Federal Aviation Administration

Federal Air Surgeon's Medical Bulletin

Aviation Safety Through Aerospace Medicine

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

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Federal Air Surgeon's Medical Bulletin

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Federal Air Surgeon
Fred Tilton, MD

Editor
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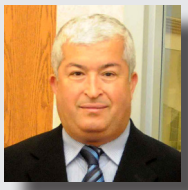
Contents



Page 6

from the Federal Air Surgeon's

PERSPECTIVE...

by Fred Tilton, MD

11 Medical Conditions No Longer Require Special Issuance, More to Come Soon

Hello, Everyone,

The approximately 600,000 pilots in the United States generate close to 400,000 medical applications each year. Since we made the use of MedXPress mandatory last year, all applicants have walked into your office after having completed their applications on-line. You, our designated aviation medical examiners (AMEs), then examined those pilots, and more than ninety percent of them left your office with a medical certificate in-hand.

I can almost hear the collective sighs of relief from those pilots, because few, if any, view the medical examination as anything other than a necessary evil. Some of them actually dread the thought of their upcoming medical because they have heard of, know, or believe themselves to be "victims" of the medical examination process.

Fortunately, we have you to explain and help them through the process, and we have found ways to safely**,** medically certificate individuals through the special issuance process who might have once been permanently disqualified. However, the applicants who required a special issuance had to have their application deferred, and they had to wait for the Federal Aviation Administration (FAA) to make a determination.

A few years ago, we introduced the aviation medical examiner assisted special issuance process (AASI), which permitted AMEs to issue applicants a special issuance certificate at the time of examination**,** provided the applicant had complied with a previously defined set of conditions. The AASI process eliminated the wait time for a subset of airmen, but there were still a large number of pilots who had to wait for the FAA to make a decision in their case.

The next logical step was to reduce the number of medical conditions requiring a special issuance, and I am pleased to report that we have done just that. We began to consider that option about a year and a half ago. Members of my staff worked hard to develop the necessary protocols, and along the way, we received some very helpful suggestions from two of your colleagues, Dr. **John (Jack) Hastings** and Dr. **Stephen Leonard**. It took us longer that we expected because we could not afford to make any changes that would compromise safety.

So far, we have identified 18 medical conditions (see list below) that will no longer require a special issuance, and we have placed the protocols for 11 of them in the *Guide for Aviation Medical Examiners (Guide).* The rest will be added to the *Guide* in the next few months. We chose these 18 because they account for 10 to 15 percent of the special issuances.

I am very excited about these changes, and I hope you are as well. They will make the medical examination process easier for you and the airmen you serve, and it will also help us to reduce the time that other airmen experience as they wait for us to approve their special issuances for more complicated medical conditions.

In the coming months, we will continue to refine the special issuance list, as well as find other ways to enhance our certification process in our efforts to support you and the airmen you serve.

Here, as I promised earlier, is the list. It is divided into two groups. The first has already been posted in the *Guide*, and the second group will be posted soon.

Group 1: Arthritis**,** asthma, hepatitis C, hypertension, hypothyroidism, pre-diabetes, migraine and chronic headaches, renal cancer, testicular cancer, and prostate cancer

Group 2: Kidney stones, carotid artery stenosis, colitis and irritable bowel syndrome, colon cancer, bladder cancer, leukemia, and Hodgkin's disease and lymphoma

And, as I always say, thanks for the contribution you make to the health and safety of the airmen you serve so well.

—Fred

More on the AME Survey Results

895 Written Recommendations Received

By Brenda Wenzel, PhD

For those who may have missed it, the article titled "Your Voice Has Been Heard: AME Survey Results" in the previous issue of the *Federal Air Surgeon's Medical Bulletin* (vol. 51 no.1, p.5) highlighted results from last year's aviation medical examiner survey for rates of satisfaction with delivered services and ranked service improvements. This issue highlights results for AMEs' written assessments of medical certification services.

One in five (428 of 2,118) domestic, military, federal, and international AMEs who submitted a survey took advantage of the opportunity to provide written input. The open text items asking for recommendations served as an unbridled source of feedback. In other words, there were no conditions placed on written input. Input was classified as a *recommendation* if it stated a needed improvement outright, identified a problem/issue that needed resolving, or both. Respondents provided 895 recommendations.

Civil Aerospace Medical Institute researchers used a content analysis technique to translate the recommendations into actionable terms and to prioritize them for the Office of Aerospace Medicine (OAM). Recommendations from AMEs were clustered into three areas for program improvement: develop personnel, enhance systems/tools, and change medical certification processes/policies.

Developing Personnel

The most frequent recommendations for developing personnel would involve enhancing knowledge and skills of program staff and keeping AMEs and airmen served by the program aware of requirements and critical information. In doing so, errors and rework would be reduced, and effectiveness and efficiency would be gained. Specific needs and issues brought to light in the recommendations included: AME training on certification issues, MedXPress, and changes/updates to the process (with a preference for online access); quick reference materials to aid certification decisions during the exam appointment; on-demand access to the Regional Flight Surgeons (RFSs) and Aerospace Medical Certification Division (AMCD) physicians and technical support via extended hours, direct lines, online chat, or on-call staff; timely return of phone calls by the RFS and AMCD; notification from the AMCD regarding changes/updates to standards and guidelines and receipt of supporting documentation; speedy and consistent decisions from the FAA; and additional qualified FAA staff. A rationale repeatedly provided for developing personnel was that everyone needs to work together to achieve the program goals.

Enhancing Systems and Tools

The most frequent recommendations for enhancing systems/tools would produce gains in program performance with stable online access and user-friendly capabilities that fully support end users. Specific needs and issues identified to improve capabilities, utility, and usability of the systems/tools included: embed guidance in the Internet-based Aerospace Medical Certification Subsystem (AMCS), MedXPress, and on the OAM website to expedite processing of the application; ensure access to and integrity of data entered into AMCS and MedXPress; accept digital ECG transmission modes (e.g., use of the Internet or upload directly to AMCS); and simplify and add quick links and cross references to the online *AME Guide* and the OAM website.

Changing Processes and Policies

The most frequent recommendations for changes to processes/policies would reduce applicant and AME errors and workload by providing airmen and their current AMEs access to past medical data/records. Resource use would also be reduced by transitioning to electronic transmission of all forms and supporting documentation.

We Are Listening

Coupling these results with the rating and ranking results provides a better understanding of the level of support that AMEs expect and potentially require as designees. Thanks again to all who submitted a survey last year. Your role in the evaluation of the quality and delivery of medical certification services and support is vital to continuously improving the program.

To learn more about how the OAM plans to use the feedback you provided, join us at the 84th Annual Scientific Meeting of the Aerospace Medical Association. We will be presenting a panel listed as "Checking Aerospace Medical Certification Vitals: Feedback From AMEs, Airmen, and the Federal Air Surgeon," on Tuesday, May 14 at 4:00 p.m.

Dr. Wenzel is a research psychologist in Civil Aerospace Medical Institute's Aerospace Human Factors Research Division.

Letters to the Editor

Sleep Apnea and Flying

Dear Editor,

I was interested to see the excellent overview on the problem of obstructive sleep apnea (OSA) presented in the Feb. 2013 issue by Lt. Col. Allen ["Obstructive Sleep Apnea in a Pilot," FASMB, vol. 51, no. 1, p 8]. There continues to be a national, downward trend in scheduled sleep as well as the quality of our sleep. What was the exception is now the norm, and sleep deprivation is a given when dealing with patients and airmen. I suspect our addiction to electronic gizmos is partly to blame.

Sleep Apnea and Aviation Safety

As human beings, we have a near-zero ability to accurately self-assess our degree of impairment from fatigue. There is little agreement on how best to objectively measure impairment, as the MWT [maintenance of wakefulness test], which measures time to intentional sleep onset, is a much more accurate assessment of pathologic sleepiness, and that is what we really want to know.

Airmen need to be educated that being awake is not the "default mode" of "being." NREM [non-rapid eye movement] sleep is. When comfortable or bored, it is *normal* to fall asleep in 15 to 20 minutes. The greater the sleep debt, for ANY reason, the shorter the time to "powering down."

Treatment and Medical Certification

Many states, like Michigan (my state), have adopted a more rigorous screening process for CDL [commercial driver's license] exams than we do for our FAA exams. I understand the insurance industry has joined with the drivers' unions and came up with this compromise: Position therapy and dental appliances are not acceptable for treating OSA for CDL licenses in Michigan. The concern regarding dental appliances and position therapy is that there is no way to confirm compliance or know when a pilot is "cramming" for an MWT test just before visiting an AME. Hence, we cannot ensure public safety the rest of the year. Also, there is very little information on compliance with dental devices. What little I could find suggests that it is actually worse than CPAP [continuous positive airway pressure]; about 50% at 30 months. Compliance with CPAP over 5 years is about 75%. Dental appliances can be very uncomfortable and cause dental problems, headaches, and TMJ [temporomandibular joint] disorders. The application of positive pressure support (CPAP) has gotten much better.

Most patients can successfully adapt to CPAP devices, and, referring to the airman in Dr. Allen's report, with an AHI 21.3, CPAP was the optimal treatment in this case, both for the airman's health and for aeromedical purposes.

Sleep apnea, effectively treated with CPAP, is the preferred method to effectively control the risk of daytime drowsiness. Adaption to CPAP may require short-term use of medications, such as temazepam (Restoril). We include a warning for long-term soporific use, and a 72-hour warning [self-grounding] for occasional temazepam use in the process of adaption to CPAP.

Mark Ivey, MD
[Spring Lake, Mich.]

Col Mark Ivey, MD, is the California Air National Guard Chief of Flight Medicine, 129th Rescue Wing, Moffett Federal Air Field, Calif., and a senior AME. He is also in a solo private practice and board certified in Internal Medicine, Pulmonary, Critical Care, and Sleep Medicine. He has 2,400 hrs. Command pilot time in helicopters and is a CFI rotor-craft-helicopters with a commercial instrument rating.

Printing After Form Submission

Dear Editor,

In today's AME Bulletin ["MedXPress Lessons Learned" by Fred Tilton, MD, vol. 51, no. 1, p. 2], you say, "If you do not print an airman's certificate before you submit the exam, the system will not allow you to print a certificate. So, remember, print before you submit …."

I ALWAYS submit before printing; I have never used Quick-Print. My method has worked reliably from the time MedXPress was first begun; in fact, I didn't even know of the Quick-Print option until I attended an AME seminar last year, as I always complete the exam myself with the airman next to me and have never needed the Quick-Print option.

I am confident that you mean that "Quickprint does not function after the exam has been submitted." In fact, once the certificate has been selected for display, it must be saved or printed right then, as we don't get a second chance. Because of this, I have always saved a local copy of the certificate.pdf while it's still displayed, in the form, in a file under the directory D:\FAA\Certs+Forms\Nnnnnnn.yr.mo.do.cert.pdf

Where Nnnnnnn is the airman's medical chart number. This has saved my bacon many times with printer malfunction.

Daniel L. Johnson, MD
Menomonie, Wis.

Dear Dr. Johnson,

Thank you for correctly pointing out that you can print certificates after submitting an exam. We clarified the statement you quoted on February 12—several days after it was first published—with these words: "So, remember to print before leaving that screen— Lesson 5."

Jana Weems
Congressional Liaison
Aerospace Medical Certification Division

Important Notices

Medical Support System Outages

As many of you know, the system we use within the FAA to support medical certification was changed to a Web-based version on March 18, 2013. There are several problems with this system that must be fixed. To do this requires periodically a brief downtime of our systems. Normally, we can accomplish this without impacting the Aerospace Medical Certification Subsystem (AMCS) or MedXPress, but there are times when the entire Medical Support System must be taken offline.

We apologize for any inconvenience this causes you. However, these issues must be resolved. We always strive to minimize system outages, especially during primary work hours. Likewise, we always try to provide you with as much advance notice as possible when the system will be unavailable.

Please be patient with us as we work to fix these issues.

—Courtney D. Scott, Jr, DO, MPH
Manager, Aerospace Medical Certification Division

FAA Scientific Colloquium Planned

Postmortem Forensic Toxicology in Aviation

The Federal Aviation Administration's Civil Aerospace Medical Institute is organizing a colloquium on postmortem forensic toxicology in aviation to be held during April 1-3, 2014, at the Mike Monroney Aeronautical Center in Oklahoma City, Okla., USA.

The colloquium will be a scientific forum for medical examiners, coroners, forensic toxicologists, FAA Regional Flight Surgeons, National Transportation Safety Board personnel, and other accident investigation authorities.

Topics to be covered include sample processing; importance of chain of custody of samples; analyses of samples for combustion gases, ethanol, and drugs; analytical results interpretation; significance of quality control/quality assurance; and litigation and expert testimony issues.

This three-day colloquium is free. If you are interested in attending, please respond by July 31, 2013, to inform the sponsors of how many plan to attend. For more information, visit this website:

www.faa.gov/go/toxmeeting

Sequestration Policy

Due to sequestration-related budget cuts and furloughs, the Office of Aerospace Medicine will continue with normal hours of operation but offices may have limited staff due to furlough days. The Alaska office will be closed every other Friday (on May 10, May 24, June 7, June 21, July 5, July 19, August 2, August 16, August 30, and September 13).

CANCELED

We regret the inconvenience.

—Carrolyn Bostick
FAA Assistant Administrator for Human Resources

Aviation Medical Examiner Information Links

AME Guide
www.faa.gov/go/ameguide

AME Training Information
www.faa.gov/go/ametraining

AMCS Online Support
www.faa.gov/go/amcssupport

Regional Flight Surgeon Contacts
www.faa.gov/go/rfs

Pilot Safety Brochures
www.faa.gov/go/pilotsafetybrochures

Medical Certification Information
www.faa.gov/go/ame/

MedXPress Login & Help
https://medxpress.faa.gov

MedXPress Video Page
www.faa.gov/tv/?mediaId=554

FASMB Archives
www.faa.gov/go/fasmb

CAMI Library Services
www.faa.gov/go/aeromedlibrary

Changing Address or Email?

Notify Your Regional Flight Surgeon's office to update your email or address. If you are unsure about the phone number or website, go online to:

www.faa.gov/go/rfs

New Deputy RFS in Great Lakes


Dr. Holmes

Joye Holmes, MD, MPH, MBA, has joined the Great Lakes Region as Deputy Regional Flight Surgeon, replacing Dr. **Matt Dumstorf** who now is working for the Civil Aerospace Medical Institute. Dr. Holmes reported for work on February 25, according to Dr. **David Schall**, Great Lakes Regional Flight Surgeon.

As the Deputy Regional Flight Surgeon, Dr. Holmes supervises the nearly 500 aviation medical examiners in the eight-state region of Great Lakes, which services over 85,000 pilots and 4,000 air traffic control specialists. Additionally, she performs aeromedical certification duties for airmen and controllers that require review for Special Issuance/Special Consideration (waivers). Dr. Holmes is also the Medical Review Officer (MRO) for the FAA-Managed DOT Drug Program for this region. Along with the above duties, she has the opportunity to perform educational outreach to AMEs, pilots, and students.

Dr. Holmes had served since October 2006 at American Airlines as Midwest Regional Medical Director at O'Hare Airport, where her duties included Medical Review Officer, Human Intervention Motivation Study sponsor Aviation Medical Examiner (HIMS AME). In addition, she provided periodic medical examinations for all employee work groups, and supervised the medical staff.

After graduating from George Washington University Medical School, she began her career as a Public Health Service Medical Officer, providing primary care in South Florida. When she completed her service, she continued in primary care as a staff physician for a health maintenance organization. She has worked in corporate health care, hospital, and private practice settings. Over 25 years, she held positions as Hospital Senior Care Program Director, Medical Officer in the U.S. Air Force Reserve, Medical Director at health maintenance organizations, and she managed her own private practice.

Dr. Holmes earned a MBA from the University of Miami and a master's in preventive medicine and environmental health from the University of Illinois at Chicago. She is board certified in occupational medicine by the American Board of Preventive Medicine.

Dr. Holmes has a practical interest in the oral history tradition. She has researched her family's history and collected oral histories from various relatives, listening to the many stories about the migration of past generations from all parts of the South to the state of Tennessee. "It is interesting, she says, "to hear the reasons they moved, how they got their names, and some of many surprising adventures they experienced." This interest was further cemented when she served as a primary care physician in South Florida. During this time, she says she was fortunate to meet many fascinating individuals, some of whom had survived German concentration camps such as Auschwitz; others had served overseas in the Armed Forces during World War II.

These histories inspired her to participate as the escorting physician for the Honor Flight Program. This program honors WWII veterans by providing them an all-expense-paid visit to the nation's capital to view the WWII Memorial and other sites. Last October, she supported just such a group of veterans, and it was one of the "most rewarding moments" of her professional career. "I eagerly look forward to assisting on future flights," she stated.

—Information provided by Dr. David Schall

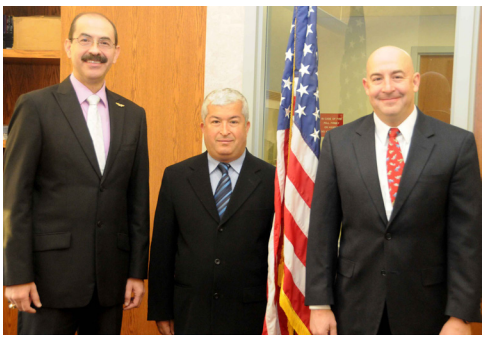
New International Exchange Participant

Dr. **Melchor Antuñano,** the Civil Aerospace Medical Institute's (CAMI's) director, announces the participation at CAMI of Dr. (Lt. Col.) **Zeki Dulkadir**, an International Exchange physician from Eskisehir, Turkey. Dr. Dulkadir is an Aerospace Medicine Specialist and Assistant Professor at Gulhane Military Medical Academy and an Aeromedical Examiner for civilian aviation personnel in Turkey.

Dr. Dulkadir is the fifth physician to participate in the International Exchange Visitor Program and will be working at CAMI for one year.

During his year at CAMI, he will assist the Aerospace Medical Education Division with aviation medical examiner courses, translate pilot safety brochures into Turkish, and develop new training materials.

The Office of Aerospace Medicine's international aviation safety efforts are enhanced by the professional assistance of its international colleagues. The International Exchange Visitor program allows qualified foreign specialists to enter the United States to conduct studies and exchange information at FAA facilities. The Office of Aerospace Medicine supports all international programs that promote interaction between aviation medicine professionals, enable the exchange of scientific information, and promote the FAA's prominence in civil aerospace medicine.


L-R: Dr. Melchor Antuñano, Dr. Zeki Dulkadir, and Dr. Brian Pinkston, in whose department Dr. Dulkadir is working.

Participants in this program at CAMI:

- Learn how the Office of Aerospace Medicine supports aerospace safety and medicine, both nationally and internationally
- Interact with FAA professional and technical personnel to learn about new aerospace medical trends at a leading aerospace medical institute
- Share their skills with FAA specialists in support of various programs

Navigating the FAA Examination

'The Only Real Guide is the Online Guide'

By Brian Pinkston, MD

Did you know that the *Guide for Aviation Medical Examiners* has been revised in 27 areas in 2013 alone? After reading Dr. **Tilton's** editorial on reducing the number of medical conditions requiring special issuance, I'm sure that it's not a huge surprise to you. It might also not be surprising that many of these conditions have criteria under which they may be issued, and these criteria are included in the current version of the *Guide for Aviation Medical Examiners*

What you might find surprising is that during a couple of recent regional offices' site visits, a few AMEs were found to be using an old hardcopy of the *AME Guide*. It might not seem a big deal in the case of not issuing a certificate for a condition that no longer requires a special issuance, but it slows down the certification system. Furthermore, issuing an unrestricted certificate to an airman using a color vision testing device which is no longer acceptable for FAA standards may be a significant issue.

The bottom line is the FAA expects AMEs to keep up on current policy. That's why there is a requirement for at least 10 examinations per year, training every three years, and annual error reporting. So what's the easiest way to do so? Use the online *AME Guide!*

You can find it online at:

www.faa.gov/go/ameguide/

The *Guide* is automatically updated with policy changes, which can occur at any time. On this webpage, you can also find the *Archives and Modifications of the Guide for Aviation Medical Examiners*. This document gives a synopsis of the date, description of changes, and reasons for modification. It can be extremely helpful in informing you of changes in the Guide that may be nearly transparent in the automatically updated online *Guide*. Remember, the only real guide is the online *Guide*.

Finding Missing Confirmation Numbers

Shifting gears, some questions have come in regarding ways to find that elusive confirmation number provided by MedXPress. If the airman forgets to bring in the summary sheet provided by MedXPress and can't remember the confirmation number, there are three ways to retrieve it.

1. The airman can login to her email account registered with MedXPress. MedXPress will have sent the confirmation number to this account.
2. The airman can call the MedXPress help desk at (877) 287-6731.
3. Finally, you, the aviation medical examiner, can call the Aerospace Medical Certification Subsystem Support Desk to retrieve it at (405) 954-3238.

Those Good Old Paper 8500-8's Have Retired (for Airmen)

In the past week, our office has reviewed the use of paper form 8500-8's because they are no longer valid for airman applications since October 1, 2012. Although they are still acceptable for use by AMEs who perform FAA air traffic controller employee examinations, we have found that, since January 2013, more than 100 exams had been accomplished on paper form 8500-8's for airman applications—instead of using MedXPress.

The Regional Flight Surgeons are contacting AMEs who have been found using paper forms for airman applications. At this point, electing not to use MedXPress for an airman application will be considered an AME error. For more information on MedXPress, please go to the MedXPress video entitled "MedXPress: It's Easy" at:

www.faa.gov/tv/?mediaId=554

or to the MedXPress brochure at:

www.faa.gov/pilots/safety/pilotsafetybrochures/media/medxpress.pdf

I hope this information has been helpful. Thank you for all you do to keep us safe in the air! Please write with any questions or suggestions for future articles at brian.pinkston@faa.gov.

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Dr. Pinkston manages the Aerospace Medical Education Division.

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CANCELED

We regret the inconvenience.

—Carrolyn Bostick
FAA Assistant Administrator for Human Resources

Antiphospholipid Syndrome Associated With Systemic Lupus Erythematosus

Case Report, by Joseph J. Martin, MD, MPH

Systemic lupus erythematosus (SLE) is a disease that potentially affects all organ systems. It is primarily a dysfunction of the immune system that results in autoimmunity. In essence, the body's immune system attacks itself. One complication of SLE is the development of antibodies directed against phospholipids, which may increase the risk of thrombotic events. Hypercoagulable patients are at increased risk for aeromedically significant medical complications such as deep vein thrombosis, pulmonary embolism, stroke, coronary artery disease, and myocardial infarction.

Case Presentation

A 33-year-old Class 1 commercial airline pilot with no significant medical history developed a deep vein thrombosis (DVT) in his right lower extremity after traveling by car to visit his family. This was his first thrombotic episode, and there were no symptoms concerning for a pulmonary embolism. He was admitted to a hospital and initiated on IV heparin for anticoagulation. He was also started on oral warfarin and continued this for 6 months of outpatient treatment. Because this was his first DVT episode and his medical history was unremarkable, no additional work-up was completed.

Approximately 18 months after finishing warfarin treatment, he started to experience joint pain and mild swelling in his fingers. He also noticed some chest discomfort when he took deep breaths, and his fingers became sensitive to cold temperatures. These symptoms improved but persisted for another 6 months. He then experienced a return of pain and swelling in his right lower extremity. He sought medical care, and a new DVT was diagnosed by ultrasound. Given the recent history of pleuritic chest discomfort, a nuclear ventilation-perfusion scan was also performed and was negative for a pulmonary embolism. He again was acutely hospitalized and anticoagulated with IV heparin. Because this was his second DVT in the last 2.5 years, a more extensive hypercoagulable work-up was initiated.

Physical exam revealed active synovitis involving the small joints of both hands and a small left-sided pleural effusion. These findings, combined with a history of fatigue, Raynaud's

Continued on page 9

Pathophysiology and Disease Management

Systemic lupus erythematosus (SLE) is chronic autoimmune disease that can affect virtually every organ. The skin, musculoskeletal, and hematologic systems are most frequently affected, but potentially life-threatening complications may occur involving the renal and central nervous systems (1). The American College of Rheumatology identifies 11 criteria, of which at least four must be present to classify a patient as having SLE. These include malar rash, discoid rash, photosensitivity, oral ulcers, arthritis, serositis, renal disorder, neurologic disorder, hematologic disorder, immunologic disorders, and a positive antinuclear antibody (2). An inflammatory and non-erosive arthritis occurs in more than 90% of patients during their disease course.

One of the immunologic abnormalities that can be seen with SLE is antiphospholipid antibodies. These are antibodies directed against phospholipids. It is not fully understood why this happens or how these complexes induce a hypercoagulable state. The major antibodies associated with the antiphospholipid syndrome are lupus anticoagulant (LA), anticardiolipin antibodies (aCL), and antibodies to β2-glycoprotein-I (β2-GP-I). The LA is not a specific antibody, but rather the presence of an unexplained increase in the activated partial thromboplastin time (aPTT). This spurious increase in PTT is due to the presumed presence of an unidentifiable antiphospholipid antibody. The term lupus "anticoagulant" is a misnomer, given that the patient is actually hypercoagulable, despite an increased aPTT.

In patients with anti-cardiolipin antibodies, the risk of thrombosis is directly related to the antibody titer (3). Much still remains to be learned regarding the specific types and functions of these antibodies in relation to the overall coagulation pathways. It is also important to remember that these antibodies may be present in otherwise healthy people exposed to certain infectious agents or drugs.

Twenty to forty percent of SLE patients will have an antiphospholipid antibody present (4). This frequency is one of the reasons that their presence is part of the American College of Rheumatology's SLE classification criteria. The antiphospholipid syndrome (APS) is defined by the presence of at least one clinical feature, such as venous, arterial, or small vessel thrombosis and/or pregnancy morbidity. Additionally, one must have moderate to high titers anti-cardiolipin, antibodies to β2-glycoprotein-I, or lupus anticoagulant activity (5).

Approximately 20-50% of SLE patients with an identifiable antiphospholipid antibody will ultimately meet the criteria for APS within 10-20 years (6, 7). It is therefore prudent to consider thrombosis in the differential diagnosis of SLE patients presenting with vascular, neurologic, or cardiac symptoms.

Once an acute thrombotic event has been treated initially with heparin, patients are transitioned to chronic therapy, usually warfarin. Warfarin at a dose resulting in an INR between 2.0 and 3.0 is now the standard of care for non-pregnant patients with anti-phospholipid syndrome (8). An additional recommended medication is hydroxychloroquine (Plaquenil). In addition to reducing with number of severe SLE flares experienced by the patient, it is also reverses platelet activation induced by antiphospholipid antibodies (9).

Lupus from page 8

phenomenon, and recurrent thromboses, highly suggested an immune dysfunction syndrome. Laboratory evaluation revealed a positive antinuclear antibody (ANA) and double-stranded DNA (dsDNA). Additionally, cardiolipin antibodies were also positive. The erythrocyte sedimentation rate (ESR) was elevated to 90. Rheumatoid factor and Smith antibody were negative. Hematologic and urine analyses were all normal.

The patient was given the clinical diagnosis of systemic lupus erythematosus (SLE). He re-initiated warfarin therapy for the recurrent DVT. Hydroxychloroquine (Plaquenil), low-dose prednisone, and celecoxib were also started to treat the patient's musculoskeletal and immune symptoms. These symptoms improved significantly, and a recommendation was made to continue the warfarin indefinitely.

Aeromedical Concerns

Both SLE and primary antiphospholipid antibody syndrome (APS) pose significant aeromedical safety concerns. The specific complications that may occur with APS include stroke, transient ischemic attack, amaurosis fugax, retinal vascular occlusion, myocardial infarctions, deep vein thrombosis, pulmonary embolism, migraine headache, and cognitive dysfunction. Antiphospholipids more than double the risk of strokes (10). Even in the absence of a history of previous focal neurologic insults, cognitive dysfunction may be seen in patients with APS. A study found that 42% had cognitive deficits on a comprehensive battery of neuropsychological tests compared to 18% of matched controls, with complex attention and verbal fluency being the most common deficiencies seen (11).

Coronary artery disease and myocardial infarctions are always of aeromedical concern. Much like diabetes, SLE is an independent risk factor for the development of coronary artery disease (12). As such, traditional risk factors such as hypertension, diabetes, hypercholesterolemia, smoking, and family history of coronary artery disease should be aggressively screened for and treated as indicated.

Outcome

The patient had resolution of his deep vein thrombosis and was placed on life-long anticoagulation with warfarin. This airman currently has a first-class airman medical certificate with a Special Issuance for warfarin use. His SLE has been well controlled and he has not developed any additional thromboses over the past 14 years.

References

(1) Von Feldt JM. Systemic lupus erythematosus. Recognizing its various presentations. *Postgrad Med*. 1995 Apr;97(4):79, 83, 6 passim.

(2) Tan E, Cohen A, Fries J. The 1982 revised criteria for the classification of systemic lupus erythematosus. *Arthritis Rheum*. 1982;40:1271-7.

(3) Ruffatti A, Del Ross T, Ciprian M, et al. Risk factors for a first thrombotic event in antiphospholipid antibody carriers. A multicentre, retrospective follow-up study. *Ann Rheum Dis*. 2009 Mar;68(3):397-9.

(4) Sebastiani GD, Galeazzi M, Tincani A, et al. Anticardiolipin and anti-beta2GPI antibodies in a large series of European patients with systemic lupus erythematosus. Prevalence and clinical associations. European Concerted Action on the Immunogenetics of SLE. *Scand J Rheumatol*. 1999;28(6):344-51.

(5) Miyakis S, Lockshin MD, Atsumi T, et al. International consensus statement on an update of the classification criteria for definite antiphospholipid syndrome (APS). *J Thromb Haemost*. 2006 Feb;4(2):295-306.

(6) Palatinus A, Adams M. Thrombosis in systemic lupus erythematosus. *Semin Thromb Hemost*. 2009 Oct;35(7):621-9.

(7) Romero-Diaz J, Garcia-Sosa I, Sanchez-Guerrero J. Thrombus in systemic lupus erythematosus and other autoimmune diseases of recent onset. *J Rheumatol*. 2009;36:68-75.

(8) Finazzi G, Marchioli R, Brancaccio V, et al. A randomized clinical trial of high-intensity warfarin vs. conventional antithrombotic therapy for the prevention of recurrent thrombosis in patients with the antiphospholipid syndrome (WAPS). *J Thromb Haemost*. 2005 May;3(5):848-53.

(9) Espinola RG, Pierangeli SS, Gharavi AE, Harris EN. Hydroxychloroquine reverses platelet activation induced by human IgG antiphospholipid antibodies. *Thromb Haemost*. 2002 Mar;87(3):518-22.

(10) Brey RL, Abbott RD, Curb JD, Sharp DS, Ross GW, Stallworth CL, et al. beta(2)-Glycoprotein 1-dependent anticardiolipin antibodies and risk of ischemic stroke and myocardial infarction: the honolulu heart program. *Stroke*. 2001 Aug;32(8):1701-6.

(11) Tektonidou MG, Varsou N, Kotoulas G, et al. Cognitive deficits in patients with antiphospholipid syndrome: association with clinical, laboratory, and brain magnetic resonance imaging findings. *Arch Intern Med*. 2006 Nov 13;166(20):2278-84.

(12) Goldberg RJ, Urowitz MB, Ibanez D, et al. Risk factors for development of coronary artery disease in women with systemic lupus erythematosus. *J Rheumatol*. 2009 Nov;36(11):2454-61.

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Sickle Cell Disease in an Airman

First Known Certification via Allogenic Bone Marrow Transplant

By Bruce B. Chien, MD

The airman is a 43-year-old male physician whose sibship included three of eight siblings who were homozygous for sickle cell disease (SSD). The other two siblings had already died due to complications of the disease. In 11/2009, because of continuous life difficulties presented by management of his SSD with hydroxyurea, he participated in a National Institutes of Health trial of bone marrow transplantation for SSD, the cohort report of which was reported in the *New England Journal of Medicine* by Hsieh M.M. et al., 361:14 2309-17.

His hepatitis C was treated with interferon and ribavirin prior to transplant. He did well and in February 2011 received his third-class medical certificate after initially being deferred.

In March of 2012 he developed a factor VIII antibody, and therefore hemophilia A (10% Factor VIII levels), manifest by compartmental bleeding that required fasciotomy in the right forearm. He self-grounded and immunosuppression was initiated transiently with rituximab and then with sirolimus 2 mg/daily. Factor VIII levels rebounded to 172 IU/dl, and he experienced a six-month period requiring no Factor 8 support and had no soft tissue bleeding. PTT was 30.3.

Three years after transplantation he has detectible haptoglobin, normal LDH, bilirubin, and reticulocyte counts; 96% of his CD14/15 cells and 29% of his CD3 cells are from his donor. He has split chimerism and had no hint of GVHD (graft vs. host disease). Quantitative hepatitis C RNA in October 2012 was negative.

The only organ system with a side effect was renal, and the airman continues to have a normal creatinine despite 20 mg/dl of proteinuria, likely due either to SSD or to sirolimus. His lipid profile was unremarkable. By surface echo he has been afflicted with none of the consequences of chronic iron overload. His life transfusional iron overload was treated with periodic phlebotomy, and his serum ferritin decreased from >4500 to 1292. He has retained normal LV function, HbA1c and thyroid functions.

On physical exam in October 2012, medications were sulfamethoxazole and trimethoprim (Bactrim) q.o.d. and sirolimus 2 mg qD. He was normotensive with a nonpalpable spleen. Protein was not detected on urine dipstick. A right forearm fasciotomy scar, healed by secondary intention, was present. The remainder of the exam was unremarkable.

After consultation with the Aerospace Medical Certification Division, he was authorized and was issued a third-class certificate for one year, contingent on annual current status reports. This is to our knowledge the first airman with homozygous sickle cell disease to achieve certification based on allogenic bone marrow transplantation.

✈

Dr. Chien is an aviation medical examiner and practices in Peoria, Illinois. He submitted this case report as the original examining aviation medical examiner.

MedXPress Video Wins Telly Award

The Civil Aerospace Medical Institute's production of "MedXPress: It's Easy!" was selected to receive a 2013 Telly Award. Telly Awards are given to honor film and video productions, online video content, and TV commercials and programs. The MedXPress video was created to broadly socialize the new online system with potential users.

The video features an 11-year old aspiring pilot who shows his mother how easy it is to fill out his medical information online so that he will be prepared to get his medical certificate when he turns 16.

"We won a Bronze Telly in the Film/Video Category for informative TV programming," said Manager of Aerospace Medical Education Division **Brian Pinkston** (AAM-400). "We had a strong team that put the video together, led by **Alan Atkins** and **Laura Shepherd-Madsen** of AMI-700 [contract production organization]. They created the script and shot the video. **Susan Buriak**, an instructional system designer from AAM-400, managed the project and the team of AAM subject matter experts to ensure accuracy."

According to Dr. Pinkston, a second installment of the MedXPress video is in production and will be available soon; a video about aeronautical decision-making is being planned for production. ✈

—Information provided by AVS Flyer

CAMI Takes Hypoxia Training to HART

By J.R. Brown

The Civil Aerospace Medical Institute announces the "maiden voyage" of its Hypoxia Awareness & Recognition Trainer (HART). This device is a direct descendent of CAMI's Portable Reduced Oxygen Training Enclosure (PROTE), which was another CAMI innovation. Each device allows participants to experience the effects of hypoxia by reducing the available oxygen by "scrubbing" it out. Air separators remove oxygen and replace it with inert nitrogen. By reducing the oxygen level from 20.95% to 7%, it effectively simulates an altitude of approximately 25,000 feet.

The HART is a normobaric "hypoxia training room" that utilizes the existing walls of the room to help contain nitrogen-rich air. This is another in a long line of CAMI innovations for the purpose of enhancing and promoting aviation safety.

Upon entry, subjects immediately begin oxygen desaturation, quickly feeling the effects of hypoxia. Within 5 minutes, they will feel several symptoms of hypoxia and will rapidly approach the time of useful consciousness. At the end of the 5-minute time limit, subjects don their oxygen masks and will have full recovery within seconds.

The advantage the HART and PROTE have over altitude chambers is that pressure changes do not become an issue. Individuals with head colds, upper respiratory infections, and seasonal allergies would have problems in the chamber because of possible barotrauma to ears and sinuses, but this, obviously, would not be an issue in a normobaric environment.

For further information on either the HART or PROTE, please contact the Airman Education Programs Team at CAMI by calling (405) 954-4837. ✈

Mr. Brown is a training instructor in CAMI's Aerospace Medical Education Division.

Index of Articles Published in the Bulletin During 2012

Headline	Author	Issue	Page
A New Horizon	Warren Silberman	1	3
Aerospace Medical Certification Manager Position Open		1	5
Aerospace Medical Education Division News	Brian Pinkston	4	15
Bauer, Louis Hopewell: and the First Federal Aviation Medical Examiners	Terry Kraus	2	14
Berry, Dr. Daniel: Named Central Regional Flight Surgeon		2	2
Biennial Survey of Pilot Satisfaction Initiated	Katrina Avers	3	7
Blank Certificates to Print? (letter to the editor)	A.J. Bogosian	3	2
Cardiovascular Disease and Stenting (case report)	Valerie Johnson	3	10
Cervical Total Disc Replacement in a Military Helicopter Pilot (case report)	John Reaume	4	11
Chinese AMEs Trained	Mike Wayda	1	14
Civil Aerospace Medical Institute Observes 50th Anniversary	Mike Wayda	4	10
Color Vision Testing for Pilots	Richard Carlson	1	6
Ercan, Dr. Erdinc: CAMI Welcomes Visiting Turkish Physician	Brian Pinkston	1	14
Form 8500-8 Phase-Out Deadline Approaches	Brian Pinkston	3	13
Glaucoma (case report)	Joseph Lopez	2	12
Glaucoma Case Report Comments (letter to the editor)	Richard Nattis	3	2
Hooray! New Rule [Statement of Demonstrated Ability] In Effect (Editorial)	Fred Tilton	3	1
How to Find Information of the FAA Website	Mike Wayda	4	4
Huntington's Disease (case report)	Robert Craig-Gray	2	16
Huntington's disease question (letter to the editor)	G.W. Jackson	3	2
Idiopathic Syncopal Episodes (case report)	William Klorig	1	10
Inaugurating Year 52 of Newsletter Publishing	Mike Wayda	1	2
International AME Seminar to Be Held in Berlin, Germany	Brian Pinkston	2	2
Letter to the Editor (Aging Brain)	David Weldy	1	14
Letters to the Editor	Giles & Sagoo	4	3
Love That Airplane!	Mike Wayda	4	9
Medical Certification of Airmen With Breast Cancer (case report)	Theresa Goodman	1	8
MedXPress Brochure for Pilots Now Online	Mike Wayda	2	11
Moving Away From Paper (Editorial)	Fred Tilton	1	1
New Deputy Regional Flight Surgeon in Central Region	Barbara Stoker	4	9
Office of Aerospace Medicine Physicians On Call, Part 1	Richard Carter	3	4
Office of Aerospace Medicine Physicians On Call, Part 2	Richard Carter	4	5
Office of Aerospace Medicine Physicians Team Up at Sun 'n Fun Fly-In	Mike Wayda	2	3
Persistent Esophoria Following Guillain-Barré Syndrome (case report)	Kimberly Toone	1	12
Post-Traumatic Stress Disorder (case report)	Nathaniel Almond	3	5
Preserving Flight Skills and Preventing Cognitive Decline	Richard Murphy, David Mirich	2	6
Radiofrequency Ablation for…Paroxysmal Atrial Fibrillation (case report)	Todd Gardner	4	13
Scott, Dr. Courtey: New Aerospace Medical Certification Division Manager	Melchor Antuñano	2	2
Silberman, Dr. Warren: Retires	Melchor Antuñano	1	4
Sometimes, Despite Our Best Efforts, We Are Misunderstood	Dominick Zito	4	6
Takotsubo Cardiomyopathy (case report)	Leigh Lewis	2	8
Ten Common ECG Issues (plus list of normal variants)	Warren Silberman	3	6
The Doctor Is In: Can My Friend Fly if…?	AVSFlyer	4	8
The Sun and Recent Space Weather	Kyle Copeland	2	10
Three OAM Staff Honored by AsMA	AVS Safety Flyer	3	3
Too Good Not to Repeat (Editorial)	Fred Tilton	4	2
Transverse Myelitis (case report)	Jonathan Stinson	3	8
Two Initiatives and a Reminder (Editorial)	Fred Tilton	2	1
Utilizing FAA MedXPress	Brian Pinkston	1	14
Wallenberg's Syndrome (case report)	John Venezia	3	12

Hypertrophic Cardiomyopathy in a First-Class Airman

Case Report, by Craig Pack, DO, MPH

Hypertrophic cardiomyopathy is a condition most commonly diagnosed in 30-40 year-olds and may present with sudden death. This article presents a case report of a first-class airman who was diagnosed with hypertrophic cardiomyopathy after being worked up for a history of heart murmur and abnormal electrocardiogram. A review is also included of the aeromedical issues associated with this condition.

History

The applicant is a 46-year-old first-class airman with nearly 13,000 flight hours, actively flying as a first officer for a major U.S. commercial transport airline. He was referred by his primary aviation medical examiner to a large medical center's executive medicine clinic for further evaluation of his obstructive sleep apnea (OSA). Upon evaluation, however, the referral center also noted the airman's medical history was significant for Wolf Parkinson White syndrome (WPW), diagnosed 10 years ago during an exercise stress test (EST). The EST, along with an echocardiogram and ECG, was obtained to evaluate a murmur found on this airman's physical exam. The echo showed a mildly dilated aortic bulb (4.4 cm), and the ECG showed Q-waves in the inferior and lateral precordial leads, suggestive of an old inferior-lateral wall mycoardial infarct.

The airman elected to have the WPW treated, and a single lateral accessory pathway was found and ablated. Since this initial evaluation, the airman's murmur was evaluated twice using echocardiograms and ECGs when the airman switched employers, and medical evaluations at these institutions noted his murmur. These echocardiograms reconfirmed the mild-to-moderate aortic root dilation (4.3 cm), and repeat ECGs revealed the same Q-waves to the inferior and lateral precordial leads.

Noting this interval history, the aviation medical examiner at the executive medicine clinic, in addition to the OSA workup, obtained a repeat echo to assess for interval aortic root dilation (it had been several years since his last echocardiogram). This new echo revealed the new findings of systolic anterior motion of the anterior mitral leaflet, a mid-systolic dynamic left ventricular outflow gradient (13 mmHg at rest up to 67 mmHg with Valsalva), increased ventricular septal wall thickness (15 mm, normal < 13 mm), and mild mitral regurgitation. The diagnosis of hypertrophic cardiomyopathy was given. However, confirmatory evidence was sought, and the echocardiogram was followed by a cardiac MRI. This MRI confirmed hypertrophic cardiomyopathy (sigmoid type), with moderate left ventricular hypertrophy of the anterior septal wall, dynamic left ventricular outflow tract obstruction with systolic anterior motion of the mitral valve, and mild mitral regurgitation.

After these findings were noted, an EST was conducted; the airmen completed a plain Bruce stress test for 10.46 min, obtaining a maximum heart rate of 176 (101% of his predicted max), with a peak blood pressure of 184/80; the test was negative for ischemia. In addition, a maximal nuclear stress test and 48-hour Holter monitor were performed. The nuclear stress test indicated a normal perfusion with no evidence of stress-induced ischemia and no areas of infarction; his ejection fraction was 66%. The 48-hour Holter monitor showed a basic sinus rhythm with rare ventricular premature contractions and rare supra-ventricular premature contractions.

The airman throughout this time had been asymptomatic and at no time complained of cardiac symptoms; specifically, he denied chest pain, chest pressure, dyspnea, palpitations, syncope, near syncope, and peripheral edema. This airman had no family history of sudden death, hypertrophic cardiomyopathy, or history of other cardiovascular diseases. Physical exam included a healthy-appearing adult with a body mass index of 25 and a grade II/VI late-peaking systolic murmur along the left sternal boarder. This murmur disappeared with squatting and became grade 3 with standing. No ectopic beats were present.

Aeromedical Concerns

The primary aeromedical concern associated with hypertrophic cardiomyopathy (HCM) is the increased risk for sudden incapacitation. Dyspnea, angina, fatigue, presyncope, and the medications prescribed for HCM are also of concern. For this reason, airmen with HCM are typically denied flying first-class and second-class certificates. The Code of Federal Regulations (CFR) 14 section 67.111(b) cardiovascular, and 67.113(b) general medical condition would disqualify first-class airman applicants with a diagnosis of HCM. 14 CFR sections 67.213(b) and 67.313(b) would limit second- and third-class certificates. 14 CFR 67.401 provides authority for special issuance medical certifications for this condition (7).

Outcome

The airman was diagnosed with asymptomatic hypertrophic cardiomyopathy with a dynamic outflow obstruction, New York Heart Association Class I. The airman's history of obstructive sleep apnea, evaluated with polysomnography and a Maintenance of Wakefulness Test (MWT), was found to be resolved. Based on the diagnosis of HCM, the airman was denied a medical certificate for Class I/II duties; however, a Class III certificate, with Special Issuance was granted. Requirements to maintain this certificate included yearly follow-up with 48-hour-Holter monitor and echocardiogram. Medical therapies for this airman were considered but not initiated, as medications do not affect long-term outcomes and are, therefore, only started when symptoms develop (this airmen denied symptoms). In addition, a defibrillator was considered but not indicated in this low-risk airman; low risk is typically defined as the absence of chest pain or exertional dyspnea, absence of a family history of HCM or sudden death, absence of syncope, absence of non-sustained VT during on Holter monitor, an outflow tract gradient of less than 30 mmHg at rest, a normal blood pressure response to upright exercise, and a wall thickness of less than 20 mm. Recommendations were made for this airman to avoid competitive athletics or burst-type training but to maintain an active lifestyle. Family screening via genetic testing or cardiac imaging was recommended for all first-degree relatives and for any athletic, second-degree relatives.

Continued on page 13

Hypertrophic Cardiomyopathy

Hypertrophic cardiomyopathy (HCM) is an inherited autosomal dominant condition resulting in hypertrophy of the left ventricle wall mass to a thickness in excess of 13 mm. HCM occurs in all racial groups with a prevalence of 0.2% (or 1/500) in the general population. The muscle hypertrophy usually occurs in an asymmetric fashion and generally involves the left ventricular septum. This asymmetric hypertrophy is the result of the development of scar tissue and disorganized myofibrils, which are thought to be the nidus for the ventricular arrhythmias, which can lead to sudden death (1,4). Although HCM is a heritable disorder that includes 400 mutations affecting at least 11 contractile proteins, roughly half of all cases are spontaneous in nature (2). HCM is most commonly diagnosed in adults in their 30s and 40s but has been identified in all age groups, including newborns. A pressure gradient of the left ventricular outflow tract is a distinctive clinical feature of HCM, but it is only present in 25% of patients (an abnormal gradient is typically considered being > 30 mmHg). This increased pressure is created by the anterior leaflet of the mitral valve (which may be elongated and abnormally large) coming in contact with the hypertrophied septum during systole, when the outflow tract is most narrow (3).

The clinical course of HCM is variable. Many patients are asymptomatic or only mildly symptomatic, and the diagnosis is made incidentally. Symptomatic HCM includes dyspnea (occurring in up to 90% of symptomatic patients), angina, palpitations, lightheadedness, fatigue, syncope, and sudden cardiac death. Dyspnea is largely due to the increased stiffness of the left ventricle, resulting in impaired ventricle filling and subsequent elevated left ventricle pressure (4).

The overall prognosis of HCM is very good, with a near-normal life expectancy, but certain factors place particular individuals at increased risk. Risk stratification for sudden death include young age at first diagnosis (age < 30 years), an episode of aborted sudden death, a family history of HCM with sudden death, specific mutations in the genes coding for troponin-T and myosin, sustained supraventricular or ventricular tachycardia, ventricular septal wall thickness over 30 mm, a hypotensive response to exercise, recurrent syncope (especially in children), and bradyarrhythmias. Overall, HCM-related annual mortality rates have been estimated at 1% in adults and 2% in children (5).

A diagnosis of HCM may be suggested by ECG, which is abnormal in 75–95% of HCM patients (6). Common abnormalities include LVH and widespread deep Q waves, suggestive of an old myocardial infarction; arrhythmias both atrial and ventricular are also common. The diagnosis of HCM is typically made with a two-dimensional echocardiography, which is able to determine heart dimensions, patterns of ventricular hypertrophy, contractile function of the heart, and severity of the outflow gradient. Cardiac MRI is also able to provide excellent information about cardiac anatomy. Cardiac catheterization and angiography can be performed but are generally used if other tests cannot provide the needed information or if invasive intervention is planned.

Medical treatments include beta- and calcium-channel blockers, and disopyramide. Diuretics should be avoided in all HCM patients as they reduce intravascular volume, decreasing the amount of blood available to distend the left ventricular outflow tract, leading to increased obstruction (4). Invasive treatments include septal myectomy, alcohol septal ablation, and pacemakers. Septal myectomy is an open heart procedure done to remove tissue from the hypertrophied septum. Alcohol septal ablation, introduced in 1994, is a percutaneous technique that involves injecting alcohol into one or more septal branches of the left anterior descending artery, resulting in a controlled myocardial infarction, thereby decreasing septal wall thickness. Pacemakers have also been used to contract the interventricular septum before the left ventricular free wall contracts, thereby decreasing the gradient across the left ventricular outflow tract. Patients deemed to be at high risk for arrhythmias and sudden death often have defibrillator implantation (15% of patients at some HCM centers). In cases that are refractory to all other forms of treatment, cardiac transplantation is an option.

References

1. Marian A.J. On predictors of sudden cardiac death in hypertrophic cardiomyopathy. J Am Coll Cardiol March 19, 2003; 41(6): 994-6.
2. Gabriel Khan M.I. Encyclopedia of heart diseases. 2006, Elsevier Inc., pg. 204-13.
3. Sherrid MV, Gunsburg DZ, Moldenhauer S, Pearle G. Systolic anterior motion begins at low left ventricular outflow tract velocity in obstructive hypertrophic cardiomyopathy. J Am Coll Cardiol Oct 2000, 36 (4): 1344-54.
4. Maron BJ. Hypertrophic cardiomyopathy. In: Braunwald's Heart disease: A textbook of cardiovascular medicine (9th ed.). Philadelphia: WB Saunders. 2011, Chap 69, 1585-6.
5. McKenna WJ, Behr ER. Hypertrophic cardiomyopathy: Management, risk stratification, and prevention of sudden death. Heart 2002;87:169-76.
6. Maron, BJ. Hypertrophic cardiomyopathy, a systematic review. JAMA 2002 Mar; 287(10):1308-20.
7. 14 CFR, Chapter 1, Subchapter D Part 67 Medical Standards and Certification. U.S. Code of Federal Regulations, Title 14, Part 67. Washington, DC: US GPO. Online at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=cd6aeaf037eb754a06f5fdb0d0ae812f&rgn=div8&view=text&node=14:2.0.1.1.5.2.1.6&idno=14. Accessed 4 May 2011.

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Medical Certification Following Q Fever With Neurologic Impairment

Case Report by Mark McPherson, MD, MPH

Q fever is a zoonotic infection endemic in the U.S. with approximately 150 cases reported yearly. It can have neurologic or cardiac sequelae. This article presents a case report of a third-class pilot with history of Q fever diplopia and syncope, as well as aeromedical issues.

History

In October 2008, a 63-year-old third-class airman with 1,838 hours was hospitalized for unexplained vertigo. He was evaluated and treated with fluids, and an MRI revealed a very small but questionable cerebellar infarct that did not correspond to his symptoms. He was discharged from the hospital, and over the course of the next two to four weeks developed fever, flu-like illness, joint pain, a bulls-eye rash and diplopia. The work-up at the time (11/11/2008) included a phase-2 positive titer for *Coxiella burnetii* (Q fever) at 1:32. The patient was started on doxycycline 100mg BID and rifampin 300mg BID for 60 days. The following evening, he was seen in the emergency room for syncope after taking his medications on an empty stomach chased down with an Irish coffee. He was diagnosed with vasovagal syncope and was released.

The patient's fever and all neurologic symptoms resolved within a week of starting on the doxycycline. A follow up MRI in December did not show any abnormality in the cerebellar region or in any other area. He completed the full course of medications and had a negative *Coxiella burnetii* titer four months following the initial diagnosis 3//16/2009, and a subsequent normal transesophageal echocardiogram showed no evidence of endocarditis. The patient resumed flying two to three months after completion of therapy. In January 2010, his aviation medical examiner examined him and noted his hospitalization and history of diplopia and syncope. Examination data, including phorias, a full ophthalmologic work up, and FAA Form 8500-7, were negative. However, the AME deferred the airman to the Aerospace Medical Certification Division for review.

Discussion

Q fever is a zoonotic infection with reservoir in cattle, sheep, and goats caused by the bacteria *Coxiella burnetii,* which was first described in Australia in 1937 (1). It has been reportable in the United States since 1999 and is increasing in frequency. The reported frequency has been 17 cases in 2000, 167 cases in 2007, and 132 in 2008 (2). The illness typically presents with fevers, flu-like illness, cough, muscle aches, and arthralgias. Hepatitis and pneumonia occur frequently, and meningitis, encephalitis, and other illness have been described (3-6). In addition, chronic Q fever, affecting <5% of cases, can be manifest by infection of the liver, bone, or other organs.(4) Endocarditis has been described as the most frequent presentation of chronic Q fever with severe complications, therefore current treatment protocols recommend follow up transesophageal echocardiogram for assessment for valvular vegetations (2-4).

Q Fever

- Signs and symptoms of Q fever are non-specific to this disease, so lab testing is necessary for diagnosis. If possible, labs should be drawn prior to starting a patient on antibiotics.
- Immunohistochemical staining and DNA detection methods, or by direct isolation of the agent via culture may isolate the bacteria in tissue.
- Serologic testing can be used to detect antibodies to *C. burnetii*.
- The indirect immunofluorescence assay is the most dependable serologic method. Enzyme-linked immunosorbent assay (ELISA) tests are also becoming available.
- Acute and convalescent antibody titers taken after 2-3 weeks demonstrate the best evidence of acute infection.
- Serologic tests evaluate antibodies to two distinct antigenic forms of *C. burnetii* called Phase I and Phase II.
- In acute cases, Phase II is higher than Phase I, usually by the second or third week.
- Phase I antibodies occur after Phase II antibodies. Both antibodies can be increased for long periods without infection. In chronic Q fever, Phase I antibody titers are much greater than phase II titers. Titers ≥ 1:800 are considered diagnostic in endocarditis patients for chronic Q fever.
- Acute patients may be followed by serology for up to two years after illness to survey for chronic disease.
- Phases I and II antibodies can persist for months or years after infection (2).

The bacteria is very susceptible to doxycycline, which is the treatment of choice; in fact, failure to respond following treatment with doxycycline calls the diagnosis into question. The typical course of treatment for acute Q fever is 14 days and for chronic disease up to 18 months (1-4). The estimated case fatality rate is <2%. Post-Q fever fatigue syndrome has been described and presents with fatigue, sweats, headache, photophobia, and myalgias in the post-infection setting (2).

Aeromedical Issues

The primary aeromedical issues in this patient were syncope and diplopia, both of which are disqualifying conditions under Title 14 CFR 67.

Continued on page 15

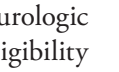
Q Fever from page 14

As specified in 14 CFR part 67.401, an airman with a neurologic condition may be considered for special issuance of a medical certificate if the person can demonstrate an ability to execute airman duties without endangering public safety (7). Submission of all treatment records, as well as current status report, is required. It is responsibility of the airman to provide documentation that the condition is stable or transient and does not interfere with cognitive or physical requirements necessary to safely pilot an aircraft.

Because this airman experienced transient diplopia, an eye evaluation was completed, including completion of FAA Form 8500-7 and no abnormalities were identified. The patient's full medical records surrounding the diagnosis, treatment of Q fever and the syncope event, and MRIs were also sent to the AMCD, which concurred with the diagnosis of vasovagal syncope and full resolution of symptoms following Q fever with neurologic symptoms. The airman was certified and issued an eligibility letter with warning regarding the return of symptoms of diplopia and syncope, and he was then certified by his AME for a third-class medical certificate.

References

1. Parker NR, Barralet JH, Bell AM. Q fever. *Lancet* 367 (2006); 679-88.
2. Center for Disease Control. Q fever. Accessed 01MAY 2011. Online at: www.cdc.gov/qfever/index.html.
3. Hartzell JD, Wood-Morris RN, Martinez LJ, Trotta RF. Q fever: Epidemiology, diagnosis and treatment. Mayo Clinic Proceedings 2008 83(5):574-9.
4. McQuiston JH, Holman RC, McCall CL, et al. National surveillance and the epidemiology of human Q fever in the United States, 1978-2004. *Am J Trop Med Hyg* 2006;75(1):36-40.
5. Kofteridis DP, Mazokopakis EE, Tslentis Y, Gikas A. Neurological complications of Q fever. *Eur J Epidemiol* 2004; 19(11):1051-4.
6. Bernit E, Pouget J, Janbon F, et al . Neurological involvement in acute Q fever, a report of 29 cases and review of the literature. *Arch Intern Med* 2002;162(6):693-700.
7. Code of Federal Regulations, Title 14, Part 67, 67.401(a). Washington, DC: U.S. GPO, [Dec 8,2009].



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2013 AME Seminar Schedule

May 13–16	Chicago, Ill.	AsMA (1)
July 15–19	Oklahoma City, Okla.	Basic (2)
August 9–11	Arlington, Va.	OOE (3)
September 26–28	Orlando, Fla.	CAMA (4)
October 28–November 1	Oklahoma City, Okla.	Basic (2)
November 15–17	Sacramento, Calif.	CAR (3)

NOTES

1) A 3½-day theme AME seminar held in conjunction with the Aerospace Medical Association (AsMA). This seminar is a new Medical Certification theme, with 9 aeromedical certification lectures presented by FAA medical review officers, in addition to other medical specialty topics. 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.

(2) A 4½-day basic AME seminar focused on preparing physicians to be designated as aviation medical examiners. Call your Regional Flight Surgeon.

(3) A 2½-day theme aviation medical examiner (AME) seminar consisting of aviation medical examiner-specific subjects plus subjects related to a designated theme. Registration must be made through the Oklahoma City AME Programs staff, (405) 954-4831. NEU= Neurology, OOE= Opthalmology-Otolaryngology-Endocrinology, CAR= Cardiology.

(4) This seminar is being 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 Website:

www.civilavmed.com.

The Civil Aerospace Medical Institute is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

Medical Certification of Pilots With Parkinson's Disease

Case Report, by Patricia A. MacSparran, MD, MOH, CPE

A first-class commercial airline pilot with a diagnosis of Parkinson's disease presents for renewal of his special issuance after noting some increased dexterity problems but denies problems with concentration, memory or depression. Aeromedical concerns related to diagnosis, treatment and disease progression are discussed.

History

A 47-year-old male first-class commercial airline pilot with 2,000-plus hours of flight time applied for a renewal of his special issuance for Parkinson's disease one year after initial diagnosis and initial 12-month special issuance was granted. He held Airline Transport, Flight Engineer, and Commercial Airman Certificates.

The airman had been diagnosed with idiopathic Parkinson's disease in August 2010 after he was evaluated for a six-month tremor of his right hand. His family history was significant for two aunts who had also been diagnosed previously with Parkinson's. He had no prior history of head trauma, and his only previous hospitalization was as a child for complications related to mumps. Before working as a commercial airline pilot, he had served as a pilot for the USAF with no significant aeromedical history.

Initial symptoms were mild; a right arm tremor was making writing difficult. His treating physician began a dopamine agonist, which was not allowed by FAA standards, and he then switched the airman to carbidopa/levodopa (Sinemet) 25/100, one-half tab orally three times a day to be titrated up to a dose of 1 mg three times a day. Over the next year, he was switched to the CR formulation (Sinemet 50/200) on an as-needed basis for the days he needs to fly. His initial dose had been effective, but it was titrated to the current dosing regimen within the first year of diagnosis. He reported the medication helped with tremor suppression about 30-50%, takes about 30 minutes to take effect, and lasts approximately 3-7 hours, depending on the severity of the tremor on any particular day. Over the last year, he has started to develop symptoms on the left arm, as well with worsening of his right arm tremor. He has noted some dexterity problems, especially on the right with difficulty buttoning the top buttons of his shirts and often feels uncoordinated. He denies any problems with concentration or memory and has had no hallucinations or symptoms of depression.

Aeromedical Issues

The primary aeromedical concerns are rooted with the progression and advancement of Parkinson's disease symptoms. The natural course of the disease will lead to decreased motor skills affecting the extremities early with increased bradykinesia and decreased fine motor skills. Ultimately, language can be affected, making crew communication and radio calls difficult. Dementia can be progressive for many individuals with Parkinson's disease, particularly older individuals (> age 50), and cognitive function needs to be evaluated to ensure continued mental capacity is compatible with aviation duties. Depression is also a common occurrence as the disease process progresses and should be treated appropriately, along with the aeromedical concerns it entails with medical therapy.

Outcome

Based on the airman's presenting symptoms, family history, physical exam, and treatment outcome with as-needed carbidopa upon initial presentation, he was granted a 12-month special issuance for Parkinson's disease. His 12-month recertification would then be based on current medical status of condition from his treating physician to include his current medications, dosages, frequency of use, degree of stability, and any interval history of disease progression. His follow-up report should specifically address any motor dysfunction, dementia/cognitive dysfunction, hallucinations, or any depressive symptoms. The airman also was to furnish the results of his most recent simulator proficiency check flight or other operational assessment for the most complex aircraft currently flown.

References

1. Hughes AJ, Daniel SE, Kilford L, Lees AJ. Accuracy of clinical diagnosis of idiopathic Parkinson's disease: a clinico-pathological study of 100 cases. *J Neurol Neurosurg Psych* 1992; 55:181
2. De Lau LM, Breteler MM. Epidemiology of Parkinson's disease. *Lancet Neurol* 2006; 5:525.
3. Scherzer CR, Eklund AC, Morse LJ, et al. Molecular markers of early Parkinson's disease based on gene expression in blood. *Proc Natl Acad Sci* USA 2007; 104:955.
4. Chen H, Zhang SM, Hernán MA, et al. Nonsteroidal anti-inflammatory drugs and the risk of Parkinson disease. *Arch Neurol* 2003; 60:1059.
5. Aarsland D, Zaccai J, Brayne C. A systematic review of prevalence studies of dementia in Parkinson's disease. *Mov Disord* 2005; 20:1255.
6. Mayeux R, Denaro J, Hemenegildo N, et al. A population-based investigation of Parkinson's disease with and without dementia. Relationship to age and gender. *Arch Neuro* 1992; 49:492.
7. Hobson P, Meara J. Risk and incidence of dementia in a cohort of older subjects with Parkinson's disease in the United Kingdom. *Mov Disorders* 2004; 19:1043.
8. Aarsland D, Andersen K, Larsen JP, et al. Risk of dementia in Parkinson's disease: A community-based, prospective study. *Neurology* 2001; 56:730.

Continued on page 17

Diagnosis, etiology and progression of Parkinson's disease

Parkinson's disease is a chronic, progressive, neurodegenerative disorder whose diagnosis is based on clinical impression. There are no physiologic tests or blood tests for confirming the diagnosis, and neurodiagnostic testing with computerized imaging is almost always unrevealing. However, it is generally accepted that bradykinesia, plus one of the other two cardinal manifestations (tremor or rigidity) must be present to make the diagnosis of idiopathic Parkinson's. Some texts will also include gait disturbance as a cardinal sign. In addition, an excellent response to dopaminergic therapy is an important criterion for the diagnosis. Other clinical features that support the diagnosis are unilateral onset, presence of a resting tremor, and a persistent asymmetry of symptoms throughout the course of the disease with the side of onset most affected.[1] Approximately 40%of patients with Parkinson's disease will eventually develop dementia. The true "gold standard" for diagnosis is neuropathologic examination.

The frequency of Parkinson's disease varies depending on the diagnostic criteria, study population, and epidemiologic methods used. With these caveats in mind, the prevalence of Parkinson's disease (number of cases at a particular point in time) is generally expected to be about 0.3% in the general population, and approximately 1% in people who are >60 years old.[2] Worldwide, there are approximately five million people with Parkinson's.[3] Estimates of the incidence (number of new cases per year) range from 8 to 18.6 per 100,000 person-years.[2] In a prospective study involving 142,902 health care professionals, the incidence of Parkinson's was estimated to be 18.6/100,000 person-years.[4] The rate was found to be much higher for men than for women (43.2 versus 10.7 per 100,000 person-years).[4] Only 4% of the cases were younger than age 50, and the rate within that group was also higher for men than for women (19.0/100,000 versus 9.9/100,000). In a review which utilized exacting criteria to identify 24 studies from the literature, 31% of 1767 Parkinson's disease patients were found to have dementia.[5] Older age, age at onset of Parkinson disease ≥60 years, duration of Parkinson disease, and severity of parkinsonism symptoms may affect the incidence of dementia in Parkinson's.[6-12]: One prospective study demonstrated the mean onset of dementia after diagnosis to be 14 years.[9]

Neurodiagnostic testing is almost always unhelpful in the evaluation of suspected Parkinson's. The American Academy of Neurology systematic review and practice parameter published in 2006 found insufficient evidence to support or refute the value of certain ancillary tests for distinguishing Parkinson's disease from other parkinsonian syndromes, including magnetic resonance imaging, ultrasound of the brain parenchyma, 18F fluorodeoxyglucose positron-emission tomography, urodynamics, autonomic testing, and urethral or anal electromyography.[13] While neuroimaging is usually non-diagnostic in the evaluation of suspected disease and there is no diagnostic test for Parkinson's, MRI of the brain should be performed to exclude specific structural abnormalities (e.g., hydrocephalus, tumor, or lacunar infarcts).

Medical treatment options are currently limited for the airman as discussed above. Regular exercise promotes a feeling of physical and mental well-being. It is especially valuable due to the chronic nature of Parkinson disease and its associated progressive motor limitations. Exercise may also improve function in some motor tasks, but it will not slow the progression of akinesia, rigidity, or gait disturbance. However, it can prevent or alleviate some secondary orthopedic effects of rigidity and flexed posture.[14]

Parkinson's from page 16

9. Aarsland D, Andersen K, Larsen JP, et al. Prevalence and characteristics of dementia in Parkinson disease: an 8-year prospective study. *Arch Neuro* 2003; 60:387.
10. Stern Y, Marder K, Tang MX, Mayeux R. Antecedent clinical features associated with dementia in Parkinson's disease. *Neurology* 1993; 43:1690.
11. Hughes TA, Ross HF, Musa S, et al. A 10-year study of the incidence of and factors predicting dementia in Parkinson's disease. *Neurology* 2000; 54:1596.
12. Reid WG, Hely MA, Morris JG, et al. A longitudinal of Parkinson's disease: Clinical and neuropsychological correlates of dementia. *J Clin Neurosci* 1996; 3:327.
13. Suchowersky O, Reich S, Perlmutter J, et al. Practice Parameter: diagnosis and prognosis of new onset Parkinson disease (an evidence-based review): Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 2006; 66:968.
14. Comella CL, Stebbins GT, Brown-Toms N, Goetz CG. Physical therapy and Parkinson's disease: a controlled clinical trial. *Neurology* 1994; 44:376.

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