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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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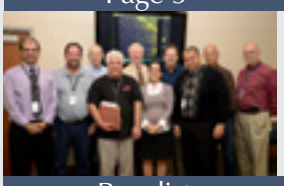

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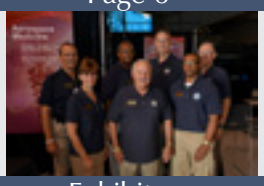

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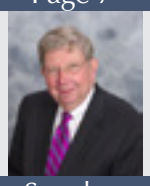

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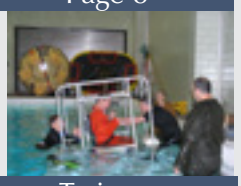

Trainers

from the Federal Air Surgeon's

PERSPECTIVE...

by James R. Fraser, MD, MPH

CACI UPDATE

In my first article, I told you that a major goal during my tenure as Federal Air Surgeon was to make interfacing with our medical certification system more efficient and airman-friendly. I told you that I would like to increase the ninety percent of airmen that walk out of an aviation medical examiner's office with a new medical certificate and decrease the ten percent of airmen that are presently deferred. I discussed the tools we could use to increase the number of certificates issued by AMEs, and I described how CACI [Conditions AMEs Can Issue] would serve as the first tool that would help us become more efficient.

The CACI protocol program allows AMEs to issue airman medical certificates that previously had to be deferred to the Aerospace Medical Certification Division or the Regional Flight Surgeon's Office for further review. Under the CACI protocol program, AMEs can issue unrestricted airman medical certificates to airmen with common medical conditions when they meet specific requirements. Before CACI, these conditions always required special issuance medical certificates.

CACI was developed so that AMEs could use their clinical experience to identify and issue airman medical certificates with medical conditions that are treated, stable, and not at significant risk for medical incapacitation.

CACI medical certificate issuances have specific requirements. At present, 12 conditions qualify. The on-line *AME Guide* lists criteria for issuing each of the 12 CACI conditions and what to document in Block 60 of the FAA airman medical certificate application. Ten of the 12 conditions have worksheets in the Guide; and criteria for the others (prostate and testicular cancer) are in the dispositions table for each condition. Links to the online CACI *AME Guide* information follow this article.

I am very excited about this program and plan to add more CACI conditions in the future, **but I need your help** as we validate the safety of the CACI process.

A recent quality assurance review revealed a large increase in AME errors. Almost all (95%) of these errors were due to AMEs not following correct CACI protocol, as described by the *AME Guide*.

To understand this better, I asked the CAMI Safety Management System team to review our first three months of CACI certification data, from July to September 2013. They identified some successes, and some opportunities for improvement.

The Safety Management System team asked two questions:

1. When exams were issued by the AME, was CACI appropriately applied and documented?
2. For CACI eligible conditions, was the new process utilized?

For Question **1,** we reviewed cases where the airman had at least one of the original nine CACI pathcodes and the AME issued a regular certificate. Of those exams, we determined that:

- 80% of the time AMEs issued correctly
- Only 25% of the properly issued CACI exams had correct notations in Block 60 documenting CACI status.

Adding the CACI protocol does not appear to increase safety concerns; however, AMEs did not adequately document their use of the CACI protocol in Block 60.

What is the proper documentation to use?

Special notations must be used in Block 60 for all CACI-eligible conditions and are found at the bottom of the CACI worksheets. **The correct notation must be typed word for word.** For example, this is for arthritis:

AME MUST NOTE in Block 60 one of the following:

- ☐ Airman meets certification criteria for arthritis.
- ☐ Airman had a previous Special Issuance for this condition and now meets the regular issuance certification criteria for arthritis.
- ☐ Airman does NOT meet certification criteria for arthritis. I have deferred this exam. (Enter the application into the Automated Data System [AMCS] and mail the supporting documents to FAA identifying which criteria were not met.)

For Question **2**, we limited the scope of the analysis to exams with the simplest medical histories, involving a single CACI condition. With this limitation, we determined that:

- 39% of the time AMEs inappropriately deferred or inappropriately special-issued a CACI eligible exam
- Only 17% of the CACI-eligible exams were properly issued and had correct notations in Block 60.

We identified missed opportunities for CACI issuance in this latter group—of all the CACI-eligible exams, nearly 40% of the time AMEs could have issued without a time-limited restriction but they did not.

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Our analysis indicates a need for more AME education regarding CACI procedures and documentation.

Actions Requested of AMEs:

1. Whenever you examine an airmen with a CACI-application condition, check the *AME Guide* and issue if the criteria are met – don't miss an opportunity to better serve the airman community. If CACI criteria are met, keep the records, and do not mail in any supporting medical documentation. This documentation is for your records and future use.
2. For all CACI conditions, document your actions in Block 60, as required by the CACI procedure.
3. Remember that if an airman does not meet the standard for CACI issuance, enter the information into the electronic data system [AMCS], identifying which CACI criteria were not met on the airman medical certificate application.
4. Use online *AME Guide* resources for current information. CACI worksheets and criteria will change over time.

In summary, CACI is one way that the FAA can leverage the skills of our AMEs to safely improve the efficiency of airman medical certification. Studying our early CACI experience, we have identified the need for your improved familiarity with CACI conditions, protocols, and documentation.

We will add more CACI conditions over time, but it is essential that you stay current and document correctly. As always, we appreciate all the great work you do for the FAA. With your cooperation, we can make CACI a resounding success!

—Jim

CACI conditions, and links in the *AME Guide* (links below are active)

Arthritis
Asthma
Colitis
Glaucoma
Hepatitis C - Chronic
Hypertension
Hypothyroidism
Migraine and Chronic Headache
Pre-Diabetes
Renal Cancer

CACIs Without Certification Worksheets
Prostate Cancer
Testicular Cancer

Documentation requirements:

AME MUST NOTE in Block 60 one of the following:

Airman meets certification criteria for ---------.

Airman had a previous Special Issuance for this condition and now meets the regular issuance certification criteria for ----------.

Airman does NOT meet certification criteria for ---------. I have deferred this exam. (Mail the supporting documents to FAA identifying which criteria were not met.)

Results: 3 Months of CACI

** 80% of the time AMEs issued correctly*
** Only 25% of the properly issued CACI exams had correct notations in Block 60 documenting CACI status*
** 39% of the time AMEs inappropriately deferred or inappropriately special-issued a CACI eligible exam*
** Only 17% of the CACI-eligible exams were properly issued and had correct notations in Block 60*

Letter to the Editor

Diabetics Using Beta Blockers

Dear Editor,

It was with some mild amusement that I saw these two classes of medications can't be used together. There was an old myth that the beta blockers would mask signs of hypoglycemia, but to the best of my knowledge this was laid to rest a long time ago. In the family medicine world we don't worry about that anymore. I would hate to see an airman disqualified on this basis.

Howard Suls, MD, FAAFP
Bedford, N.H.

Dear Dr Suls,

Thank you for your letter to the editor regarding FAA policy on the use of beta blockers in airmen taking glucose-independent diabetic medications such as insulin, sulfonylureas, and meglitinides. Historically, various sources to include the National High Blood Pressure Expert Working Panel in 1994 discouraged the use of beta blockers in diabetics, based largely on theoretical concerns about increased hypoglycemic episodes, decreased hypoglycemic awareness, and prolonged recovery from hypoglycemic episodes.

The implications of a significant hypoglycemic episode while flying are obvious. Subsequent review articles by Majumdar in 1999, and Sawicki and Siebenhofer in 2001 found no evidence of adverse effects of beta 1 selective blockers on glucose metabolism. With so many glucose-dependent diabetic medications now available, with which beta blockers are approved, we had not recently revisited the question which you raise.

Furthermore, our analysis of the literature is complicated by the fact that clinical papers often do not define "significant" hypoglycemic episodes the same way as we might define aeromedically significant episodes. We believe, however, that it is reasonable to readdress the safety of cardioselective beta blockers in airmen also taking glucose-independent oral diabetic medications.

Penny Giovanetti, DO
Deputy Manager
Aerospace Medical Certification Division

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

Multimedia Aviation Medical Examiner Refresher Course (MAMERC):
www.faa.gov/go/ametraining

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

Airman Education Programs & Aerospace Physiology
www.faa.gov/pilots/training/airman_education/aerospace_physiology/

2012 Medical Certification Statistical Handbook
www.faa.gov/data_research/research/med_humanfacs/oamtechreports/2010s/media/201325.pdf

Inside
the Federal Air Surgeon's Cardiology Panel, Part I

By Brian D. Johnson, MD

This is the first of a two-part review of the Federal Air Surgeon's Cardiology Panel and the Federal Air Surgeon's Cardiology Consultant process to help you understand their function and makeup. In the second part to be published in the next issue of the *Bulletin*, I'll explain how you can help to facilitate certification for your applicants that have been deferred or denied certification because of heart problems.

The Reasons

First, we have to start with the reason for the existence of these entities. Multiple cardiac conditions are specifically disqualifying under Title 14 Code of Federal Regulations Part 67.111, 211, and 311. These conditions are: significant coronary artery disease requiring treatment to include cases with angina, myocardial infarction, or requiring bypass, angioplasty, stenting, or atherectomy. It also includes cardiac valve replacement, permanent pacemaker implantation, and heart transplants.

All of these conditions may receive special issuance under Part 67.401 if they satisfy the conditions set forth by the Federal Air Surgeon. The Federal Air Surgeon, with the assistance of his cardiology consultants, decided that first-and second-class airmen (third-class only for heart transplants) with the above conditions would require review by the cardiology panel or the cardiology consultants for initial certification after any one of these events.

Over the years, we have also included review for all classes of initial certification of asymmetric hypertrophic cardiomyopathy and significant congenital cardiac abnormalities corrected with surgery. We will also bring the third-class cardiac cases to panel that we are not comfortable with and that we believe requires a comprehensive review (such as unusual rhythm disturbances). Typically, I or Dr. **Benton Zwart**, Dr. **Joseph Ray**, or AMCD manager Dr. **Courtney Scott** have already reviewed these cases.

The History

The Federal Air Surgeon's cardiology panel first started in the early 80s and originally met in Washington, D.C., as part of a bigger multispecialty consultant panel. Early members included Dr. **Myrv Ellestad**, Dr. **Earl Beard**, and then Dr. **Jay Sands**. The panel eventually moved to Oklahoma City, as a cardiology panel only, and currently meets there every other month. A Federal Air Surgeon's cardiology consultant comes out to review cases in the months that the panel does not meet. I took over organizing and chairing the panels from Dr. **Stephen Carpenter** when he retired four years ago.

A recent cardiology panel. L-R: Drs. Farhad Sahir, Brian Johnson, Frank Pettyjohn, John Raniolo, James Devoll, Marlene Grenon, Andy Miller, Mr. Reggie Richardson, Dr. Steve Savran, and Dr. William Fors.

The Technology Improves

On the human interest side, it is noteworthy to point out that when I started attending these panels 13 years ago, we looked at angiograms on reel-to-reel players, echos on VHS tapes, and radionuclide films on the X ray light box. Now, we look at most of the studies on CDs and photo-quality paper. The old reel-to-reel player is collecting dust in some warehouse, and in all likelihood the VHS players have all disappeared.

We have also worked panels during all kinds of weather conditions, including during a snow storm with hardly anyone else in the building to provide support. During one of our lunch breaks in a restaurant, our cardiologists even resuscitated someone who went into cardiac arrest.

The Team

The 27 physicians on our cardiology consultant list include 20 cardiologists, three cardiothoracic surgeons, one vascular surgeon who specializes in aortic repairs, a heart transplant surgeon, and three electrophysiologists. They come from all over the nation with vast amounts of experience and highly respected credentials.

The specialists rotate through the panels, and a typical panel consists of four to five specialists, myself, a medical records technician, **Reggie Richardson** (an automation clerk), and Dr. **James DeVoll** from the Headquarters Medical Specialties Division. Occasionally, other FAA physicians will attend.

The Statistics

Some statistics about the cardiology panel and the cardiac consultants programs are interesting and worth mentioning. For the years 2011 through 2013 we reviewed an average of 32 cases per panel/consultant visit, for an average of 384 cases per year. Over those three years, we issued certificates for 72% of the cases seen. This percentage of approvals has remained fairly consistent in recent years. About 61% of cases reviewed were first-class, 23% second-class, 1% limited second-class, and 15% of the cases were third-class.

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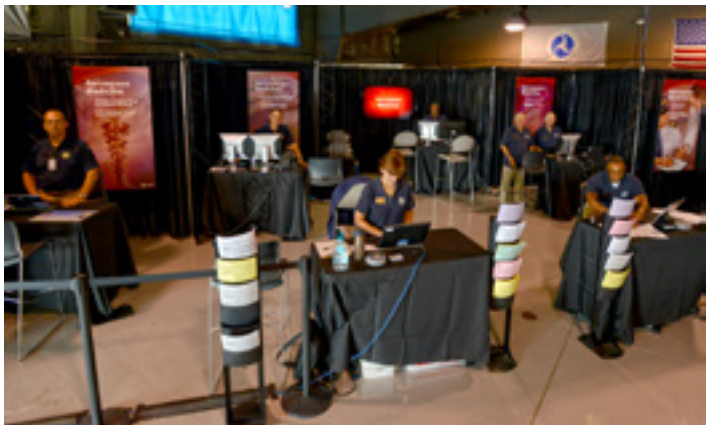
OSHKOSH, the Airshow

By Mike Wayda



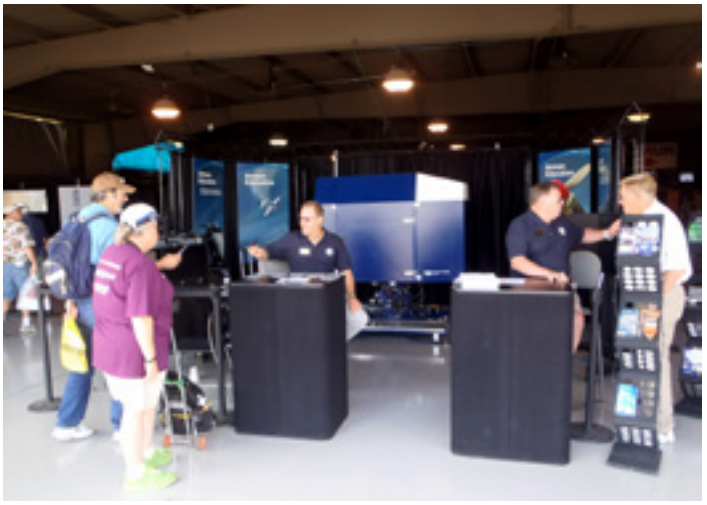
The Office of Aerospace Medicine's medical information booth at the EAA AirVenture airshow.

Two teams from the Office of Aerospace Medicine were on the scene to assist a portion of the expected 508,000 aviation enthusiasts at the 2014 Experimental Aircraft Association's annual AirVenture airshow in Oshkosh, Wis., during its recent one-week run.

Dr. **Michael Berry**, Deputy Federal Air Surgeon, joined the team hosting a booth staffed by experts from the Great Lakes Regional Flight Surgeon's office and the Civil Aerospace Medical Institute, all of whom were on hand to lend medical certification advice to airmen. The team assisted approximately 900 airmen.

Participation in the airshow displays supports the Federal Aviation Administration's efforts to reduce the number of general aviation accidents.

Deputy Federal Air Surgeon Dr. Michael Berry (center front) led a team of medical specialists at the Oshkosh airshow information booth. L-R: Southern Region Flight Surgeon Dr. Arnold Angelisi, the Great Lakes Region team: Program Analyst Kathleen Rogers, Flight Surgeon Dr. Marvin Jackson, Regional Flight Surgeon Dr. David Schall, Program Analyst Joshua Parker, and from Oklahoma City, Aerospace Medical Certification Division Manager Dr. Courtney Scott.



Eric Simson (left) and Rogers Shaw, from the Civil Aerospace Medical Institute's Airmen Education Team, introduce pilots to spatial disorientation.

A second team, anchored by Team Lead **Rogers Shaw**, was also helping airmen but in a different way. Instructors from the Civil Aerospace Medical Institute showed pilots the ups and downs of spatial disorientation by spinning them in the "Gyro," the general aviation spatial disorientation demonstrator. The experience invokes vestibular and visual illusions (spatial disorientation) that can occur during low-visibility flying conditions, often with severe consequences.

Instructor Roger Storey briefs a pilot in the cockpit of the Gyro as a future aviator looks on.

After receiving a two-minute orientation, the pilot takes the controls and launches on a six-minute flight, progressing from VFR, with "out-the-window" scenes on a video screen, to instrument conditions. Pilots learn why they should trust their instruments and not rely on their subjective notions of where right-side-up should be.

Nearly 300 airmen tried their hand at flying the Gyro during the airshow.

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FAA Photos by Laurie Zaleski and Eric Simson

CARDIOLOGY PANEL from page 5

The Anatomy of a Panel

The panel review process is somewhat detailed, as you might expect it to be, but is well established and works well. We typically meet for two days and review an average of 38 cases. However, before a case ever gets to the panel, it is throughly reviewed. First, when we receive the case, supplemental narratives, reports, and films it is previewed and organized by a medical records technician. Second, it goes to a legal instrument examiner to make sure we have all the needed information and to request anything else that is still needed. Once complete, the case is reviewed by an Aerospace Medical Certification Division physician, and if it is ready for the panel, returns it to be abstracted.

They then send the case to our transcriptionist to type up the abstract. Finally, it then goes to the panel where one of the cardiologists will review the case and then present it to the other cardiologists. The entire panel will then review the studies provided, including the cardiac catheterization films, echo films, radionuclide perfusion films, and stress test tracings. They will then discuss the case and pertinent findings.

Taking into account the medical findings, the current regulations, Federal Air Surgeon's guidelines, and using their combined medical expertise, they make a decision on the likelihood of incapacitation during the proposed certification period. They will then recommend either certification or denial. The final decision is then made by the FAA. Uncomplicated cases are reviewed by the Aerospace Medical Certification Division's appeals physician. Complicated cases go to the Federal Air Surgeon's office for a decision.

Note that all third-class heart transplant cases and all asymmetric hypertrophic cardiomyopathies are returned to the Federal Air Surgeon's office.

If the panel recommends a denial, we will include a copy of the panel or consultant's dictation in the denial letter to the airman so that the airman can take it to his or her personal cardiologist to discuss. Typically, the airman should receive a letter within one to two weeks after the panel has met regarding the decision that was made.

The Next Time

In Part II, I will give you some more "inside information" about how you, the aviation medical examiner, can successfully navigate your cardiology cases through the Federal Air Surgeon's cardiology panel.

Dr. Brian Johnson is a cardiac appeals physician in the Aerospace Medical Certification Division.

Seminar Speaker Feature: Dr. Richard Carlson

By Janet Wright

Dr. **Richard Carlson** is our featured speaker for this quarter. Dr. Carlson is a practicing ophthalmologist from Norfolk, Virginia. He has been an aviation medical examiner for 39 years, a senior AME for most of those years. He is a consultant to the FAA, as well as a lecturer.

As a speaker for the ophthalmology portion of AME seminars, Dr. Carlson has been all over the United States and estimates that he has spoken in Oklahoma more than 100 times. The first visit was memorable for him in that one always remembers where you were and what you were doing during major news events. Dr. Carlson recalled that, in 1980, he was in Oklahoma attending a seminar when **President Jimmy Carter** attempted to rescue the 52 hostages from Iran.

Dr. Carlson served as a flight surgeon for the United States Navy for 26 years. He is now an assistant professor of ophthalmology at Hampton Roads Medical College and an adjunct professor of physiology, aviation safety, and human factors at Embry Riddle Aeronautical University. He is on staff at Sentara Hospital in Norfolk, Virginia.

> *"An AME's job is really to be an advocate for the pilot"*

Being with pilots is his favorite thing about Dr. Carlson's AME duties. "An AME's job is really to be an advocate for the pilot," he said. "We, as AMEs, know what is acceptable to the FAA, who to call, and how a pilot can probably be certified."

Dr. Carlson is an associate fellow of the Aerospace Medical Association and is a 33rd Degree Mason and 3rd Degree Knight of Columbus.

Janet Wright is the Aerospace Medical Education Division's Team Lead for aviation medical examiner education.

Educational Opportunities Abound!

By Brian Pinkston, MD

It's a good day to be an aviation medical examiner if you are looking for education. The Office of Aerospace Medicine is offering more options than ever. Of note, Mrs. **Janet Wright** and Mr. **Gary Sprouse** are offering a new refresher course that combines aviation medical examiner requirements and Human Intervention Motivation Study (HIMS) requirements into a 5-day super seminar. That's right, if you are a current HIMS independent medical sponsor, you can sign up for this seminar, which will take place in Denver, Colorado, from September 6-10. It is offered as a joint program with the annual HIMS seminar in Denver.

Dr. **Susan Buriak** has released updates to the online multimedia AME refresher course. She also led an all-star team to release a completely updated Civil Aviation Physiology for AMEs course this past year. Both courses are easy online methods to get some free CME.

If you are interested in getting some face time with your Regional Flight Surgeon's office, the Office of Aerospace Medicine team has worked tirelessly to provide you with options. In addition to the regular regional educational programs, the team released the first-ever distance learning seminar in March at six regional offices through the FAA Academy's Studio. In addition to standard didactic topics provided from the studio, the regional staff was available for questions and further education. Based on the positive feedback, we plan to offer this program annually. All of these courses are eligible for Aerospace Medicine maintenance of certification credit as well.

If you desire hands-on aviation education, the Airman Education team provides weekly physiology and survival courses at the Civil Aerospace Medical Institute in Oklahoma City at no cost. While you are at CAMI, they can give you a night vision imaging system orientation. They also can provide physiology courses away from the campus through our mobile spatial disorientation and hypoxia training systems. They are able to schedule on-location training for groups of 200 or more.

Finally, the Aerospace Medical Education Division sponsors medical student, resident, and graduate medical education in Aerospace and Environmental Medicine in conjunction with the Aerospace Medical Certification Division and our research divisions. In short, the Office of Aerospace Medicine has a program for any interest in Aerospace Medicine.

For general questions, please send them to me at

BRIAN.PINKSTON@FAA.GOV.

For AME-specific programs, please write

JANET.E.WRIGHT@FAA.GOV

GARY.SPROUSE@FAA.GOV

We look forward to seeing you soon!

Dr. Pinkston manages the Aerospace Medical Education Division.

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Physiological training at CAMI.

Night vision setup

Spatial disorientation demonstation

Hypoxia training

Water survival

Land survival

AME Feedback Improves the Quality of Airman Medical Certification Services:

2014 Survey Summary Results

By Brenda Wenzel, PhD and Katrina Avers, PhD

The Federal Air Surgeon followed suit with the 2012 AME survey and invited all domestic, military, federal, and international aviation medical examiners (AMEs) to participate in the 2014 survey evaluation of airman medical certification services. We received responses from nearly 1,700 AMEs.

This year's survey had a new look and new items to better gauge how well the FAA serves and supports AMEs in performing their duties as federal designees. In keeping pace with the digitization of the airman medical certification process, the survey was online and accessed from either a Web browser or mobile device such as a smartphone. The timing of the survey allowed the Aerospace Medical Certification Division to collect critical information to guide a near-term decision on upgrading to digital submissions of ECG records.

The importance of your feedback, as an AME, cannot be overstated. The Office of Aerospace Medicine relies upon your collective assessment of the online tools and resources, training, and support used to perform your duties and uses it to improve the AME program and airman medical certification services.

The survey provides the OAM with data to: (a) examine trends in service satisfaction, (b) assess service quality, (c) determine if programmatic changes translate into service improvements, (d) prioritize changes being considered in the upcoming program review, and (e) identify needed service improvements. Criteria for participating in the survey was to have both served as an AME for a year or more and seen at least one airman applicant during the 12 months prior to the survey. The satisfaction and service quality ratings were restricted to AMEs with direct experience using/receiving the service within 12 months prior to completing the survey. Survey results presented here are expressed in percentages of respondents, referred to throughout as AMEs.

Relative to 2012, the rates of AMEs satisfied with medical certification services provided in the 12 months prior to the survey rose above 90%, across the board, for the Aerospace Medical Education Division (up 5 percentage points to 93%), Aerospace Medical Certification Division (up 3 percentage points to 91%), and Regional Flight Surgeon (up 5 percentage points to 92%) offices. As first-time assessments, the quality of services provided by the Medical Education and Certification Divisions and the Regional Flight Surgeon offices surpassed expectations for the majority, with 9 of 10 AMEs rating service quality at or above *good*. First-time measures of rates of service satisfaction for the Office of Aerospace Medicine were similarly high (89%), with the same patterns of service quality surpassing expectations for the majority, and 9 of 10 rating the quality at or above *good*.

We evaluated 36 changes made since the 2012 survey for impact on performance of AME duties. There was overwhelming evidence of the effectiveness of changes made, which were based, in part, on the 2012 feedback. The 2014 feedback reveal that the changes constituted service improvements (i.e., the rate of positive impact on AME performance outweighed the rate of negative impact), with the exception of a change in the AMCS Internet system that prevents users from continuing if a comment is too long. Below are the top 10 improvements (ordered by Δ):

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	Pos%	Neg%		Pos%	Neg%
1. AMCS capability to modify a certificate before reprinting (Δ79%)	79.4	0.9	6. AMCS Summary Report of explanations, comments, general notes (Δ67%)	67.2	0.2
2. Mandatory use of MedXPress (Δ77%)	83.0	5.7	7. "Policy update" messages in AMCS (Δ66%)	67.6	1.9
3. AMCS capability to reprint a certificate (Δ72%)	73.6	1.7	8. "Go AME" website (Δ63%)	63.6	1.2
4. Conditions AMEs Can Issue (CACI) (Δ71%)	73.2	2.6	9. Downloadable medical forms and brochures (Δ60%)	60.8	0.8
5. Notification of new issue of the *Federal Air Surgeon's Medical Bulletin* (Δ67%)	68.1	1.2	10. AMCS capability to print interim Special Issuance (non-AASI) certificate (Δ58%)	58.8	0.7

Δ = positive percent - negative percent (rounded to nearest whole number); Pos=positive; Neg=negative

SURVEY from page 9

Equally important to determining if the changes improved support to AMEs was the proportions of AMEs that were unaware of the changes. As many as 1 in 3 AMEs were unaware of virtual office inspections, email access to their Regional Flight Surgeon, and online videos covering policy updates. As few as 1 in 100 were unaware of mandatory use of MedXPress. AMEs can expect to receive more communications on process changes and policy updates and more locations for reviewing and downloading updates to stay current.

Fifteen proposed changes currently under consideration (some AMEs identified as "needed improvements" and others are solutions to issues identified by AMEs) were prioritized based on individual need. Below are the top 10 priority improvements (ordered by Σ):

	Top%	High%		Top%	High%
1. MedXPress capability for applicant to attach supporting documents (Σ65%)	29.1	35.5	6. Easy access to CACI worksheets (Σ58%)	22.5	35.4
2. Capability for applicant to electronically check status of certificate (Σ61%)	23.1	38.3	7. Provide online spec sheets (Σ48%)	15.1	32.5
3. Capability to electronically check status of deferral (Σ61%)	26	35.4	8. More regional seminars (Σ45%)	15.2	29.8
4. AMCS capability to attach supporting documents (Σ59%)	24.9	34.3	9. Consistency between NavAids and the AME Guide pdf (Σ43%)	13.8	29.5
5. Offer CACI Theme Seminar (Σ58%)	19.6	38.8	10. Offer "Super AME" status (Σ33%)	13.8	19.0

Σ = top priority percent + high priority percent (rounded to nearest whole number)

The following online resources were evaluated by those who used them: *AME Guide*, *Federal Air Surgeon's Medical Bulletin* (*FASMB*), "Go AME" website, Office of Aerospace Medicine (OAM) website, and downloadable pilot safety brochures. Although the resources are well received (i.e., satisfactory quality, relevant content, useful, and user friendly) by most AMEs, there is room for improvement. The *AME Guide*, and "Go AME" and OAM websites had relatively low rates for "user friendly" (respectively, 53%, 61%, and 60% compared to 76% for the *FASMB*). Online content that is not easy to navigate may be disregarded as "useful" even if it is highly relevant. With exception of the *AME Guide* (91% rated content as very/completely relevant), enhanced content will spur usefulness of the resources, and so will design solutions that make content easy and quick to locate. However, there are constraints on FAA document and website formats that limit design solutions to improve ease of use.

For those who were able to participate in the 2014 survey, we greatly appreciate your involvement and expert input. The Office of Aerospace Medicine relies on your candid feedback in meeting their goal of continuously improving the airman medical certification process, and thereby elevating quality standards for services and support offered to all AMEs. Your feedback and commitment makes a difference to the medical certification services provided airman applicants.

The next release of the survey will be in 2016, so expect an invitation to participate--we would like to hear from all aviation medical examiners.

Drs. Wenzel and Avers are research psychologists in the Human Resources Research Division; Dr. Avers is also the Acting Flight Deck Human Factors Research Branch Manager.

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Cerebral Venous Thrombosis

By Dwight Peake, MD, MPH

Cerebral venous thrombosis is an uncommon condition that has become more easily diagnosed with the advent of high-detail neuroimaging. This article presents a case report of a first-class pilot who developed this condition and who demonstrates many typical findings of this disease process, which has a quite variable clinical picture.

History

About 30 minutes after deplaning from his aircraft, a 48- year-old male airline pilot became dizzy and felt stiffness in his right lower extremity and lost consciousness after falling to the ground. Bystanders reported that his body flailed about, except for his right lower extremity. The flailing lasted a short period, ceased without treatment, and was followed by a period of decreased responsiveness, which did not resolve until he arrived at a local hospital about half an hour later.

He subsequently reported having had a severe headache prior to the flight that day and a similar one a week before, in addition to periods during the week when he felt "disoriented." By hospital arrival, he reported feeling fine with no ongoing symptoms, and a review of symptoms was positive only for snoring. His medical history was unremarkable except for dyslipidemia treated with simvastatin and prophylactic daily aspirin; his family history was notable for peripheral vascular disease in his father. He is a nonsmoker.

On hospital admission, he was noted to be obese (BMI 34.4) and appeared comfortable, with blood pressure 130/80 mm Hg, pulse 133 beats per minute, respirations 16, and temperature 98.6°F. His physical exam was otherwise normal, with no evidence of papilledema, trauma, incontinence of stool or urine, or neurological deficits. His non-contrast head CT was normal. His laboratory results showed normal complete blood count and electrolyte values. His serial levels of the following with baseline and follow-up results were: Troponin <0.04 and 0.09, CK 368 and 1168, CK-MB 0.9 and 2.3, and myoglobin 3.8 and 479. Electrocardiogram showed ST depression in leads V2, V5, and V6.

Cardiac catheterization showed minimal luminal irregularity in the left anterior descending artery and diagonal branch but was otherwise normal, with a dominant right coronary artery and an ejection fraction of 60%. Brain MRI/MRA indicated a dural arteriovenous fistula. EEG was normal. His discharge diagnosis was syncope, dural arteriovenous fistula, and possible partial complex seizure.

During outpatient evaluation, he underwent CT angiogram of the head that showed sagittal sinus thrombosis and probable dural venous fistula. A subsequent head and neck arteriogram confirmed an extensive cerebral sinus fistula, sagittal sinus thrombosis, and a 2 mm aneurysm in the right superior cerebellar artery.

The initial loss of consciousness event was considered most likely to be a provoked seizure due to the sagittal sinus thrombosis and that the mildly elevated troponin, myoglobin, and CK and CKmb resulted from the seizure activity, not a cardiac event. He was treated with levetiracetam for six months for seizure prevention, and multistage embolism of the dural fistula was accomplished without complications.

Work-up also included evaluation for hypercoagulable states. His factor VIII levels were persistently elevated at 241% of normal, and he was started on warfarin sodium with a target INR of 2 to 2.5 and then continued on aspirin.

Twenty-one months after the initial event, the applicant had not experienced a recurrence of altered mental status and loss of consciousness. Follow-up cerebral angiography was planned to evaluate the status of his repaired arteriovenous fistulae and the aneurysm noted on his initial test.

Aeromedical Concerns

This airman appropriately followed FAA regulations (Title 14 CFR Part 61.53) by not flying and applying for special issuance for his medical condition.

The most significant aeromedical concern for this applicant is the history of a provoked seizure and the presence of a small intracranial aneurysm. A history of two seizures is required to establish a diagnosis of epilepsy, and his single seizure was provoked by a presumed known cause. Therefore, it is not a specifically disqualifying condition under Part 67.109. It does appear to meet the conditions of Part 67.109 (b) (1): "No other seizure disorder, disturbance of consciousness, or neurologic condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—(1) Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held…"

He had a seizure at diagnosis that increased the risk for a recurrent seizure, Factor VIII was elevated very significantly and persistently, as well as obesity (both risk factors for recurrent thrombosis), was on warfarin therapy with aspirin for anticoagulation, and had the additional finding of an intracranial aneurysm. The risk from a seizure while in control of an aircraft is self-evident, since the seizure would represent a prolonged period of altered consciousness, and the seizure itself could be a violent event with the individual thrashing about hitting controls and other crewmembers.

Although the short-term risk of subarachnoid hemorrhage from the aneurysm would be considered very low since it is under the 7mm diameter thought to represent a significant risk threshold, it does add to the medical complexity of this case (see *The Federal Air Surgeon's Medical Bulletin,* Vol. 45, No. 3, 2007, p. 6 for a detailed discussion of this condition).

The single seizure is due to a presumed known condition, cerebral venous thrombosis, CVT. While the CVT has been treated, at this point, it has not definitely been corrected, and the applicant remains at risk for further seizures. Otherwise,

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a special issuance could be considered if the seizure cause had been corrected and the applicant were doing well after a one-year recovery period followed by a neurological evaluation. For an unexplained single seizure, the typical recovery period required prior to FAA consideration for special issuance is four years.

Furthermore, if he remains on warfarin, he will need to provide the information required for the thromboembolic disease protocol (www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/dec_cons/disease_prot/thromboembolic/).

In addition, due to his history of obesity and snoring, his personal physician should evaluate him to determine if a formal sleep study is indicated for sleep apnea, which would also require special issuance.

Outcome

Twenty months after his seizure, the FAA Aeromedical Certification Division referred his case to an FAA neurology consultant. After examining the records documenting the applicant's hospitalizations and other evaluations, the consultant determined that the risk of recurrent seizure remains significant and that the applicant is unable to safely perform the duties or exercise the privileges of a first-class airman certificate and recommended the special issuance request be denied.

References

1. Saposnik G, Barinagarrementeria F, Brown RD, Jr., et al. Diagnosis and management of cerebral venous thrombosis: A statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2011;42(4):1158-92.
2. Dentali F, Ageno W. Natural history of cerebral vein thrombosis. Curr Opin Pulm Med. 2007;13(5):372-6.
3. Cakmak S, Derex L, Berruyer M, et al. Cerebral venous thrombosis: Clinical outcome and systematic screening of prothrombotic factors. Neurol. 2003;60(7):1175-8.
4. Kim MJ, Cho AH, No YJ, et al. Recurrent cerebral venous thrombosis associated with elevated factor VIII. J Clin Neurol. 2006;2(4):286-9.
5. Eichinger S, Hron G, Bialonczyk C, et al. Overweight, obesity, and the risk of recurrent venous thromboembolism. Arch Intern Med. 2008;168(15):1678-83.
6. McBane RD, 2nd, Tafur A, Wysokinski WE. Acquired and congenital risk factors associated with cerebral venous sinus thrombosis. Thromb Res. 2010;126(2):81-7.
7. Filippidis A, Kapsalaki E, Patramani G, Fountas KN. Cerebral venous sinus thrombosis: Review of the demographics, pathophysiology, current diagnosis, and treatment. Neurosurg Focus. 2009;27(5):E3.

Cerebral Venous Thrombosis

Cerebral venous thrombosis (CVT) is an uncommon condition with an estimated incidence of about 5 cases per million people per year. The thrombosis may involve the dural sinuses, most commonly the sagittal sinus, or the cerebral veins (1). Historically, most cases were associated with infections, but in the antibiotic era are most common in persons with inherited or acquired hypercoagulable states (2). Factor VIII elevation may be the most frequent coagulation association, with significantly increased risk for thrombosis (3, 4). Obesity is also a significant risk factor for thrombotic events (5). Females are more commonly affected by CVT (60 to 75% of cases) (6). Similarly, three-fourths of patients are less than 50 years old. Dural arteriovenous fistula is often associated with CVT and may either result from or cause CVT (1).

The diagnosis can be difficult, particularly since 25% of cases present with only isolated headache, and cerebral venous thrombosis is a rare cause of this common symptom. Another 25% of patients may present with headache and papilledema (1). The headache is typically generalized and dull, may be worsened by Valsalva, but it may also present as a sudden, severe headache and mimic subarachnoid hemorrhage or be associated with aura. In addition to headache, CVT may present as a focal neurological deficit that may be unilateral or bilateral, including weakness, aphasia, and cognitive deficits; about 1% of strokes are due to CVT.

Forty percent of patients may develop seizures, and half of the seizures may be focal (7). Between 5 and 32% of patients experience their first seizure more than two weeks after diagnosis of CVT, and about 5% of patients will have two or more seizures. Having a seizure within the first two weeks of CVT diagnosis is a risk factor for recurrent and late seizures (1).

Some patients present with diffuse encephalopathic symptoms. Cavernous sinus thrombosis, currently the rarest form of CVT, presents with third and fifth cranial nerve palsies, facial pain, and is most typically associated with infection (7).

Prior to the availability of current CT and MRI technology, CVT was typically diagnosed by autopsy studies. Non-contrast CT, however, has low sensitivity for CVT and cannot be used to exclude the diagnosis. The currently preferred screening test is MRI T2-weighted imaging with MR venography, although CT contrast venography may be used (1).

Current guidelines recommend treatment of CVT with anticoagulation (1).

About the Author

Dwight Peake, MD, MPH, FACEP, LtCol, USAF, MC, FS, is board certified in Internal Medicine and Emergency Medicine and was a resident in Aerospace Medicine when he wrote this case report at the Civil Aerospace Medical Institute.

Adenoid Cystic Carcinoma

Case Report, by Andrew W. Schiemel, MD

Adenoid cystic carcinoma is a rare epithelial tumor entity and comprises about 1% of all malignant tumor of the oral and maxillofacial region.[1] The long natural history of this tumor, its propensity for perineural invasion, and its tendency for local recurrence are well known.[2] It is a slowly growing but highly invasive cancer with high recurrence rate; however, patients undergoing complete surgical excision have shown excellent rates of 5-year disease-free state and survivability.[3] This article presents a case report of a third-class pilot who developed a parotid adenoid cystic carcinoma and underwent successful surgical excision. A brief review of disease pathophysiology, outcomes associated with treatment, and aeromedical concerns is included.

History

A 67-year-old male third-class pilot with over 3,500 hours of flight time applied for third-class medical recertification roughly 6 months following excision of a right parotid adenoid cystic carcinoma. While initial presentation specifics are unavailable, the patient was evaluated and found to have a 2 x 2 centimeter mass in the right parotid gland. Right parotidectomy was recommended as a definitive course of action, and the patient underwent surgery in October 2010. The right parotid gland was removed in its entirety, along with two regional lymph nodes. Operative report notes the facial nerve was untouched.

Pathology report noted complete excision of the offending tumor with 1mm clear margins and the two regional lymph nodes were without evidence of carcinoma. Liver function tests and chest X ray were negative.

Evaluation by the pilot's aviation medical examiner (AME) in May 2011 revealed well-healed right preauricular/neck surgical scars, no evidence of masses or lymphadenopathy on head and neck examination, normal neurological findings, and a normal conversational voice test at 6 feet. The remainder of the examination was unremarkable. An evaluation by the patient's surgeon, in support of the medical certificate application, was included. The surgeon's note reported no palpable masses or lymphadenopathy on the neck or parotid beds, intact facial nerves bilaterally, and normal computed tomography imaging of the head, neck, and chest.

Aeromedical Issues

In all cases, the primary aeromedical concern remains the same – Is the pilot at risk of sudden or subtle incapacitation as a result of the medical diagnosis? According to the Aeromedical Certification Reference Manual, "the risk for sudden or subtle incapacitation can arise from the primary caner itself, paraneoplastic effects of cancer, the side effects of cancer treatment, and effects of metastases." In this particular case, the answer is straightforward. The primary cancer was completely excised; the airman has suffered no obvious paraneoplastic effects, tumor progression, or metastases; and he is free of post-surgical complications. We'll examine issues for the AME a bit further along, but a discussion of a few potential aeromedical issues related to salivary gland tumor excision is in order prior to moving forward.

Additional aeromedical concerns surrounding this case involve two related but separate issues. Each has to do with the potential for damage to cranial nerve VII – the facial nerve – during tumor excision. While the parotid gland is in proximity to the more distal aspects of the nerve, it is important to nonetheless evaluate for potential nerve damage from excision. The most obvious concern revolves around potential symptoms of nerve palsy such as drooping facial musculature and dry eyes due to inadequate lid closure and poor parasympathetic-driven secretion from the lacrimal glands. While the latter would produce a mere annoyance, the former may affect a pilot's ability to properly don an oxygen mask and achieve an adequate seal. Adhesion or scarring related to surgical procedure might compound this difficulty.

The other concern regards the facial nerve branch that innervates the stapedius muscle. Damage proximal to this branch of the facial nerve would result in wider oscillation of the stapes and subsequent heightened reaction of the auditory ossicles to sound vibration. This condition, known as hyperacusis, causes normal sounds to be perceived as being very loud and might interfere with proper communication in the cockpit and with controllers.

Role of the Aviation Medical Examiner

The general medical standards for medical certificates annotated in Title 14 of the Code of Federal Regulations parts 67.133, 67.213, and 67.313 include no functional or structural disease, defect, or limitation that makes the person unable to safely perform the duties or exercise the privileges of an airman.[4] AMEs are authorized to examine airmen to determine whether or not they meet these standards.

In the case of a patient with a tumor of the parotid gland, the AME should fill the dual role of examining the patient thoroughly and facilitating the collection of supporting documentation needed for a potential special issuance. Physical examination in this case should confirm adequate healing of surgical incision, absence of lymphadenopathy or masses, proper hearing acuity and lack of a history of hyperacusis, and normal facial nerve function with regard to innervation of the facial musculature. Standards for the third-class medical certificate head and neck examination are outlined in §67.305.[5]

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Outcome

The airman was issued a time limited special issuance following submission of a full clinical evaluation 6 months s/p his parotidectomy and tumor excision by a qualified surgeon. The evaluation included documentation of normal facial nerve function and a well-healed surgical scar, along with normal head/neck/throat examination absent of masses or lymphadenopathy. Diagnostic studies included a negative head/neck/chest computed tomography scan and a normal liver panel. Per requirements set out in the *Guide for Aviation Medical Examiners*, the special issuance requires annual follow-up with submitted documentation of similar evaluation to ensure no return of the primary tumor, no metastases, and no clinical manifestation of disease related to same.

References

1. Kokemueller H, Eckardt A, Brachvogel P, Hausamen JE. Adenoid cystic carcinoma of the head and neck – a 20 years experience. *Int J Oral Maxillofac Surg* 2004;33:25–31.
2. Spiro RH. Salivary neoplasms: Overview of a 35-year experience with 2, 807 patients. *Head Neck Surg* 1986;8:177–84.
3. Terhaard CH, Lubsen H, Van der Tweel I, et al. Salivary gland carcinoma: Independent prognostic factors for locoregional control, distant metastases, and overall survival: Results of the Dutch head and neck oncology cooperative group. *Head Neck* 2004 Aug;26(8):681-92; discussion 692-3.
4. Title 14 Code of Federal Regulations, Chapter 1, Subchapter D, part 67 Medical Standards and Certification. Available at:

   WWW.FAA.GOV/GO/AMEGUIDE

5. General Systemic Examination Techniques. Office of Aerospace Medicine Guide for Aviation Medical Examiners. Federal Aviation Administration. Available at: www.faa.gov/about/office_urg.headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/. Accessed January 25, 2012.

About the Author

Andrew W. Schiemel, MD, MPH, CDR MC (FS) USN, was a Resident in Aerospace Medicine when he wrote this case report at the Civil Aerospace Medical Institute. Currently, he is serving as the Senior Medical Officer on the USS John C. Stennis, based in Bremerton, Washington.

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Reminder

CACI – Conditions AMEs Can Issue

Make Statement in Box 60

The Box 60 statement is the only way the FAA knows that you evaluated the airman for the CACI condition and issued with a CACI. You do not need to send the worksheet or any other documentation to the FAA, but you must document if the airman meets CACI criteria for that medical condition or not, with the wording at the bottom of the CACI worksheet.

Medical Certification of Pilots With Pituitary Microadenoma

Case Report, by Michael Penny

Pituitary adenomas have an estimated incidence in the population of approximately 16.7%. The natural history of these tumors varies with the cell type, hormonal activity, and rate of tumor growth. Pituitary microadenomas are defined as being less than 10mm in size. This case report presents a pilot with a first-class certification who was diagnosed with pituitary microadenoma and reviews pituitary adenomas and associated issues related to aeromedical suitability (1).

History

A 3mm pituitary microadenoma was discovered by MRI in this 47-year-old male first-class pilot during work-up for hypogonadism in 2007. Subsequently, he was evaluated by neurosurgical and neuroendocrine specialists. Due to the tiny size (3mm), lack of hormonal hypersecretion on laboratory testing, and normal neurological examinations, it was thought that surgical and pharmacological interventions were currently unnecessary. The airman was started on testosterone (AndroGel) 5 grams once daily and growth hormone replacement therapy because of low free and total testosterone levels and a low insulin-like growth factor 1 level. These hormone deficiencies were thought to be unrelated to the pituitary adenoma. During this work-up and all follow-up visits, the airman was noted to be asymptomatic, specifically denying headache or visual problems.

Between 2007 and 2010, surveillance of the airman's pituitary adenoma by annual MRIs showed no change in tumor size. Aside from noting hyperlipidemia and slightly elevated hemoglobin, the airman's remaining laboratory tests (including his thyroid function test) were within normal limits during this interval. Patient notes from the attending neurosurgeon in 2009, as well as the attending endocrinologist in 2009, both state that the tumor was small, stable, non-functioning, and was unlikely to progress or cause neurological symptoms. A 1-year follow-up interval with MRI and annual vision testing was suggested, and both specialists recommended that the airman be cleared for flight duties.

In March 2011, the airman's annual MRI failed to demonstrate evidence of pituitary adenoma, and the airman's neurosurgeon recommended that no additional surveillance was needed. The endocrinologist concurred, stating that the patient had been asymptomatic since initial diagnosis; the pituitary microadenoma was stable, very small, and most likely an incidental finding requiring no intervention. Additionally, because his growth hormone and testosterone levels normalized, the airman was directed to wean off of his testosterone and growth hormone medications. It was noted that the prolactin level was slightly elevated at 17.7. The airman was directed to return in 4 months to have this test repeated.

Aeromedical Issues

The clinical decision-making process in aerospace medicine requires the aviation medical examiner to focus on the safety-of-flight factors surrounding an airman's medical condition. Frequently, this special focus drives a more thorough and more expensive surveillance and treatment of the disease process. In the case of a commercial pilot, the additional aeromedical evaluation is deemed necessary, as subsequent decisions regarding the airman's flight status affects public safety as well. According to Title 14 Code of Federal Regulations Part 67, intracranial tumors should be deferred to the FAA for medical certification decisions (2).

Pituitary microadenomas are frequently asymptomatic and discovered incidental to imaging for other neurological issues. The potentially deleterious effects they can produce are related to rapid growth or hormonal activity. Initial work-up should therefore include an MRI, as well as prolactin levels, thyroid panel, insulin-like growth factor levels, dexamethasone suppression test, and luteinizing hormone and follicle-stimulating hormone levels (3). A 12-month period of stability after initial diagnosis is generally required for follow-up. The annual work-up must include an MRI to document the tumor size and the appropriate lab work to document normal hormone levels. A study of pituitary adenoma surveillance methods, which compared quality of life measures and effectiveness, concluded that annual prolactin levels were the most cost-effective method of surveillance in the general population. In light of the aeromedical goal of ensuring public safety, it is suggested here that this conservative approach falls short (4).

Outcome

This case was reviewed by the Aerospace Medical Certification Division of the Civil Aerospace Medical Institute, and specific concerns were raised in regards to hormone secretion and growth of the adenoma. As previously stated, the airman remained asymptomatic, and the most recent MRI indicated that the microadenoma had resolved. He had no evidence of hormone hypersecretion, but instead had transient growth hormone and testosterone deficiencies that normalized and no longer required hormone replacement. From 2008-2010, he was given first-class, time-limited certification. The decision to re-issue a first-class certification with a warning for pituitary adenoma revolved around resolution of the adenoma on the current MRI and normalization of the hormone levels.

References

(1) Ezzat S. The prevalence of pituitary adenomas. *Cancer* 2004;*101*(3), 613-19.

(2) 14 CFR, Chapter 1, Subchapter D, Part 67 Medical Standards and Certification. www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/standards/ Accessed 20 January 2012.

(3) Serhal D, Weil R, & Hamrahian A. Evaluation and management of pituitary incidentalomas. *Cleveland Clinic Journal of Medicine* 2008;*75*(11), 793-801. doi:10.3949/ccjm.75.11.793.

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(4) King J, Justice A, & Aron D. Management of incidental pituitary microadenomas: A cost effectiveness analysis. *The Journal of Clinical Endocrinology & Metabolism* 1997; *82*(11), 3625-32. doi:10.1210/jc.82.11.3625.

(5) Heaney P. Pituitary tumor pathogenesis. *British Medical Bulletin* 2005;75-76. 10.1093/bmb/ldh062.

(6) Serri O, Chik C, Ehud U, & Ezzat S. Diagnosis and management of hyperprolactinemia. *Canadian Medical Association Journal* 2003;*169*(6), 575-81.

(7) Feldkamp J, Santen R, Harms E, et al. Incidentally discovered pituitary lesions: High frequency of macroadenomas and hormone-secreting adenomas- results of a prospective study. *Clinical Endocrinology* 1999;(51), 109-13.

(8) Fernandez-Balswells M, Murad M, Barwise A, et al. Natural history of nonfunctioning pituitary adenomas and incidentalomas: a systematic review and metaanalysis. *Journal of Clinical Endocrinology and Metabolism* 2011; *4*(96), 905-12.

(9) Molitch M. The pituitary "incidentalomas." *Annals of Internal Medicine* 1990; *12*(112), 925-31.

About the Author

Michael G. Penny, MD, CAPT, USN, MC, UMO, FS,was a resident in aerospace medicine when he wrote this case report at the Civil Aerospace Medical Institute. Currently, he is the Senior Medical Officer at CVN-78, the pre-commissioning unit of USS Gerald R. Ford, the U.S. Navy's new class of aircraft carrier.

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Pituitary Microadenomas and Incidentalomas

Pituitary adenomas are the most common central nervous system tumors, accounting for 10% of all intracerebral tumors and are common in the general population with an incidence of 16.7%, based on a combination of imaging studies and post-mortem examination (5). Formerly classified by size (tumors > 10mm as macroadenomas and tumors < 10mm as microadenomas), immunohistochemical methods now allow determination of cell type predominance and hormonal activity. Prolactin-secreting cells are the predominant cell type, occurring in 25-41% of pituitary adenomas (1).

Clinical detection of symptomatic pituitary adenomas typically occurs due to mass effect or hyper secretion of hormones from the anterior pituitary axis. The mass effect is most common in pituitary macroadenomas and results in headaches, visual deficit due to pressure on the optic chiasm, or (rarely) cavernous sinus thrombosis. Pituitary apoplexy is a rare complication caused by hemorrhagic infarction of macroadenomas. It presents with sudden onset of headache, nausea, vomiting, vision loss, and cranial nerve deficits. The risk of this complication in pituitary macroadenomas is 0.4 to 7% over 2-6 years of follow-up (3).

Hypersecretion, or hyposecretion of hormones in the anterior pituitary gland, may occur in micro- or macroadenomas. The most common hypersecretion syndrome is prolactinemia, which produces weight gain, infertility, galactorrhea, hypogonadism, decreased libido, and eventual osteopenia. In women, it also causes amenorrhea (6). Pituitary adenomas account for 80% of Cushing's syndrome cases due to hypersecretion of ACTH. Hypersecretion of growth hormone causing acromegaly, and thyrotropin leading to hyperthyroidism, are other less common complications of anterior pituitary hypersecretion. It is noteworthy that surveillance for these complications is relatively straightforward, involving periodic lab tests that are readily accessible in the United States (3).

Asymptomatic pituitary adenomas are frequently discovered incidental to imaging studies for other medical workups. Frequently referred to as *incidentalomas*, they have a low complication rate. In one small study, visual field deficits were found in 4.2% and prolactin secretion in 11.9% of incidentalomas. Progression in size was seen in 3.2% of microadenomas versus 26.3% of macroadenomas (7). In a recent metaanalysis by the Mayo Clinic in 2011, microadenoma growth occurred in 3.3 per 100 patient years versus 12.5 per 100 patient years in macroadenomas. The overall incidence of new endocrine dysfunction was 2.4 per 100 patient years (8).

Treatment and surveillance in pituitary adenomas vary according to the size, growth, and hormone production of the tumor. Surgical excision via the transphenoidal route is the most common method of intervention in symptomatic or rapidly growing pituitary adenomas. Other modalities include radiotherapy or medications specific to the cell type. Bromocriptine, for example, is a dopamine agonist used for medical treatment in prolactin-secreting tumors (3).

In the case of non-secreting, asymptomatic, stable pituitary microadenomas, conservative treatment is standard. Initial workup includes a comprehensive history and physical exam focusing on neurological, ophthalmological, and potential stigmata of pituitary hypersecretion. Laboratory studies should be obtained to include CBC, electrolytes, kidney and liver functions, thyroid panel, urine cortisol, prolactin level, insulin-like growth factor, follicle stimulating hormone, and luteinizing hormone. Imaging by MRI (if not already performed) is used to assess adenoma size and to look for impending mass effect (3).

Follow-up in a conservatively managed patient typically occurs every 12 months. Education of the patient with respect to possible symptoms from a progressing pituitary adenoma is key to this approach. Presence of symptoms warrants timely follow-up. Annual MRIs are indicated to assess potential tumor growth (9).

2014 AME Seminar Schedule		
August 8-10	Bethesda, Maryland	OOE (1)
August 21-24	Munich, Germany	Refresher
September 6-7	Denver, Colorado	HIMS (2)
October 9-11	Reno, Nevada	CAMA (3)
October 27-31	Oklahoma City, Oklahoma	Basic (4)
November 21-23	San Antonio, Texas	CAR (1)

2015 AME Seminar Schedule		
January 30-February 1	Salt Lake City, Utah	Refresher
March 23-27	Oklahoma City, Oklahoma	Basic (4)
May 10-14	Orlando, Florida	AsMA (5)
June 8-12	Oklahoma City, Oklahoma	Basic (4)
July 17-19	Philadelphia, Pennsylvania	Refresher
October 8-10	Fort Worth, Texas	CAMA (3)
October 26-30	Oklahoma City, Oklahoma	Basic (4)
November 20-22	St. Louis, Missouri	Refresher

NOTES

(1) 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.

(2) HIMS AMEs refresher training. Registration is limited to HIMS AMEs.

(3) 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

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

(5) A 3½-day theme AME seminar held in conjunction with the Aerospace Medical Association (AsMA). This seminar is a Medical Certification theme, with 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.

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