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
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## Contents

from the Federal Air Surgeon's

# *PERSPECTIVE...*

by James R. Fraser, MD, MPH

## Group Formed to Investigate Pilot Fitness

Two recent airline tragedies, Malaysia Flight 370 and German Wings Flight 9525, have ignited the aviation community's concerns. As an outcome, a joint Federal Aviation Administration and industry group was formed to investigate the question of pilot fitness.

Known as the Commercial Aviation Safety Team, it is made up of senior safety officials from the airlines, pilot unions, manufacturers, and the Federal Aviation Administration. Because the new team lacks sufficient expertise to fully examine the question, the FAA has determined that an Aviation Rulemaking Committee (ARC), supported by a working group of medical professionals, would provide the most complete and expeditious review of this issue.

The Pilot Fitness ARC will provide a forum for the United States aviation community to review the following questions and provide recommendations to the FAA Associate Administrator for Aviation Safety:

a. What does research show us about changes in awareness and reporting of emotional and mental health issues in the general population?

b. If the review completed under Task (a) demonstrates a change in awareness and reporting of mental health issues in the general public, can we determine whether a similar change is reasonably expected to have occurred in the pilot community? If not, why not?

c. If so, do the changes in the awareness and reporting of emotional and mental health issues reflected in the pilot community indicate increased risks to aviation safety? If so, does that suggest that further review will be useful?

d. What methods are used to evaluate the emotional and mental health of pilots today? Do those methods differ depending on the level of medical certification held by the pilot? If so, are those differences appropriate?

e. What methods are used to encourage pilots to report medical conditions, including emotional and mental health issues? What steps are taken when emotional and mental health conditions are reported—either by the pilot or by concerned family, friends, or co-workers?

f. Are there barriers that prevent pilots from reporting medical conditions, including emotional and mental health issues?

Given the findings under Tasks (a) through (f), are there gaps in the methods used today to evaluate the emotional and mental health of pilots?

If there are such gaps, what would the ARC recommend to mitigate those gaps? Some examples include:

- Medical methods
- Aircraft design improvements
- In- flight policies and/or procedures
- Pilot training and/or testing improvements
- Actions by professional standards groups, airlines, and unions
- Training or other improvements for aviation medical examiners

If the Pilot Fitness Aviation Rulemaking Committee determines that there are gaps in the methods used to evaluate the emotional and mental health of pilots, it will make recommendations that may be used by the FAA to improve the emotional and mental health training and certification of U.S. pilots. The report should include:

- An explanation of the data and research found as a result of Tasks (a) through (f)
- Proposed mitigation of identified risks for aircraft design and pilot training and testing
- Revised regulatory language based on identified gaps
- Any additional information the ARC considers, associated with the tasks, that would help the FAA further understand the recommendations
- Estimated costs associated with suggested improvements

The Pilot Fitness ARC is to provide the FAA with recommendations within six months.

At present, thanks to the work done daily by aviation medical examiners, I believe our U.S. pilots undergo a reasonably robust medical screening. However, there is always opportunity for improvement, and I look forward to reporting to you the recommendations from the Pilot Fitness ARC the next time.

Thanks for all that you do for aviation safety.

*—Jim*

# AME Guide Updates

By Judith Frazier, MD, MBA

By now you may have noticed a few helpful changes in the *Guide for Aviation Medical Examiners* (AME Guide). This article summarizes what you should see and what you should look for next.

As we all know, medicine is continuously changing—the conditions and treatments change on a daily basis. The same is true for medical certification. There have been big changes over the last several years, and more are to come.

Some of the big policy changes have included the introduction of the CACI (Conditions AME Can Issue) program in 2013. In 2014, significant changes were made to the cardiology protocols for coronary heart disease, the addition of a Do Not Issue – Do Not Fly medications list, and an Acceptable Combinations of Diabetes Medications list were placed in the AME Guide. The implementation of the obstructive sleep apnea requirements began in 2015.

*Number of medical policy changes in the AME Guide, by year*

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 (as of July) |
|---|---|---|---|---|---|---|
| Changes | 10 | 19 | 16 | 48 | 24 | 23 |

*How to Keep Up With the Changes*

**1. Check out the AME Guide Archives and Updates section** the last Wednesday of each month, which can be found under Resources of the AME Guide main page. Routine updates will be posted on these dates. If there are any urgent updates, they will be posted when deemed necessary by the Federal Air Surgeon. In this case, you will receive a notification in the Aerospace Medical Certification Subsystem (AMCS) .

*AME Guide Updates*
*Scheduled Release Dates*

| 2015 | 2016 |
|---|---|
| July 29, | January 27 |
| August 26 | February 24 |
| September 30 | March 30 |
| October 28 | April 27 |
| November 25 | May 25 |
| December 30 | June 29 |

**2. Read the Notification Messages When You Log Into AMCS.** The message will say "Updates to the Guide for Aviation Medical Examiners are available." When you click on this message, it brings up a list of what has changed, and how. It will also have a link to that section in the AME Guide so you can review it before your next airman's physical exam. Remember to click the box that says you have read and understood this message. You can also print the message for review at a later time.

For example, the June 24, 2015, message you received in the AMCS listed these changes:

- POLICY CHANGE **HTN medication—wait time is now 7 days**
- Updates to the CACI Hypertension Worksheet
- Testicular Cancer –now has a CACI Worksheet
- New pharmaceutical page for erectile dysfunction and benign prostatic hyperplasia medications, including wait times table; and
- CACI Index in PDF version of the AME Guide to link to the CACI conditions.

The Federal Air Surgeon wants the number of airmen that leave their AME's office with a medical certificate to increase from 90% to 95%. To accomplish this, you will see more information in the AME Guide, easier ways to help your airman collect required information such as the Status Report forms, and establishing more CACI conditions.

*Additional Conditions Added to the Disposition Tables*

For example, skin cancer and gout

We have included these conditions because you asked for them or because the increasing volume of phone calls we receive on a particular topic means that if many of you are calling on the same topic, more guidance is needed.

Required information for review is listed in the Evaluation Data column. It includes the basic evaluation we need for a certain condition. It is done in check box format to help you identify what information we will require. Please educate your airmen that this is the information that they should provide you to review during their examination. In some cases, this information will need to be sent in to the Aerospace Medical Certification Division for a determination. However, if they currently hold a Special Issuance letter, they should submit the items requested in their authorization letter.

**Disposition column expanded.** There is more specific direction based on what you find on your review of documents. For example, "melanoma < 0.75 mm depth." This tells you that we need the medical records and pathology reports. The disposition columns now states, "ISSUE—if complete resection with clear margins, no recurrence, no metastatic and favorable reports. Document in block 60 AND submit reports to FAA for retention in the file."

*Continued*

The disposition table organization will have the more historical or benign manifestations of a condition at the top. So if your airman does not fit into that category, keep moving down the table. As you move from the top to the bottom, the conditions are more likely to require a special issuance.

**CACI changes/updates.** ALL CACI conditions will soon have worksheets. The testicular cancer CACI worksheet was released last month. The prostate cancer worksheet is in production and should be released shortly (yes, on the last Wednesday of the appropriate month).

**CACI wording simplified.** Now, if the airman has a CACI condition and meets all of the worksheet criteria, all you need to put in block 60 is "CACI qualified HTN" or "CACI qualified hypothyroid."

**CACI worksheet notes added.** This "Notes" section at the bottom of the worksheet will give you more information. For example, on the testicular cancer CACI worksheet, "Note: if the airman is now 5 years out from all treatment for this condition with no history of metastatic disease and no recurrence, CACI is not required. Just note this in block 60 (see disposition table). If the airman is currently on chemo or radiation treatment, defer the exam (see disposition table)."

**Status report forms added.** We see notes from treating physicians on a daily basis that are not adequate for the FAA to make a determination on the airman's medical status. Much of this can be eliminated by putting notes in block 60. However, for some conditions, we see this so frequently that we have developed Status Report forms for the airman to take to their treating physician. Note that these are not CACI forms. These must be signed and dated by the treating physician and summarize the information we need.

This wraps up this version of AME Guide updates. We hope you find them useful. Remember to look at the updated dispositions table for your airman's medical conditions first to determine your course of action and check out the Archives section on the last Wednesday of each month for the most recent updates.

Thank you for the work you do as an aviation medical examiner. We hope changes like these will make your job just a little easier.

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*Dr. Judith Frazier is the Medical Officer for the Aeromedical Standards & Policy Branch, AAM-220.*

## Aviation Medical Examiner Information Links

Guide for Aviation Medical Examiners
www.faa.gov/go/ameguide

Register for an AME Seminar

AME Training Information

AMCS Online Support

Regional Flight Surgeon Contacts

Pilot Safety Brochures

Multimedia Aviation Medical Examiner Refresher Course (MAMERC):

Medical Certification Information

Video Training Topics

MedXPress Login & Help

MedXPress Video Page

FASMB Archives

CAMI Library Services

**SLEEP APNEA INFORMATION (links)**

Frequently Asked Questions

Sleep Apnea Protocol

Quick Start Guide

Specification Sheet A: Information Request

AASM Tables 2 & 3

Specification Sheet B--Assessment Request

OSA Information Brochure

# Aviation Medical Examiner Seminars

2015

| | | |
|---|---|---|
| August 31-September 2 | Denver, Colorado | Refresher (5) |
| October 8-10 | Fort Worth, Texas | CAMA (4) |
| October 26-30 | Oklahoma City, Oklahoma | Basic (2) |
| November 20-22 | St. Louis, Missouri | Refresher (1) |

NOTES

(1) A 2½-day theme aviation medical examiner (AME) seminar consisting of aviation medical examiner-specific subjects plus subjects related to a designated refresher theme. Registration must be made through the Oklahoma City AME Programs staff, (405) 954-4831, or online through the link on the AME seminar Web page.

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

(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

(5) The Human Intervention Motivation Study (HIMS) seminar. The Pre-HIMS refresher seminar will be the two weekend days immediately prior. This is limited to HIMS participants until we know what our space limitations are.

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

**Basic AME Seminar Oklahoma City, Okla. June 8-12, 2015**

**Class and instructors are pictured with Lear fan jet on static display at the Civil Aerospace Medical Institute.**

**Classroom discussion with Drs. Stephen Véronneau (left) and Courtney Scott.**

**Physiological training with instructor Roger Storey (right).**

# Medical Certification of Pilots With Autism Spectrum Disorder-Asperger's Type

Case Report, by Elizabeth R. Anderson-Doze MD, MPH

*Autism spectrum disorders are characterized as a group of intellectual disorders resulting in developmental delay. Normally diagnosed in childhood but persisting into adulthood, these disorders can manifest in a wide range, from individuals with low intelligence to those with normal or superior IQs. Patients characteristically display poor social interactions, poor communication skills, and perform repetitive, stereotypical behaviors.[1] This is a case report of a young adult with Autism Spectrum Disorder of Asperger's type, seeking renewal of a second-class medical certificate.*

## History

This college sophomore majoring in aeronautics presented to his local aviation medical examiner (AME) for a medical exam to renew his second-class medical certificate. At the time of presentation, he was 20 years old and had 210 hours of flight time with 50 in the previous 6 months.

He was diagnosed with Asperger's syndrome as a young child but never received formal treatment for this, with the exception of a single, brief hospitalization 3 years before for suicidal ideation. Subsequent psychiatric evaluations determined the correct diagnosis to be a situational adjustment disorder. He was also briefly prescribed Concerta as a result of this episode, but after a few months, it was discontinued because it was ineffective.

Despite the Autism Spectrum Disorder (ASD) diagnosis, he never had any difficulty in school. His teachers described him as cooperative, conscientious, and diligent in his schoolwork performance. Intelligence and cognitive testing revealed a greater-than-average IQ, consistent with Asperger's syndrome. He displayed no signs or symptoms of Attention Deficit Disorder and successfully applied and was accepted to college. He planned to pursue an aeronautics degree, with hopes of making a career in the airline industry as a commercial, then transport pilot. A year later, he successfully obtained a second-class airman medical certificate after the granting of a one-year Special Issuance by the Federal Aviation Administration.

## Aeromedical Issues

The hallmarks of ASD include poor communication skills, as well as a lack of insight and poor judgment in decision making. Although those with the subtype of Asperger's syndrome tend to function at the higher end of the autism spectrum intellectually, the tendency to be inflexible and to have the inability to make quick-thinking decisions in the face of an unexpected emergent situation could be disastrous in an aviation environment. Lack of insight into social cues and the loner mentality often exhibited by these individuals would also be a concern for airmen with this diagnosis.[2] Cognitive skills may be exhibited unevenly, which could mean that although the airman may do well during the learning and student aspect of flight training, once left to interpret emergent situations alone, poor decisions regarding safety may occur.[3]

In a paper by Lorenz and Heintz, the authors noted that those with Asperger's syndrome are more adept at concentrating on long and tedious tasks, identifying logical patterns, recalling facts, and processing visual information than "neurotypical indviduals." As a result of these skills, they excel in natural science, information technology, and engineering, as well as other career fields not requiring empathy or emotional investment.[4]

### *Autism Spectrum Disorder – Asperger's type*

According to the Centers for Disease Control, the prevalence of autism among children in the United States is currently 1 in 68.1 This disorder is defined as a developmental disability and ranges over a wide spectrum from those profoundly disabled to those with superior intellectual abilities. Asperger's disease is a subset of the disorders comprising the autism spectrum of diseases. There is no widely available data evaluating the long-term performance of these individuals or studies on the function of autistic patients as adults. It is known, however, that they function poorly in positions requiring communication, social skills, and do not make good team players. They can, though, be trained through one-on-one coaching to excel in professions for which they may have superior intellect and can also be taught to overcome the obstacles of social ineptitude via occupational self-efficacy.[4]

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## Role of the AME

The aviation medical examiner is delegated authority to examine airmen that are either applying for or in possession of an airman medical certificate to determine if they meet the health qualifications to possess this certificate. This decision is based on applicable medical standards outlined in *The Guide for Medical Examiners*, or the AME Guide.

Neither ASD nor the subtype of Asperger's syndrome is discussed in the AME Guide. Under the general medical standards outlined in Title 14 of the Code of Federal Regulations Part 67.213, any functional disease or functional defect that makes it unsafe for an airman to operate an aircraft will preclude the granting of any class of medical certificate. This applies to a currently active disease process or to a health issue which could recur before the expiration of the certificate in question.[5]

## Outcome

This airman was diagnosed with ASD, Asperger's type, for several years since childhood. He had never required formal treatment for this diagnosis, however, and it never affected his ability to perform well in school. His cognitive tests revealed an average to superior intelligence, and so he was initially granted a second-class airman's medical certificate with an Special Issuance. The AME who examined him referred his exam to the FAA Aerospace Medical Certification Division (AMCD) for review and final disposition. Upon review of his exam, an "Unable to Establish" letter was sent to the airman requesting documentation from his psychiatrist, confirming stability of his condition in the past year. Because he was no longer under the care of a psychiatrist since his brief hospitalization 3 years previously, documentation from his primary care pediatric provider was accepted instead. The AMCD issued another second-class medical certificate with a 1-year Special Issuance to the airman.

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## About the author


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# Postconcussion Syndrome After Closed-Head Injury in an Airline Pilot

Case Report, by Michelle R. Brown, MD, MPH

*Traumatic brain injury is a global health concern. Annually, 300-800/100,000 individuals suffer head injuries often resulting in disability and permanent neurologic impairment.[1] Neurological sequelae include postconcussion syndrome, post-traumatic epilepsy, and neuropsychological deficiencies. This article presents a case report of a first-class pilot who experienced a mild closed head injury and includes a brief review of the aeromedical issues surrounding such an event.*

## History

A 51-year-old male airline pilot with over 14,000 hours of flight time suffered a closed-head injury after losing control of the motorbike he was operating. The airman was not wearing a helmet for protection, and his head impacted a grassy surface at 30 mph. The impact resulted in a loss of consciousness of approximately 5 minutes. The airman was transported via private vehicle to a local emergency room for evaluation. Physical examination was negative for focal neurological deficits and positive for cervicalgia. The airman had a Glasgow Coma Scale score of 14 with posttraumatic amnesia less than one hour. Imaging included CT scans of the head and cervical spine, both of which were negative. The airman was discharged from the emergency department with a diagnosis of mild traumatic brain injury (TBI).

Seven days post-injury, the airman presented to his primary care physician complaining of headache, dizziness, unsteady gait, and blurred vision of the left eye. He was referred to both neurology and neuro-ophthalmology for further evaluation. Additional imaging was obtained by neurology, which included a brain MRI/MRA that was negative except for a T2 signal hyperintensity in the right pontine region. A neuro-ophthalmologic evaluation was normal to include visual field testing.

The airman was diagnosed with postconcussion syndrome and placed on amitriptyline. In addition, he was enrolled in a multidisciplinary vestibular rehabilitation program for his balance and dizziness complaints.

Three months following the incident, he denied any symptoms of headache, dizziness, unsteady gait, blurry vision, irritability, depression, anxiety, insomnia, concentration or memory issues, or fatigability. He sought a repeat neurological evaluation for return to duty. Repeat neurological exam and follow-up neurocognitive testing was normal. The airman was cleared by his neurologist to return to all daily activities.

### Traumatic Brain Injury and Postconcussion Syndrome

Traumatic brain injury is a global health concern. Mild traumatic brain injury accounts for 70-90% of hospital treated adult cases of TBI with an incidence of 100-300/100,000 adults at risk.[6] National household surveys capturing those who did not seek medical care, likely due to the mild nature of the injury, report an incidence of up to 600/100,000 adults at risk.[6] Mild TBI can result in physical disability with high direct and indirect costs to society. Current evidence-based economic studies for mild TBI are lacking; however, a 1982 study estimated the total cost in the United States at $12.5 billion.[7] Risk factors for TBI include male gender and young age. The majority of mild TBI cases are caused by motor vehicle collisions or falls. Current evidence-based studies suggest that mild TBI can be prevented with helmet use supporting national educational programs and helmet legislation.[6]

Postconcussion syndrome occurs in up to 45% of mild TBI patients. Symptoms include headache, dizziness, insomnia, fatigue, depression, poor concentration, and impaired memory. Studies show that women not only have postconcussion syndrome more than men but that symptoms last longer. Women report a higher prevalence of headaches and depression. Fatigue is the most common symptom that prevailed at both three and ten years following the event.[8]

## Aeromedical Issues

Aeromedical concerns are directed at the neurological disability that may persist for days or weeks following the acute event. Neurological sequelae such as postconcussion syndrome, focal neurological deficit, neuropsychological deficiency, and posttraumatic epilepsy may lead to disability.[2] Postconcussion syndrome includes non-specific complaints such as headache, dizziness, irritability, insomnia, and impairment in memory or concentration. These symptoms usually last three to six months and are self-limiting. Focal neurological deficits cover a broad range of impairments, which may include cranial nerve palsies, aphasia, or hemiparesis. Most focal deficit recovery occurs within a six-month period, but full recovery may take up to three years.[2] Structural brain injury may result in personality, behavioral, or executive function changes, leading to neuropsychological deficiencies. Often, neuropsychological testing is required to evaluate for deficiencies.

The most concerning neurological sequela from an aeromedical standpoint is posttraumatic epilepsy. Risk of epilepsy following a closed head injury is approximately 5%.[2] The risk of posttraumatic epilepsy increases in individuals with depressed skull fractures, posttraumatic amnesia lasting more

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than 24 hours, cerebral hematoma, loss of consciousness, and cerebral contusion.[2] For mild TBI, the excess risk of seizures remains elevated for 10 years after mild brain injury.[3] While seizure risk is difficult to predict, it is also complicated by various conditions such as hypoxia and sleep deprivation, both common conditions in commercial aviation that can lower the threshold for occurrence.

## Outcome

The general medical standards for medical certificates are annotated in Title 14 of the Code of Federal Regulations (CFR) Parts 67.113, 67.213, and 67.313. An airman may not possess any disease, defect, or limitation that makes the airman "unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held."[4] Head trauma associated with epidural or subdural hematoma, focal neurologic deficit, depressed skull fracture, or any loss of consciousness or amnesia can be found under item 46 in the *Guide for Aviation Medical Examiners*, neurologic, presence of any neurological condition or disease that potentially may incapacitate an individual.[5]

TBI is classified as mild, moderate, or severe. Mild TBI includes loss of consciousness and/or posttraumatic amnesia of less than 1 hour. Moderate TBI includes either loss of consciousness and amnesia of more than 1 hour but less than 24 hours or non-depressed skull fracture. Severe TBI includes loss of consciousness greater than 24 hours, brain contusion or intracranial bleed, or depressed skull fracture. Mandatory waiting periods are based on the severity of the TBI and risk of posttraumatic epilepsy. The mandatory waiting period for mild TBI is six months if free from seizures (AMCD staff, personal communication, 12/16/2014). An airman may recover full neurocognitive function but remain disqualified due to a high risk of posttraumatic epilepsy. The disposition guidance indicates that for all classes of medical certificates, aviation medical examiners should submit all medical records, including pre-hospital, emergency department, specialty consultation, and operative reports. In addition, a current status report is required annotating all medications to include dosages and side effects.[5]

In our case, the airman received a general denial letter after the incident for not meeting the medical standards prescribed in 14 CFR, Section 67. The FAA requested any previously issued unexpired medical certificate(s) be returned in accordance with 14 CFR Part 61.53, to which the airman complied.

The airman's case underwent an independent medical review by The Federal Air Surgeon's Neurology Panel, which convenes twice yearly. Given the history of mild TBI with loss of consciousness, the panel recommended a six-month waiting period from the time of the incident, and the airman had to remain free from symptoms during that period before he could be reinstated to flight duties. After the mandatory waiting period, the airman was issued a warning letter requiring him to report immediately to the FAA any adverse changes in his medical condition and to abide by 14 CFR Part 61.53.

Aerospace Medical Certification Division data analyses from 2011-2014 revealed that 203 active airmen with a history of head trauma were issued medical certificates. Most of the cases were third-class certificates (75%), followed by second- (13%), and first-class (12%) holders.

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# Medical Certification of Pilots With Uveal Melanoma

Case Report, by Tim D. Duffy, DO, MOH

*Uveal tract (iris, ciliary body, or choroid) melanoma is the most common primary intraocular malignancy in adults. The incidence in the United States is approximately 4.3 new cases per million people, which is comparable to international rates of 5.3 to 10.9. This article presents a case report of an airman who presented to a physician with visual complaints. Included is a review of the disease process, treatment, and aeromedical concerns.*

## History

A 36-year-old white male presented to an ophthalmologist in 2007 due to decreased visual acuity of his right eye. On examination, his right eye vision was 20/30 and otherwise normal except for a membrane suggestive of histoplasmosis. He underwent yearly Avastin (bevacizumab) injections for three years and had no further problems until 2013, when he returned with left eye symptoms. The left eye exam was normal, but a slit lamp examination of the right eye discovered an anterior pigmented mass with a convoluted surface pressing anteriorly on the iris and posteriorly on the lens. This mass did not transilluminate, and there were pigmentary changes in the macula.

He was sent to a specialist who repeated the dilated fundus exam. An ultrasound showed a mass with a lesion height of 3.27 mm. A fine needle aspiration (FNA) of the mass was performed, and a gene expression assay for uveal melanoma using a new RT-PCR assay indicated a Class 1A ciliary body melanoma. This Class 1 molecular signature is associated with a low risk of near-term clinical metastasis. Ninety-eight percent of patients with a Class 1A tissue diagnosis are cancer-free at 5 years with external plaque radiation treatment (1). During the subsequent workup, the patient underwent a CT of the chest, abdomen, and pelvis. No metastatic lesions were discovered. Post–radiation, the patient's vision was 20/40 on the right and 20/20 in the left. The specialist released him to observation and subsequent 6-month evaluations.

This applicant presents to your office for a third-class student pilot certificate, having flown 3.7 hours with a flight instructor at the local airport.

## Aeromedical Issues

The ultimate aeromedical concern for melanoma is the risk of in-flight incapacitation. The clinical issue of aeromedical concern is recurrence and the clinical effects of metastasis. Numerous studies have attempted to explore the relationship between sunlight exposure and the risk of uveal melanoma, which to date, yield a weak association. Other associations include Caucasian race, fair skin that tans easily, and light-colored eyes. The cancer is more commonly diagnosed in males in their 60s and is not considered an inherited disease, even though there are sporadic reports of family clusters. Whether some environmental exposure triggers the development of uveal melanoma remains an open question. Sunlight is the strongest environmental factor, since it has been established in melanoma of the skin. Unlike cutaneous melanoma, uveal melanoma rates have not increased over time and do not vary by latitude. Whether or not altitude exposures to airmen are contributing risk factors is yet to be determined (2).

Our student pilot candidate is an atypical case, since he is 43 years old, Caucasian, has brown eyes, and does not tan easily. There is no family history of melanoma. The aeromedical concern for melanoma for him is potential incapacitation associated with metastasis.

## Role of the AME

According to the *Guide for Aviation Medical Examiners*, if this is a first-time application for an applicant with a history of melanoma, the examiner must defer to the Aerospace Medical Certification Division (AMCD) or Regional Flight Surgeon for the initial determination:

> Examiners may re-issue an airman medical certificate under the provisions of an Authorization, if the applicant provides the following: An Authorization granted by the FAA; and a current status report performed within 90 days that must include all the required follow-up items and studies as listed in the Authorization letter and that confirms absence of recurrent disease. The Examiner must defer to the AMCD or Regional Flight Surgeon if: There has been any recurrence of the cancer, or any new treatment is initiated. A Special Issuance or AASI is required for any metastatic melanoma regardless of Breslow level. A Special Issuance or AASI is required for any melanoma which exhibits Breslow Level > .75 mm with or without metastasis. A melanoma that exhibits a Breslow Level < .75 mm which has no evidence of metastasis may be regular issued (3).

## Role of the FAA

The FAA will send a "cancer letter" requesting the following documentation: a current detailed report from the treating physician, operative and pathology reports, complete laboratory studies, and any other testing the physician performed. Based on the type of cancer, other reports may be requested. Uveal melanoma is an aggressive cancer that metastasizes in up to half of patients. It spreads preferentially to the liver, and metastatic disease is almost always fatal. Currently there are no effective therapies for advanced metastatic disease, so the most promising strategy for determining suitability for flight would be staging and prognosis. Until recently, the gold standard for staging uveal melanoma was chromosome 3 testing for monosomy (3). Within the last two years, a new gene expression profile (GEP) was developed based upon a 15-gene, qPCR-based assay of a FNA of the mass. This assay, known as DecisionDx-UM, is a proprietary assay highly accurate for predicting which patients will develop metastatic disease. The assay molecular signature is divided into Class 1A, 1B, or 2, with respective 5-year metastasis-free rates of 98%, 79%, and 28%, respectively.

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Using the FAA's 1% rule as a guideline and this new prognostic assay, it was determined that this airman poses a low risk for sudden incapacitation. Aviation safety is the FAA's primary goal, and issuing a Special Issuance (SI) for this individual poses low risk to the airman or others.

## Outcome

The applicant was subsequently evaluated by an ophthalmologist with expertise in uveal melanoma. An ultrasound showed a tumor height of 3.27 mm. A FNA and subsequent GEP assay staged him as Class 1A. He underwent plaque radiotherapy and was risk stratified to have less than a 2% 5-year risk of metastasis. The FAA requested a copy of the ultrasounds, copies of the radiation treatment records, and current Humphrey visual field graphs. Since uveal melanomas behave differently than cutaneous melanomas, the FAA's decision was to certify and follow without brain MRIs. The airman received a student pilot third class-certificate and a SI for uveal melanoma.

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*About the Author*

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### Etiology of Uveal Melanoma

Uveal melanoma can arise from either the anterior (iris) or posterior (ciliary body or choroid) uveal tract. Anterior lesions have a better prognosis because they tend to be small, slow growing, and can be visually detected. Posterior lesions tend to be detected only upon slit lamp exams and have a more malignant histologic appearance. A choroidal nevus may be mistaken for a melanoma, or it may develop into a malignant melanoma. The USAF School of Aerospace Medicine reviewed the eye exams of more than 5,000 aviators over a period of 14 years; 2.2% of aviators were noted to have one or more choroidal nevi. These lesions were found not to affect the aviators' visual performance, but following these lesions at regular intervals by an ophthalmologist was recommended.

In a large, retrospective, single-center series of 2,514 consecutive patients with choroidal nevi, the progression rates to melanoma at 5, 10, and 15 years was 8.6%, 12.8%, and 17.3%, respectively (4). The 5-year mortality rate associated with metastasis from posterior lesions was 30%, compared to the 3% rate of anterior lesions.

There are many treatment options available for uveal melanoma. These include: enucleation, plaque radiotherapy, proton beam radiotherapy, and transpupillary thermotherapy. Each treatment has potential aeromedical concerns. Enucleation results in monocular vision, and radiotherapy has a 5-year, 50% risk of radiation retinopathy. Cutaneous melanoma metastasizes to the brain, while uveal melanoma spreads to the liver. For this reason, the risks of sudden incapacitation with uveal melanoma are less (5).

# Medical Certification of Pilots With Nonsustained Ventricular Tachycardia

Case Report, by An T. Duong, MD, MPH

*The incidence of nonsustained ventricular tachycardia (NSVT) in the general population varies between 0 and 4% (1), NSVT, defined as three or more consecutive ventricular beats at a rate of greater than 100 beats/min with duration of less than 30 sec is a relatively common clinical problem (2). While premature ventricular contractions and NSVT are frequently seen in the general population and are sometimes considered clinically insignificant, they mark a population at increased risk for cardiac disease, including sudden cardiac death and cardiomyopathy (3). With careful cardiovascular evaluation and follow up, current practice has been to allow for a Special Issuance to airmen of any class that have been treated with radiofrequency ablation for NSVT without structural heart disease.*

## History

A 46-yr-old male air transport pilot presented to his aviation medical examiner (AME) for a renewal of first-class medical certificate. He had over 16,000 hours, with 0 hours flown in the preceding 6 months. He had been grounded for 6 months following an episode of non-sustained ventricular tachycardia, reproduced by stress testing, subsequently requiring ablation.

The airman had no significant medical history until he presented with having some intermittent chest pain, along with back pain and scapular pain. He was feeling weaker than usual, with some lightheadedness and dizziness. He had coughing associated with palpitations and irregular heartbeats at times. He sought emergency care after walking up the stairs and feeling severely diaphoretic and short of breath.

During his hospital evaluation, myocardial infarction and pulmonary embolism were ruled out. Exercise treadmill stress testing showed several episodes of isolated premature ventricular contractions (PVCs), plus couplets and triplets, consistent with monomorphic non-sustained ventricular tachycardia. Initially, his burden of PVCs decreased on beta blockers, and he was released for an outpatient workup, which showed no evidence of underlying coronary artery disease, valvular disease, or thyroid dysfunction. Stress echo and stress tests showed frequent ventricular ectopy. A follow up Holter monitor revealed HR ranging from 49 to 144 bpm, with 10,152 isolated uniform ventricular ectopic beats, including 8 pairs of 3 runs lasting up to 5 beats, with rates up to 198 bpm. Trigeminy and quadrigeminy rhythms were observed. The patient reported symptoms of palpitations that were associated with isolated ventricular ectopic beats.

The airman opted for and was successfully treated for symptomatic PVCs with radiofrequency ablation, specifically right ventricular outflow tract PVC. Post-ablation, a 24-hour Holter monitor showed a significant reduction of ventricular ectopy to less than 0.2% of previous. His symptoms resolved after ablation.

## Aeromedical Issues

The primary aeromedical concern with new onset cardiac arrhythmia is the airman's ability to safely operate an aircraft and not subsequently endanger the safety of his passengers; another concern is disabling cardiopulmonary compromise to impede his ability to egress an aircraft in the event of a mishap.

In addition to addressing functional impairment from cardiac arrhythmia, an aviation medical examiner should consider other underlying diseases associated with non-sustained ventricular tachycardia. Three major concerns regarding the presence of PVCs and NSVT are:

1. Monomorphic VT increases the risk for sustained VT.

### Non-Sustained Ventricular Tachycardia

Nonsustained ventricular tachycardia (NSVT), defined as three or more consecutive ventricular beats at a rate of greater than 100 bpm with a duration of less than 30 sec, is a relatively common clinical problem that occurs in up to 4% of the population (1,2).

NSVT is typically diagnosed during cardiac monitoring (e.g., ambulatory monitoring or inpatient telemetry) or during exercise stress testing (10).

Once NSVT has been diagnosed, it is important to determine the presence or absence of any associated structural heart disease. A thorough history and physical examination, 12-lead electrocardiogram, transthoracic echocardiography, and exercise stress testing are generally sufficient to exclude prognostically significant structural heart disease in asymptomatic patients (10).

In patients that present with syncope felt to be related to NSVT, or those with a strongly positive family history suggesting an inherited cardiomyopathy (e.g., hypertrophic cardiomyopathy, arrhythmogenic right ventricular cardiomyopathy), additional testing may be useful, including genetic testing for specific mutations, as well as advanced non-invasive imaging with cardiac computed tomography or magnetic resonance imaging (10).

For patients with NSVT who are asymptomatic and have no evidence of structural heart disease, we suggest no specific medical therapy. However, for patients with disabling symptoms, use of a ß-blocker is advised unless there is a contraindication (e.g., uncontrolled asthma), in which case a calcium channel blocker, usually verapamil or diltiazem, can help. If the arrhythmia persists despite treatment with these drugs, the therapeutic options include more potent antiarrhythmic medications or catheter-based ablative therapy (10).

In contrast to persons with underlying structural heart disease, the prognosis of NSVT is generally benign in those without apparent structural heart disease (1, 3, 8-9)

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2. Another concern, particularly with increased automaticity and polymorphic VT is that a ventricular beat may be coupled closely with the preceding QRS complex and produce ventricular fibrillation.
3. Finally, frequent ventricular ectopy is known to adversely affect cardiac function itself, namely tachycardia-induced cardiomyopathy (3).

In all cases, follow up evaluations and current status reports of further testing are required prior to issuance of a medical certificate (RefMan, 5-2, 5-4, 5-7). The AME must defer to the Aerospace Medical Certification Division or Regional Flight Surgeon if the airman has received radiofrequency ablation (*Guide for Aviation Medical Examiners*, pg. 285).

The incidence of PVCs and NSVT in the adult population varies. A Framingham Offspring Study in patients without known cardiac disease reported PVCs during exercise testing in 27% of patients. Those with PVCs had a statistically significant (but small) increased mortality hazards ratio of 1.71-1.86 (3). Patients with heart disease have a higher incidence of complex or frequent arrhythmia. Overall, ventricular ectopy appears to be a frequent finding with a small, but statistically significant, increased sudden cardiac death and mortality risk (3).

It can be difficult to determine whether a primary cardiomyopathy is present resulting in ventricular ectopy or a primary arrhythmia is causing tachycardia-induced (3). The arrhythmias are usually monomorphic, most arise from the right ventricular outflow tract (RVOT), and their frequency and duration can be affected by both exercise and autonomic manipulation. Sixty to 80 percent of patients with idiopathic ventricular tachycardia have VT originating from the RVOT (4). In comparison, with the generally good prognosis associated with idiopathic monomorphic VT, polymorphic VT is associated with an increased risk of sudden death (10). While supraventricular arrhythmias and ventricular tachycardias are recognized mediators of tachycardia-induced cardiomyopathy, PVCs have recently been shown to cause tachycardia-induced cardiomyopathy (5, 6). Differentiating a primary cardiomyopathy from tachycardia-induced cardiomyopathy is essential, as the latter may be reversible, particularly by radiofrequency ablation (7).

In the case that treatment is radiofrequency ablation of a by-pass tract, a 3-month recovery period is recommended before consideration for medical certification. A current clinical status report, a resting electrocardiogram, and a 24-hour Holter monitor are recommended after the 3-month recovery period (RefMan, 5-8; *Guide for Aviation Medical Examiners*, pg.79).

## Role of the AME

The disposition guidance indicates that, for all classes of medical certificates, "any episode of tachycardia during the course of the examination, and any other irregularities of pulse other than an occasional ectopic beat or sinus arrhythmia" must be noted and reported by the AME. If there is bradycardia, tachycardia, or arrhythmia, further evaluation may be warranted and deferral may be indicated (*Guide for Aviation Medical Examiners*, item 35, heart)

## Outcome

Seven months following the NSVT event and 5 months after his ablation of his monomorphic NSVT, the airman has had at least 3 months of recovery from ablation and is asymptomatic. His post-ablative 3-month follow up 24-hour Holter study has shown a significant improvement (6 isolated supraventricular ectopic beats with no pairs or runs, 19 isolated uniform ventricular ectopic beats with no pairs or runs), and his ECG is normal. Echocardiography reveals no chamber enlargement, wall motion abnormalities, or significant valvular disease. His only current medication is Losartan (Cozaar) 50mg QD for control of blood pressure, which is normal. He reports no further symptoms since his ablation.

Based on his favorable evaluation with normal studies, an Authorization for Special Issuance of a first-class medical certificate was granted under 14 CFR §67.401. Required follow up will include annual cardiovascular evaluation, including repeat 24-hour Holter monitoring to include the representative tracings, summary sheet, the tabular report, and a statement regarding medication prescribed, including the type, purpose, dosage, frequency, and any side effects noted. He will be required to have regular first-class physical examinations at the frequency prescribed under the provisions of §61.23.

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## About the author


*An T. Duong, MD, MPH, was a Resident in Aerospace Medicine when she wrote this case report at the Civil Aerospace Medical Institute. Currently, she is completing aerospace medicine rotations as part of USAF School of Aerospace Medicine curriculum.*

## Awards Scored by OAM Announced

### Aerospace Medical Association Awards

The Aerospace Medical Association (AsMA) honored members of the Office of Aerospace Medicine (OAM) staff during the association's annual meeting on May 21, 2015.

**Thomas Nesthus**, PhD, received the **Raymond F. Longacre** Award for his contributions to improved fatigue risk management in air traffic controllers, and the identification and application of fatigue countermeasures. His research has contributed to regulatory practices, including the recently implemented change in pilot duty hours by the agency. Dr. Nesthus is an engineering research psychologist at the Civil Aerospace Medical Institute.

**Susan Northrup**, MD, received the **John A. Tamisiea** Award for her contributions as FAA Southern Regional Flight Surgeon to general aviation safety. Her work with the American Board of Preventative Medicine and the American Society of Aerospace Medicine Specialists has contributed to the overall foundation of aerospace medicine credentialing and certification.

In addition, two OAM physicians—Dr. **Nicholas Lomangino** and Dr. **Marvin Jackson**—were selected as AsMA Fellows for their outstanding contributions to aerospace medicine.

### Financial Discipline Excellence Award

The Office of Aerospace Medicine's Virtual Site Visit Team won the 2014 Federal Aviation Administration Financial Discipline Excellence Award. This award recognizes significant enhancements to service or process that reduce the overall cost of doing business in the agency or have demonstrated sustained and enhanced financial discipline associated with managing their organizational budgets and allocations.

**Virtual Site Visit Team Members**

- ★ **Harriet Lester**, MD, Eastern Regional Flight Surgeon
- ★ **Leah Olson,** Program Analyst for International/Military/Federal regions
- ★ **Brian Pinkston,** MD, former manager, Aerospace Medical Education Division
- ★ **Bobby Ridge,** AME Program Analyst, Designee Management System Lead
- ★ **Carty Wilson,** Surveillance Program Analyst, Eastern Region
- ★ **Mindy Zalcman,** Program Analyst, Eastern Region
- ★ **Dominick Zito,** MD, Deputy Eastern Regional Flight Surgeon

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*—Information provided by AVS Flyer*

## Dr. Véronneau New AMED Manager

**Stephen J.H. Véronneau,** MD, MS, was selected as the manager of the Aerospace Medical Education Division, effective May 31, 2015. In announcing the selection, Civil Aerospace Medical Institute Director **Melchor J. Antuñano** said, "Dr. Veronneau is a great choice to be the Manager of the Aerospace Medical Education Division as he has clearly demonstrated during his assignment as Acting Division Manager."

Dr. Veronneau received his medical degree in 1983 and a MS degree in Aerospace Medicine in 1990.

He is board certified in Aerospace Medicine and an expert in medical accident investigation and research, epidemiology, bioinformatics, electronic medical record research, safety management systems, probabilistic risk assessment, epidemiology, aeromedical certification, and safety management systems. He is also a private pilot.

Previously the principal investigator and team lead of the Numerical Sciences team at the FAA Civil Aerospace Medical Institute, Dr. Veronneau has worked at the Institute since 1990.

Dr. Veronneau is a lifetime member and Fellow of the Aerospace Medical Association and is an active member of the Civil Aviation Medical Association.

He had been the acting manager since November 1, 2014, when former manager Dr. **Brian Pinkston** left on military leave.

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## CME Changing for Osteopaths

By Jan Wright

For a number of years, aviation medical examiners (AMEs) who are DOs have had to be content with the American Osteopathic Association's Category 1-B continuing medical education (CME) credit for attending FAA Aerospace Medicine seminars. I am happy to announce that a policy has been changed that will help our DO colleagues tremendously in obtaining CME credit.

Thanks to the tireless efforts of FAA Medical Certification Officer **Richard Carter**, DO, physicians who attend Basic or Refresher training as aviation medical examiners will now receive American Osteopathic Association (AOA) Category 1-A continuing medical education credit.

As physicians, AMEs are required to meet continuing medical education requirements. Since the Civil Aerospace Medical Institute's Medical Education Program meets the Accreditation Council for Continuing Medical Education standards, AMEs can attend training and not only get FAA policy, procedures, and best practices, they also get continuing medical education that helps them stay board certified.

This change will appear in the rewrite of the AOA CME Guide for the 2016-18 CME cycle, retroactive to January 1, 2014, so if you have attended training since then, it is now eligible for the required 1-A hours.

*Ms. Wright is the Aerospace Medical Education Division's team lead for the AME education program.*

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