2010. →

a medical certificate, and they should be sent to a cardiologist for a complete workup. This may eventually include electrophysiology testing. A 24-hour Holter monitor will also be required.

5. A new complete LT BBB requires that you rule out coronary disease in the airman. The airman should have a cardiovascular evaluation and a maximal nuclear stress test. This is the one definite situation where a pharmacologic nuclear stress test would be the choice. The usual nuclear stress test shows an abnormality in the intraventricular septum. This is distinguished more by the chemical stress.

6. Left anterior or posterior hemiblocks both require one to demonstrate that there is no coronary disease, so a maximal nuclear stress test is required.

7. If an airman has a small r and deep S wave in leads 3 and aVF, suggesting that there may have been an old inferior wall myocardial infarction, you can make a simple determination while the airman is still in the office. ECG leads can be quite inconsistent—they are affected

by respiration, so the simple thing to do is to have the airman first inhale and hold their breath, then perform an ECG, and then exhale and repeat. Please provide us with all of these graphs. If the S waves shorten and taller R waves now develop, the electrocardiographic changes are due to respiration, and no workup is required.

8. Please note that glycemia (eating prior to performance of the ECG) can affect electrocardiograms and should ideally be performed fasting.

9. Wolf-Parkinson-White pattern (short P-R interval with the classic delta wave and prolongation of the QRS complex) requires a CVE, Holter monitor, and maximal stress test. If there are no supraventricular arrhythmias, then the airman likely does not have the syndrome and will be cleared to fly.

These are just some of the common electrocardiogram findings that you will encounter, along with the FAA's requirements.



Fourth International AME Seminar to Be Held in Wiesbaden, Germany

All physicians interested in aviation medicine welcome

By Melchor Antuñano, MD

The German Academy of Aviation and Travel Medicine will conduct their 4th International aviation medical examiner seminar in Wiesbaden, Germany, August 26-29, 2010. The Academy has invited Drs. **Melchor Antuñano** and **Warren Silberman** from the Federal Aviation Administration to participate to the degree necessary to consider the training equivalent to an FAA aviation medical examiner (AME) refresher seminar.

Credit will be given for FAA AME seminar attendance to those AMEs requesting it, if a passing score is obtained on an FAA test administered after the seminar. Guest lecturers from Germany will provide the clinical lectures normally given at FAA seminars and will also give other presentations in aviation medicine and human factors.

It is expected that participation by physicians representing other civil aviation authorities will engender fruitful discussion of the aeromedical significance of a multitude of medical conditions and contrast the approaches taken by other countries regarding pilot medical certification.

The Academy welcomes all physicians interested in aviation medicine, whether or not they are FAA AMEs. However, we encourage FAA AMEs (particularly those residing in Europe and the Middle-East) to consider attending this seminar as an alternative to our regular AME seminars offered within the U.S. or if you just want a different training experience. →

Dr. Antuñano is the Director of the Civil Aerospace Medical Institute.

Night Vision Goggles: The Basics for AMEs

It will only be a matter of time before a pilot walks into your office asking questions about night vision goggles. As an AME, are you prepared to answer questions or offer advice?

By G.J. Salazar, MD

On January 29, 1999, the Federal Aviation Administration (FAA) issued the first supplemental type certificate (STC) to permit use of night vision goggles (NVGs) by a civilian helicopter emergency medical services operator. Since then, the FAA has worked at least 55 STCs for use of NVGs in more than 40 models of helicopters.

The use of these devices is rapidly becoming commonplace in the civilian helicopter community. To obtain an STC, an operator must demonstrate a program in place that complies with FAA requirements for pilot and other crew qualifications, training, aircraft lighting modifications, and NVG maintenance.

Night vision goggles are one of several technologies that have made it possible to enhance human capability to see at night. The simplest analogy to explain how NVGs work is a video camera. The basic principle is the same in that the user is not directly seeing a scene, but rather is viewing an electronic image of a scene. An NVG is an electro-optical sensor; it contains optical lenses and an electronic image intensifier, which, as the name suggests, is responsible for increasing the available electromagnetic energy to produce an image from a dimly-lit scene. Unlike a video camera, which utilizes the visible portion of the energy spectrum, NVGs have the capability to utilize visible light and part of the near-infrared spectrum that would not be visible to the human eye.



Advantages of NVGs

There is no doubt that the use of NVGs provides clear advantages to aircrew. The single most important advantage is a higher level of situational awareness, which, when coupled with appropriate decision-making, can reduce the possibility of a mishap. Unaided visual acuity at night is approximately 20/200; however, aided visual acuity with NVGs improves to about 20/30, and in some cases to as much as 20/25, depending on the goggles and environmental conditions. This increase in visual acuity results in greater nighttime awareness of someone's surroundings due to a variety of factors such as the ability to:

- distinguish and avoid terrain and objects,
- see and avoid other aircraft sooner,
- utilize near-infrared energy normally not available to the eye,
- improve visual navigation,
- land and take off with no external light references,
- see and avoid weather.

Disadvantages

In spite of the substantial benefits provided by NVG, they are not without problems. Some of the disadvantages include:

- reduced field of view (approximately 40°),
- impaired distance estimation,
- loss of color discrimination,
- reduced visual acuity in marginal weather or with changing illumination,
- increased possibility of spatial

disorientation,

- presence of large halos around incompatible light sources,
- neck strain due to weight of NVG and helmet,
- fatigue due to increased workload.

FAA Medical Concerns

From an FAA medical standpoint, Part 67 does not address NVG use; however, several key points for an AME to remember are:

- Pilots must still meet the visual requirements for the class of certificate they desire. Typically, this will be second-class since these helicopter operations are commercial in nature.
- Even though the optical part of an NVG can be focused, they DO NOT supplant corrective lenses. Pilots must still wear corrective lenses to meet the visual standards for the class of certificates they hold.
- Glasses can be used with NVGs.
- Refractive surgery does not preclude use of NVGs.
- Even though a pilot's aided vision, i.e., using NVGs, may not be 20/20, they are in still in compliance with Title 14 of the Code of Federal Regulations Part 67, as long as unaided vision meets standards, with or without corrective lenses.

Finally, the Civil Aerospace Medical Institute (CAMI) in Oklahoma City has created a Night Imaging Training Environment (NITE) facility to demonstrate the capability of NVGs to pilots or other interested individuals attending aviation physiology training. If you are interested in participating, contact the Aerospace Medical Education Division at CAMI (405-954-4837) or your Regional Aerospace Medicine Division.



Dr. Salazar is the Southwest Regional Flight Surgeon.

Western Pacific Medical Certification: The Need for Speed

By Richard M. Carter, DO, MPH

The Aerospace Medical Certification Division (AMCD) accepted a challenge from the Western Pacific Regional office to make the medical certification process more responsive.

Respective managers, Dr. **Warren Silberman** and Dr. **Stephen Goodman** agreed that faster medical certification was needed. Dr. Goodman's office hosted a very intense airman medical certification week of work in January, and I was invited out to share certification methods and procedures with the Western Pacific staff. In turn, they shared their methods of medical certification with me, as a representative of the AMCD.

Aviation medical examiners know that the regional offices, as well as the AMCD, review medical cases, determine eligibility, and issue Authorization letters for Special Issuances. This process requires each FAA region to have specialists that function like the AMCD staff. The Document Imaging and Workflow System (DIWS) is the glue that connects AMCD staff with their counterparts in the regions.

Simply stated, a medical officer in any regional office or the AMCD can make an entry on the DIWS to approve a special issuance, and the Authorization letter may be generated in either the regional office or the AMCD as a seamless operation. AMEs may call either their regional office or the AMCD to request guidance or get verbal authorization for special issuances. It gets even better, but I'll go into that later.

A primary concern for the airman is the time needed to approve a deferred medical exam. The airman, of course, wants a medical certificate as soon as possible. The key to faster certification is a well-integrated medical certification program involving AMCD medical officers and regional medical staff. The initial screening and review of deferred cases is typically quick and efficient using automated methods. The most significant time factor is the limited

Western Pacific mini-Tiger team: (L-R) Dr. Steve Griswold, Dr. Carter, Donna Braxton, Ruth Arnold, Dr. Stephen Goodman, Nancy Dorr, Astrid Bernal, Mary Williams, Evan Ray, Sandy Poland, Myrtis Mims, and Hattie Robinson.



number of medical officers available to review the sometimes complex issues considered in a individual airman medical case and the large number of cases reviewed. DIWS is a quantum leap forward in the processing speed needed to issue the medical certificate. The next step is closely integrating the decision-making process of the AMCD medical officers and Regional Flight Surgeons.

The Tiger Team program for all AMCD medical officers, initiated by Dr. Silberman, has significantly improved the medical certification decision process while decreasing the backlog of cases pending review. The Tiger Team is a concentrated week-long effort, working virtually with a Regional Flight Surgeon to rapidly process medical certification case work. Each Tiger Team pushes the speed of the certification process a little more. Thus, after each Tiger Team, there is the continued benefit of a vastly improved process.

This Western Pacific collaborative effort was a mini-Tiger Team. We worked cases and also conducted training. Their new Flight Surgeon, Dr. **Stephan Lencher**, was introduced to medical certification systems to fast-track his learning process. New AME analyst **Evan Ray** got up to speed on general medical certification guidelines while participating in actual medical case reviews. Program analysts **Hattie Robinson**, **Latonya Walton**, **Nancy Dorr**, **Myrtis Mims**, and **Astrid Bernal** also participated in this team effort.

The weather in California was balmy, but back in Oklahoma City an ice storm shut down the entire Center—and our office as well—for two whole days. However, a seamless transition occurred. The AMCD's central database

servers (all airman medical records are located in Oklahoma City) continued to function well, and all regional offices continued to process time-sensitive airman inquiries from AMEs. Email inquiries were forwarded from AMCD to Western Pacific, and their staff processed the medical requests, issued Airman Authorization letters and certificates that originally had been sent to Oklahoma City. It was a job well done by the Western Pacific Regional Flight Surgeon's office!

During the week, we processed and approved about 250 additional airmen. We discussed medical policy issues involving common medical conditions. The following week, Dr. Silberman followed with another virtual Team effort that approved medical certificates for 693 airmen, for a combined total of 943 airmen now flying.

By the way, did you know that if you have a certification question or issue and you can't get your Regional Flight Surgeon, you may contact any other regional office or the AMCD for answers? Maybe this is a little-known fact, but all regional medical staff are available to help you to issue a certificate when there is a concern keeping an airman from flying. They all are ready to assist you—to keep them flying.

For the contact information of all regional medical offices, see the FAA Web site:

www.faa.gov/licenses_certificates/medical_certification/rfs/



Dr. Carter is a medical officer in the Aerospace Medical Certification Division.

Lyme Carditis and Atrial Fibrillation

Case Report, by Joseph T. LaVan, MD

Lyme disease is relatively rare but can have a variety of presentations and complications. Pericarditis is one such complication and has many other triggers as well. This case describes an airman who was diagnosed with Lyme disease after presenting in atrial fibrillation with a hemodynamically significant pericarditis and pericardial effusion. The clinical aspects, treatments, aeromedical implications, and special issuance requirements of all these conditions are discussed.

LYME DISEASE

LYME DISEASE is the most common arthropod-borne infection in the United States. It is caused by *Borrelia burgdorferi*, transmitted by the bite of the deer tick, *Ixodes scapularis*. In 2006, the Centers for Disease Control received 19,931 case reports of Lyme disease, and 93% of all cases came from only 10 states (Connecticut, Delaware, Massachusetts, Maryland, Minnesota, New Jersey, New York, Pennsylvania, Rhode Island, and Wisconsin) (2).

The clinical course is broken down into early localized, early disseminated, and late stages. Common early symptoms include the archetypical erythema migrans rash (single lesion in early cases and localized, multiple lesions in early disseminated cases), joint and muscle pains, headaches, malaise, fever, neck stiffness, focal neurologic deficits, shortness of breath, dizziness, and/or substernal chest pain.

Late symptoms include destructive polyarthritis of large joints, scleroderma-like skin lesions, and central nervous system involvement. Lyme carditis can occur in up to 5% of untreated cases, typically presenting during the early disseminated to late stages.

The most common manifestations of carditis are conduction disturbances – frequently complete heart block. This generally resolves with successful antibiotic therapy and does not recur if adequately treated. Rarely, pericarditis with or without effusion can occur as well (3). Other long-term sequelae with aeromedical implications include neurologic manifestations and debilitating polyarthropathy, but these do not occur if the condition is identified and treated at an early stage (4). The greatest challenge in the management of Lyme disease is accurate diagnosis. An index of suspicion is a requisite, keeping in mind that even patients who live in low-risk areas may have traveled through higher-risk areas. Blood cultures, even in media that favor the growth of *Borrelia*, take 12 weeks to grow and are positive less than half of the time in patients with confirmed cases of Lyme disease. Serological testing is highly specific (99%-100%) but has a poor sensitivity (28-68%, average 56%); up to 44% of patients with Lyme will have negative serology (5). Given the poor sensitivity and the extended time required to obtain two-tier serology testing (especially if convalescent titers are included), current guidelines recommend basing treatment decisions on clinical grounds (6). Patients with exposure to ticks in an endemic area who present with the typical Lyme rash (erythema migrans) plus other systemic signs (malaise, joint or muscle pains, headaches or fevers) should be treated empirically, pending results of two-tiered serologic testing. This aggressive approach offers the best options for minimizing long-term sequelae in affected individuals (7,8). If Lyme-EIA is positive for IgM only, this is evidence of an early-stage infection. If Lyme-EIA is positive for both IgM and IgG, it is consistent with a late-stage infection (7).

History

An 83-year-old airman presented to the Emergency Department in the middle of the night complaining of the sudden onset of severe substernal chest pain that woke him from sleep. An electrocardiogram showed diffuse elevation of all ST segments and a computed tomographic angiogram showed dilated pulmonary arteries, but no pulmonary emboli. Cardiac biomarkers were negative, and a heart catheterization was unremarkable. A trans-esophageal echocardiogram showed a circumferential pericardial effusion. He had a history of two prior episodes of Lyme disease and had ongoing exposure to ticks on Nantucket Island (a Lyme endemic area). Empiric intravenous antibiotic therapy was started. He developed atrial fibrillation, which evolved into a complete heart block. The heart block resolved within 12 hours, but the atrial fibrillation persisted, despite an attempt at elective cardioversion. Once stable, he was discharged with instructions to complete two full weeks of IV antibiotics. However, prior to completing the antibiotics, he experienced an episode of near-syncope and hemodynamic instability. The pericardial effusion had worsened, so was taken to surgery and the effusion was drained through a pericardial window. Ultimately, Lyme antibody capture enzyme immunoassay (Lyme-EIA) was positive for IgG and IgM antibodies and was confirmed by Lyme immunoblot. This pattern was consistent with a late-stage infection. The remainder of his recovery was unremarkable, but his atrial fibrillation persisted, despite a second attempt at elective cardioversion, so he was maintained on warfarin sodium.

Aeromedical Concerns

The aeromedical concerns and special issuance procedures with respect to atrial fibrillation have been

Continued →

well described in a previous issue of this *Bulletin* (1). Lyme disease is a common arthropod-borne infection, which can be challenging to diagnose in a timely manner. Of aeromedical significance, patients can develop cardiovascular compromise (either from conduction disturbances due to carditis or cardiac tamponade due to pericarditis), neurological deficits, and debilitating arthritis. This airman developed transient complete heart block and pericarditis with effusion, both of which resolved with treatment, so he is at low risk for recurrence of these cardiac problems. Pericarditis may recur in up to 20% of patients after an acute attack, which may lead to cardiac tamponade and significant hemodynamic instability. Sudden incapacitation is unlikely because patients usually have a prodrome, lasting hours to days, and characterized by significant chest pain, long before hemodynamic compromise occurs. This airman remains in atrial fibrillation, requiring periodic re-evaluation for special issuance. This ongoing surveillance is likely to detect any complications of the Lyme carditis. Thus, neither the history of Lyme disease with Lyme carditis (complete heart block) nor pericarditis, should significantly impact the aviation suitability of this applicant.

Outcome

The airman applied for renewal of his third-class airman medical certificate 10 months after the onset of acute pericarditis and atrial fibrillation and six months after the second failed cardioversion attempt. He submitted the requested documents for a special issuance for the diagnosis of atrial fibrillation. His 24-hour Holter monitor showed an average ventricular rate of 60 bpm (< 90 bpm) and a maximum ventricular rate of 118 bpm (<140 bpm). Echocardiography demonstrated full

PERICARDITIS

There is an extensive list of infectious and non-infectious causes of pericarditis, and *Borrelia* infection is one of these clearly identified causes. The exact incidence and prevalence are unknown, but autopsy studies have found evidence of pericarditis in up to 6% of asymptomatic patients. While the clinical picture of pericarditis spans a wide spectrum from asymptomatic to critical illness, it is generally a self-limited, single-occurrence condition, and symptoms are generally controlled within 48-72 hours of onset. Treatment of acute pericarditis is targeted at specific causes, if identified, as well as symptom control with aspirin, non-steroidal anti-inflammatory drugs (NSAIDs), or narcotic analgesics. The condition can recur in up to 20% of patients. Recurrent pericarditis is initially treated with aspirin or NSAIDs, as well. If symptoms of recurrent pericarditis persist for more than 7-10 days during conservative therapy, a month-long course of systemic steroids is recommended. While the risk of recurrence is high, the risk of sudden incapacitation is low because hemodynamic compromise from an effusion would be preceded by days of gradually worsening chest pain (9,10).

resolution of his pericardial effusion and a normal ejection fraction. Exercise stress testing showed no evidence of ischemia and good exercise tolerance. Laboratory evaluation was within standards as well, and 80% of his INR results (minimum standard $\geq 80\%$) were within the acceptable range. He received a special issuance for the diagnosis of atrial fibrillation requiring medication.

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Pituitary Adenomas in Airmen: A Cause for Pause for Medical Certification?

Case Report, by Alfred F. Shwayhat, DO, MPH

Pituitary tumors are the third-most common reason for intracranial surgery, are most commonly seen in the third to fifth decades of life, and affect an estimated 1.5 to 27% of patients, with an overall mean estimate of 10.6% in the general population.^{1,2} Their presentation can range from the purely incidental and asymptomatic, as in the case of the non functioning pituitary microadenoma, to a clinically apparent syndrome such as the giant macroprolactinoma with headache and the classic homonymous hemianopsia that would compromise an airman's safety of flight. Whether to pursue medical or surgical management involves four main areas of evaluation: 1) size of the tumor and its involvement of adjacent anatomic structures, 2) whether the tumor is functioning and secreting hormones, 3) whether other pituitary axis are involved, and 4) whether the pituitary tumor is involved as part of a syndromic presentation that occurs in multiple endocrine neoplasia. The impact on aeromedical safety calls for familiarity with the natural history of these tumors, their clinical effects, general treatment strategies and complications of therapy.

History

A 51-year-old airline transport pilot presented to his aviation medical examiner (AME) for a biannual first-class medical exam. He had more than 15,000 hours of flight time with no interruptions in his medical certification. He had no complaints about his health. His medical history is pertinent for (controlled) hypertension, for which he was prescribed a diuretic. His physical examination was entirely normal. The airman admitted that two months ago he requested and received an MRI of his brain, since his younger brother was recently diagnosed with a glioblastoma. The MRI was absent of any masses in the brain parenchyma but noted the presence of an abnormality in the sella turcica. Specific imaging of the sella revealed a hypodense 17 mm mass in the anterior lobe of the pituitary gland, which was distinct and abutted but did not displace the optic chiasm. There was no involvement of any adjacent anatomic structures.

The primary care physician performed gross visual field testing, which was normal, and referred the airman to an endocrinologist and neurosurgeon. The endocrinologist's

evaluation included a comprehensive family history and pituitary hormone testing, all of which were normal. The neurosurgeon indicated that he did not believe surgery was warranted but recommended biannual imaging and follow up. The airman asked his AME if this entire evaluation would be acceptable to the FAA and whether he would be allowed to continue flying as an airline pilot.

Pathophysiology and Aeromedical Concerns

Pituitary tumors can occur in and affect the cells in either the anterior lobe of the pituitary, where prolactin, growth hormone, adrenocorticotrophic hormone, gonadotropins, and thyroid-stimulating hormones are secreted, or the posterior pituitary, which secretes arginine vasopressin (antidiuretic hormone) and oxytocin. Of all pituitary tumors presenting either clinically or incidentally, the majority stain positive for cells secreting prolactin (lactotrophs) and may or may not present with elevated prolactin at the time of detection.^{2,3} Tumors are classified as *microadenomas* if the maximum dimension is less than 10 mm or

macroadenomas if the maximum dimension is 10 mm or greater. They are additionally classified as *functional* or *nonfunctional* based on whether the tumor cells inappropriately secrete their cell-specific hormones. Secondary secretion or suppression of hormones from the anterior or posterior lobes can also occur, depending on the location and size of the primary tumor.

The metabolic component of the patient's presentation depends on which hormones are inappropriately elevated or suppressed. For example, excessive prolactin can lead to loss of gonadotropins and testosterone production in the male. The signs are excessive fatigue and anemia, both of which impact aeromedical safety.

Other anatomic effects of these tumors can occur that would clearly affect safety of flight. A large tumor can cause superior displacement of the diaphragma sella and abate the optic chiasm, causing headache, but more importantly, homonymous hemianopsia, the classic visual deficit. In the latter, peripheral vision of the airman can be severely affected and is usually detected by gross visual field examination but may not be demonstrable unless formal visual field testing is performed.

This is why all patients presenting with macroadenomas must receive formal visual field testing by an optometrist or ophthalmologist. They must also demonstrate on biochemical testing that other pituitary axis hormones are not suppressed and remain functional.

Pituitary apoplexy is an infrequent complication, which as a rule, occurs in larger tumors and can be subclinical or overt in presentation—but when clinically apparent can result in death if unrecognized. In the case of syndromic presentation, as in the case of multiple endocrine neoplasia (MEN), the effects are related to the target organs involved. In MEN (1a) the triad of pancreatic, pituitary, and parathyroid tumors are commonly seen.

Medications used for treatment of prolactinomas or other tumors may not be aeromedically safe. Dopamine agonist therapy is commonly associated with headache, nausea, vertigo, dizziness, and postural hypotension, among other effects, early in the treatment course, although not all patients experience these side effects, and most side effects disappear with time when they are experienced, warranting a grounding period prior to granting aeromedical certification.^{4,5}

Medication for replacement or suppression of other pituitary or target organ hormones are well known and include side effects, when not appropriately dosed or monitored, that may affect safety of flight. A discussion of these other medications and their side effects can be found elsewhere.⁶

Complications are also known to occur as a result of transsphenoidal or transcranial resection and vary from hypopituitarism and rhinorrhea to complete unilateral loss of vision from inadvertent resection of the optic nerve. Radioablation also has hypopituitarism and optic nerve neuropathy as a risk of therapy, in addition to a small but detectable increase in the risk of other brain tumors.⁷

Case Outcome

The airman described in this case report had a single pituitary tumor classified as a nonfunctional macroadenoma, which abuts but does not displace the optic chiasm. The FAA recommended further testing by an eye specialist to detect more subtle visual deficits, and it was found to be normal without visual deficit. The Class-I special issuance was granted, with requirements for annual reports by the endocrinologist, neurosurgeon, and eye specialist.

NONFUNCTIONING PITUITARY ADENOMAS

Nonfunctioning tumors, as in the case of the airman presented, usually arise from gonadotrophs in the anterior pituitary gland, which secrete biologically inactive gonadotropins. If other pituitary hormones are normal, these tumors are usually monitored for growth, which virtually always occurs slowly or not at all.²

For microadenomas, a surveillance plan involving annual hormonal testing for prolactin alone with imaging is probably adequate; screening for Cushing's disease and acromegaly, as well, is appropriate if the triad of diabetes, hypertension, and obesity co-exist. This can be done with a 24-hour urine collection for free cortisol and a blood test for insulin-like growth factor type I.

For nonfunctional macroadenomas, the evaluation is expanded to include testing for all pituitary hormones, in addition to a chemistry panel and formal visual field testing by an eye specialist. Medical therapy of nonfunctional tumors involve a trial of dopamine agonist therapy to attempt to shrink these tumors, but success rates of 10-20% limit the use of this approach.⁸

Radiotherapy has been used, but surgical success and complication rates are better when in the hands of an experienced surgeon.⁹ Thus, when a nonfunctioning pituitary tumor threatens adjacent structures, including the optic chiasm, or affects other pituitary hormones, then surgical resection is indicated.

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Aviation Medical Examiner Seminar Schedule 2010

May 10 – 13	Phoenix, Arizona	AsMA (1)
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August 6 – 8	Washington, D.C.	OOE (3)
August 26 – 29	Wiesbaden, Germany	GAATM (4)
October 7 – 9	Pensacola, Florida	CAMA (5)
November 1 – 5	Oklahoma City, Oklahoma	Basic (2)
November 19 – 21	Kansas City, Missouri	CAR (3)

2011 Basic Seminar Schedule

February 28 – March 4	Oklahoma City, Oklahoma	Basic (2)
June 13 – 17	Oklahoma City, Oklahoma	Basic (2)
October 31 – November 4	Oklahoma City, Oklahoma	Basic (2)

CODES

AP/HF Aviation Physiology/Human Factors Theme

CAR Cardiology Theme

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- (1) A 3½-day theme AME seminar held in conjunction with the Aerospace Medical Association (AsMA). Registration must be made through AsMA at (703) 739-2240. A registration fee will be charged by AsMA to cover their overhead costs. Registrants have full access to the AsMA meeting. CME credit for the FAA seminar is free.
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- (5) This seminar is sponsored by the Civil Aviation Medical Association (CAMA) and is sanctioned by the FAA as fulfilling the FAA recertification training requirement. Registration will be through the CAMA Web site: www.civilavmed.com.

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