



# Federal Air Surgeon's Medical Bulletin



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

U.S. Department of Transportation  
**Federal Aviation Administration**

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*FAA Photo by Eric Simson*

*Ever wonder what a myocardial infarction would feel like—while piloting an aircraft by yourself? Sudden incapacitation is a definite possibility and a fatal outcome even more likely. The following is a pilot's account of his experience with a very serious situation and how he lived to tell about it.—Ed.*

## An MI in the Sky

By Tom Cruse

*'A week before this flight, my flight surgeon gave me a new 3<sup>rd</sup>-class medical certificate. This pain could not be a heart attack, even if it did read like a script from one of the many brochures I had read....'*



**Pilot Tom Cruse** pictured with his Cessna 172 prior to having his near-incapacitation.

**T**HE FIRST THURSDAY in August was a great day to fly. The early fall weather combined low humidity, gentle winds, and an infinite sky over Dayton, Ohio. My brother and I had agreed that I would pick him up in Greenwood, Indiana, a one-hour flight from home.

I launched into that infinite sky on time with no other activity at Dayton-Wright Brothers Airport. The climb was smooth as I leveled off at 3500 feet, set the autopilot, and studied the many corn and grain fields below. Ohio is just one

of the beautiful states to fly over that my wife and I have enjoyed over the years. But today, I was flying alone.

I monitored Dayton Approach, listening to the increasing pace of general aviation activity in our area. One pilot, after getting a good traffic call and contact, commented to the controller that, earlier, he had not been given warning of a much closer call. This controller

*Continued on page 5*

## QUICK FIX (Times 3)

By Dick Jones, MD

### Avoiding Late Transmission Criticism

**PROBLEM:** My office provides the regional offices quarterly and monthly reports detailing their aviation medical examiners examination submission delay records. Auditors for ISO-9000 quality management efforts, International Civil Aviation Organization, Government Accountability Office, House Transportation and Infrastructure Committee, and Aviation Safety Designee Steering Group regularly evaluate our compliance with our own guidance. They can easily see

from our reports that many AMEs are not complying with the requirement to electronically submit examinations to our system within 14 calendar days. The regional office, in an effort to show auditors they are trying to ensure compliance, have begun to send letters to noncompliant AMEs, suggesting they improve. Understandably, AMEs are frustrated because it often takes longer than 14 days to get supporting information that could let the AME issue the certificate, rather than defer. What is an AME to do when a few more days might let them issue?

*Continued on page 3*

## You Want Me to Do What?

**I**MAGINE THAT JOHN DOE is the founder and president of Cumquat Go-Carts. He is an entrepreneur who has come up with a design for a new type of go-cart that he believes will corner the go-cart market and make him a multimillionaire in three years.

To keep expenses to a minimum, he has asked his attorney-wife, **Jane**, to serve on his board of directors as the company's legal counsel; and his son, **Jim**, to be his human resources vice president.

John realizes that before he can go public, he must demonstrate that his design concept is sound, and that the new carts are safe to drive, so he hires several test drivers. Jane has read all about the physical demands associated with test driving, and she decides to



limit the company's liability by telling Jim that each driver must take a physical examination before he or she can be assigned to this rigorous work.

Jim knows that since the physical examination is a requirement of the job that Cumquat has to pay, so he calls his cousin, **Jenny**, a family physician, and asks her to perform the examinations. However, Jenny tells Jim that she cannot perform the exams because: (1) she is not familiar enough with racetrack driving to know just exactly what tests should be accomplished, and (2) even if she could determine the appropriate tests, she works for a health maintenance organization and the overhead costs would make the exams too expensive.

Trying to be helpful, Jenny tells Jim about her friend, **Jeff**, a solo practitioner who recently returned from Oklahoma City where he learned how to be an aviation medical examiner. She tells Jim that she thinks that the stresses associated with test driving might be similar to those experienced by a pilot, and that she is certain Jeff would be willing to do the examinations because his business has been slow.

Jim is enthused over Jenny's idea, so he surfs the Web and learns that pilot physical examinations are covered under 14 CFR part 67. He looks up part 67 and decides that he will require his test drivers to take an FAA Class II medical examination.

He then sends his newly-hired drivers to Jeff's office with instructions to get an FAA Class II physical and to make

sure that Jeff writes "Go-Cart Testing Only" on the medical certificate.

**Question:** Is it okay to issue an FAA Form 8500-9 Medical Certificate that says, "Go-Cart Testing Only?"

**Answer:** No!!

It is not okay to use the FAA form for Go-Cart testing, or for any purpose other than FAA examinations. Jeff should tell the drivers that he cannot perform an FAA Class II examination and issue a "Go-Cart" 8500-9. However, as a business person, the doctor can perform physicals on the drivers. If he wishes, he can use part 67 as a basis to determine the content of the examinations, and report the results on a prescription form or in some other way— as long as he does not use an 8500-9.

He could also treat them strictly as pilot applicants, perform a Class II examination, and issue them airman medical certificates if they meet part 67 requirements or defer the results if they do not. If he elects to do this, he must enter the results into the Airman Medical Certification System. For all intents and purposes, and as far as the FAA knows, the exams performed are Class II pilot examinations, and the drivers could use them to fly if they were otherwise qualified.

**NOTE:** We understand why Cumquat or other such companies might want to use part 67 standards as a basis for physical examinations for their employees who do stressful work. However, if they do so, we would prefer that they accept an alternative form of reporting and not elect to treat them as pilots.

We have been asked this type of question numerous times in the past. Hopefully, this hypothetical vignette helps clarify our position.

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I hope each of you has a very safe and happy holiday season and a prosperous and rewarding New Year; and thanks again for all you do for us and your airmen.

*Fred*

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## International Rules Conflicting

*Dear Editor,*

I read with interest Dr. Tilton's update on expiration dates for 1st and 3rd class medicals [Federal Air Surgeon's Medical Bulletin, Vol. 46, No. 3, p 2, It's on the Street]; however, I recently learned that there are situations where this rule may be problematic for pilots who fly internationally. My office recently told one of our 1st class applicants that he only required an annual medical as he was less than 40. This airman told me something I was not aware of: A number of countries still require a first-class medical every six months regardless of age. Furthermore, they may not honor a U.S.A. 1st-class medical certificate that is beyond six months even if the airman is under 40. I am aware of a pilot who was on a trip to Latin America with a 1st-class medical that was seven months old, and as he was 38, it was valid under our new regulations. However, the country he was in would not recognize it as a 1st-class medical certificate, and his company ended up flying down a replacement pilot. I now tell all my 1st-class applicants who fly internationally to check with their flight departments before deciding to just renew their medicals annually.

*Respectfully,  
Brett Elliott, MD  
Milford, Del.*

*Dear Dr. Elliott,*

**Although the United States has changed the frequency of pilot medical examinations to more closely match the ICAO recommendations, not all countries have done so. A country can choose to have stricter requirements than ICAO proposes and still be in compliance with the International standards. Some countries have just not taken the time yet to make the recommended changes**

**and others do not intend to change their frequencies. We have no control over other countries' practices, so companies flying to other countries need to ensure they know the certification requirements of the countries to which they fly and monitor their pilots for currency under the destination country's rules before allowing them to depart. The FAA will perform examinations at whatever frequency each pilot requests.**

*Dick Jones, MD*

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## MedXPress 'Positively' Works

*Dear Editor,*

I read with interest **Dr. Jones'** note in the recent Medical Bulletin [*Quick Fix: Medical History Forms*, Vol. 46, No. 3, p. 10]. For what it's worth, it might be worth a follow-up article reporting the experience of aviation medical examiners like myself. I haven't used the FF printed form for a long time now, because the MedXPress works extremely well. The airman's info is all there to start, all my charting is done online in real time, and now the certificate prints online. If all the AMEs would use MedXPress it would greatly reduce paperwork and physician time. In fact, it works so well, I'm not sure why we would even need the old triplicate forms at all. Just some positive input to forward to Dr. Jones and the MedXPress computer people.

*Dr. Robert L. Speakman  
Park City, Utah*

## Quick Fix from page 1

**SOLUTION:** AMEs *must* transmit all examinations to the FAA within the 14 days in a deferred status if they cannot support issuing by then, regardless of how close they are to issuing. If supporting documentation that will probably support issuance is expected shortly, call the Regional Office to explain the situation, and hold the certificate. They can pull the case from the processing queue and suspend the case for receipt of your additional material.

When you get the documents you need, coordinate with the Regional Office to fax the material. If everything is as advertised, the Region will tell you to issue, and you avoid a late transmission report. Everyone is happy!

## International Student Pilot Certificates

**PROBLEM:** Some International AMEs are uncertain as to whether or not they can issue Student Pilot Certificates to applicants seeking them.

**SOLUTION:** There was a point in the past when International AMEs were not permitted to issue Student Pilot Certificates to applicants, but that policy was withdrawn several years ago. So, *issue away!*

## AME Designation Card Confusion

**PROBLEM:** We recently reissued AME Designation Cards extending expiration dates up to three years. We were able to do this after a Notice of Proposed Rulemaking changed 14 CFR part 183 to allow any duration we want. FAA Order VS1100.2 limits

*Continued on page 4*



## Certification Update

*Information About Current Issues*

By Warren S. Silberman, DO, MPH

### NEW FORMS, MEDICAL CERTIFICATES

#### New GG Forms

I AM GOING to dispense with case presentations this time to relay some important information. By now, you should have received the new FAA Form 8500-8 (Medical/Student Pilot Certificate) GG examination forms. If you have the new GG forms, please destroy the FF forms in your possession. If you have not received the GG forms, please contact the Aerospace Medical Education Division<sup>1</sup> because the FF forms will soon be obsolete.

When you open the electronic 8500-8 form, you will see a drop down box that will allow you to choose the appropriate series. Airmen who utilize FAAMedXpress will automatically have the GG form selected. If you do not have the GG form, please place the airman's response to # 18y (regarding receiving compensation for a disability) in block 60. If the airman checks *yes* to receiving compensation for a disability, you must comment on the disability in block 60 of the 8500-8. Many airmen, especially retired military members, receive some disability compensation that is not medically disqualifying for airman medical certification. If the condition is not disqualifying, you may issue the medical certificate. Of course, if you need additional information or tests to determine whether or not the airman is qualified, you should request

*Dr. Silberman manages the Aerospace Medical Certification Division.*

that the airman provide the information. If the airman does not send you the information within two weeks, then you must defer issuance.

#### Medical Certificates

The Aerospace Medical Education Division is not planning to print packets of plain white medical certificates (new 8500-9). The current certificates do not have the correct regulatory language on the reverse side. Accordingly, an airman who needs a new time-limited certificate in conjunction with an AME-Assisted Authorization for Special Issuance will need: (1) to get a certificate from the FAA; or (2) to consent for you to perform a new examination; or (3) to have you call your Regional Medical Office or the Aerospace Medical Certification Division to provide the necessary information so that we can FAX you a wire confirmation of the certification. We are developing the capability for AME offices to print time-limited medical certificates.



<sup>1</sup>To order new GG forms (and other medical certification-related forms) online, link to [http://ame.cami.jccbi.gov/form\\_and\\_brochure/medicalform.asp](http://ame.cami.jccbi.gov/form_and_brochure/medicalform.asp)

#### FAA Remembers

##### Dr. Bernardini Passes

A long-time member of the Aerospace Medical Certification Division, **James V. Barnardini**, PhD, died Sept. 28, 2008, after a short illness. Dr. Bernardini, a program analyst who specialized in handling special issuances, worked in the division since 1988. Aviation medical examiners will remember him for the extensive amount of work he did on special issuances and medical appeals. Dr. Bernardini was 77.



### Quick Fix from page 3

the duration to three years, hence our choice of this maximum duration. So, we sent out new cards with new dates using existing card stocks.

However, I had forgotten the cards say they are valid "FOR ONE YEAR ENDING ON THE LAST DAY OF..." Since the new dates were all longer than a year away, there has been considerable confusion about the apparent contradiction on the cards.

**SOLUTION:** The AME I.D. card used to allow an AME to gain cockpit entry to fly in the jump seats of commercial aircraft. These days, however, the only value—other than a reminder of when re-designation must be accomplished—is to get reduced prices on food in some private airport restaurants.

Therefore, there is no need to reissue another set of cards. The new date on the cards should be valid. If anyone should ask about the discrepancy (an unlikely event), you can refer them to 14 CFR part 183 and to VS1100.2. You may ignore the language "FOR ONE YEAR ENDING ON THE LAST DAY OF..." and can actually use a pen to eliminate the "FOR ONE YEAR" and the "THE LAST DAY OF" words, if you want. Sorry for the confusion!

*Dr. Dick Jones manages the FAA's Aerospace Medical Education Division in Oklahoma City, Okla.*



## FAA Aviation News to Feature FAA Aerospace Medicine Free copies to AMEs

By James Williams

**T**HE JANUARY/FEBRUARY 2009 issue of *FAA Aviation News* will focus on medical issues relevant to the general aviation community, with special emphasis on the FAA's aeromedical staff, services, and resources. A copy of the January/February issue will be sent to all domestic AMEs as a resource for themselves and their pilot patients. The magazine will also be available for free online at: [www.faa.gov/news/aviation\\_news/](http://www.faa.gov/news/aviation_news/).

The *FAA Aviation News* is a bi-monthly publication designed to make the non-commercial general aviation community aware of FAA resources, help readers understand safety and regulatory issues, and encourage them to focus on continued training and skills development. The editorial content capitalizes on the magazine's unique ability to be the policy voice of FAA, as well as provide safety information to the non-commercial general aviation community.



*James Williams is an Associate Editor with FAA Aviation News*

### MI from page 1

commented that on a day like this, a lot of pilots were flying so they (we!) "could touch the sky." I felt a real bond with all those who, with me today, could say we were there to touch the sky.

Around the halfway point, I switched over to Indianapolis Approach for monitoring, as I would be approaching a field enroute that had a lot of pilot training.

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This pain could not be a heart attack, even if it did read like a script from one of the many brochures I had read last fall.

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Suddenly, the center of my chest felt as if a three-inch log was jamming into me. It started at a low level of pressure but rapidly grew to a very uncomfortable strain, and the pain now radiated outward to my shoulders.

While I do not fly with a cardiac checklist, it sure seemed like a heart attack, but how could this be? A few months earlier I had a significant set of tests, including the isotope stress test and the new calcium CT scan. By all accounts, my cardiovascular system

was in great shape. I had been a small-time jogger for many years and watched (rather, my wife did) the types of food I ate. That set of cardiology exams was accompanied by warnings that my marginal blood lipids results and slightly elevated blood pressure were warning signs. A week before this flight, my flight surgeon gave me a new 3<sup>rd</sup>-class medical certificate. *This pain could not be a heart attack, even if it did read like a script from one of the many brochures I had read last fall.*

The pain grew intense. I had to take my headset off and wipe the profuse sweat from my head. I was soaked from the waist up. I realized that I would have to do something, and soon, as the pain intensity continued to grow. The Connersville airport that I was just past abeam of was the obvious place to land. Among the now out-loud comments to myself that this could not be real, I started putting the Unicom frequency into the radio. I began to consider the next step of how I would get help when I landed.

Abruptly and completely, the pain ended and my sweating stopped. What happened? I asked, as I let the autopilot

*Continued* →

### From His Aviation Medical Examiner's Perspective

*The author's aviation medical examiner, Dr. Walter W. Keyes, Kettering, Ohio, provided the following brief patient history.*

**MR. CRUSE** was a 65-year-old general aviation pilot with 800-plus hours of flying time when he was evaluated for palpitations in 2006. A Holter monitor test was negative. His palpitations abated with the reduction of caffeine intake. He had no family history of arteriosclerotic heart disease. His lipid panel was mildly abnormal, and he elected to control it by diet.

He was evaluated by a cardiologist in November of 2007 for discomfort in the upper bronchial area, which would begin about 10 minutes into his jogging routine, but would spontaneously abate and did not prevent him from reaching his 1.5-mile goal.

More recently, he had stopped jogging due to musculoskeletal problems but continued a vigorous walking program without chest pain. His workup included a stress cardiolute test, which showed no EKG change and a small fixed defect in the anterior wall; a 2D echo, which showed normal ejection fraction, mild tricuspid and mitral regurgitations; a CT scan for coronary artery calcification showing a score of 75.48 (mild plaque burden) predominately in the LAD. He remained on a low dose of aspirin and seemed to be doing very well — until August 7, 2008.

continue me toward Greenwood. I did not consider turning for home, even though the winds would favor the time for return over the continued flight. But, I reasoned, I was picking up my brother. But, I countered, I could not allow him to fly with me after this experience. The indecision carried me on for another several minutes and miles. The Indianapolis skyline appeared ahead and a bit north of my course.

The pain begins again. And I know that this really is a heart attack and I have to act now. I call the Greenwood Unicom saying I have a medical emergency and to summon EMT to meet my landing. Silence. Then, an aircraft just announcing his turn to final for Runway 01 at Greenwood speaks up, saying that he'll call 911 for me as soon as he can get to a phone. I respond with thanks.

Less than ten minutes out...the grows more intense. Concentrating on flying was getting harder. I am drenched again. Time for the landing checklist. I started a slow descent. I never asked myself how I could get on the ground faster. There was the structure of a thousand hours of flying and many approaches to uncontrolled fields. I announce that I'd be overflying on cross-wind to the downwind for 01. More pain and time continues.

My voice, now weaker, announces that 8NG is over the field and turning for downwind. Downwind now. Speed to 85 knots. Ten degrees of flaps. Trim. The numbers for 01 abeam now. Power to 1500 RPM. When to turn base. OK. 8NG turning base, landing 01, Greenwood...my voice not very strong...8NG final for 01.

Ahead is the most beautiful runway I have ever seen. It is very long.

*Speed!* I'm below 60 knots. Add some power...be patient. I'm starting to almost shout at myself to keep concentrating as my mind is nearly consumed by the pressure in the chest. Patience...let the speed drain off...let the aircraft settle...add some power for cushion...patience. The landing is smooth but a bit fast.

Left turn off the active, right turn on taxiway. I see Dave, the line man, just at the edge of the parking ramp, wands up, guiding me in. Next to him a fire department pumper and an ambulance with flashing lights.

The pain begins again. And I know that this really is a heart attack and I have to act now.

For me. Thank God. What a great sight!

Switches off. Double-check systems are down. Now, I

can open the door. Two EMTs pull me out. I am on the stretcher then into the ambulance. The EMTs are working on me, one on each side. They hook me to an IV on the right and an EKG setup on the left. The EMT on my left, a young woman—another angel—shouts, “Hit it, we have a real heart attack!”

Five minutes later, I am in the E.R. of a very close and very new St. Francis hospital. The emergency team takes control of my situation. While they work, my clothes are removed, and my history is asked for and given. The cardiologist then speaks up, “Folks, let's prep him for surgery.” This is followed rapidly by a catheter insertion at my groin into the right femoral artery. The cardiologist gets his angiogram indications of a 99% block due to stenosis in the left anterior

descending heart artery, otherwise popularly known as the “widow maker.”

I find out later in my Critical Care room that they deployed a stent at the key location and achieved 100% flow there.

Later, tests confirm that my heart has no permanent, measurable damage. My cardiologist says that, except for the one other, less critical location, my heart does not have significant arterial blockages. Finally, there is agreement with the earlier positive cardiology findings that I have healthy arteries and no systemic heart issues, and that tests can't always predict heart attacks.

Two days later, I am released from the hospital and my wife drives me home to Dayton. I am alive, and it is a beautiful day as I write this down. It is a day so wonderful, it makes you want to fly and “touch the sky” again.



**About the author.** Tom Cruse has been a private pilot since 1975. He is a semi-retired research Air Force consultant and previously was a professor of mechanical engineering at Vanderbilt. He now flies every two weeks with a flight instructor to stay IFR current and work toward a Commercial rating, which he plans to earn after getting his medical back.

#### REQUIREMENTS FOR ANY CLASS OF AIRMAN MEDICAL CERTIFICATION AFTER CORONARY HEART DISEASE

1. Recovery period: 6 months after angina, infarction, bypass surgery, angioplasty, stenting, rotoblation, or atherectomy.
2. Hospital discharge summary (history and physical), coronary catheterization report, and operative report regarding all cardiac events and procedures.
3. A current cardiovascular evaluation must include an assessment of personal and family medical history; a clinical cardiac and general physical examination; an assessment and statement regarding the applicant's medications (and any side effects), functional capacity, modifiable cardiovascular risk factors, motivation for any necessary change, prognosis for incapacitation; and blood chemistries (fasting blood sugar and current blood lipid profile to include total cholesterol, HDL, LDL, and triglycerides).
4. A current maximal Graded Exercise Stress Test
5. A SPECT myocardial perfusion exercise stress test using technetium agents and/or thallium may be required for consideration for any class if clinically indicated or the exercise stress test is abnormal by any of the usual parameters. The interpretive report and all SPECT images, preferably in black and white, must be submitted.

Note: If cardiac catheterization and/or coronary angiography have been performed, all reports and the actual films (if films are requested) must be submitted for review. Copies should be made of all films as a safeguard against loss. Films should be labeled with the name of the applicant and a return address.

(Source: excerpted from *Guide for Aviation Medical Examiners* online edition: [www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/aam/ame/guide/](http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/))

## Central Region's New Deputy Regional Flight Surgeon

By Barbara Stoker

The Central Region medical staff welcomed **Daniel K. Berry**, DO, MS, PhD, as the new Deputy Regional Flight Surgeon on September 15, 2008. As Deputy, Dr. Berry supports the Aerospace Medicine safety programs in the Region.

Dr. **Larry Wilson**, Regional Flight Surgeon, says "The FAA is very fortunate to have Dr. Berry join our ranks. I cannot envision anyone more highly qualified



Dr. Berry

for the position of Central Regional Deputy Regional Flight Surgeon."

Dr. Berry joined the Federal Aviation Administration after serving in the U.S. Air Force for 28 years. He has an extensive background in biological defense and retired as joint project manager, Chemical, Biological, Radiological and Nuclear Contamination Working Group, a 100-person joint command team.

He has exceptional experience as an aviation medical examiner and medical review officer, with clinical experience in an alcohol and drug rehabilitation program. As an Air Force flight surgeon, Dr. Berry has presented on numerous aerospace medicine and chemical-biological defense topics, and he has authored several publications.

At the age of 19, Dr. Berry graduated from Southern Adventist University with a bachelor's degree in Mathematics. He also has advanced degrees in Biomathematics and Biomedical Engineering. He received his medical degree from the University of Health Sciences-Kansas City and completed the MPH requirements for Aerospace Medicine certification at the University of Oklahoma. He is board-certified in Family Practice and Preventive Medicine with a sub-specialty in Aerospace Medicine.

Dr. Berry is licensed to practice medicine in Oklahoma and New Jersey. In his spare time, he is a private pilot, operates a ham radio, and is certified as an advanced, open-water diver. He and his wife, Pamela, have three children.

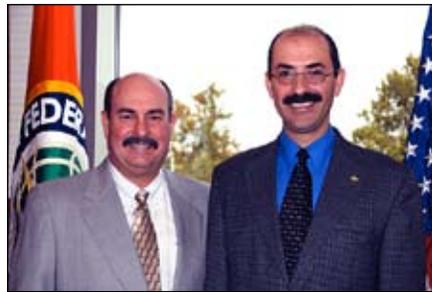


## Dr. Robert Johnson Selected as New CAMI Deputy

**Robert Johnson**, MD, MPH, MBA, was selected as the Civil Aerospace Medical Institute's new deputy director and began at CAMI on September 15th, according to **Melchor J. Antuñano**, MD, MS, the Institute's director.

Among his responsibilities are to focus on the programmatic management of aerospace medical certification, research, and education. He will also help to maintain the certification process by lending his extensive knowledge of aerospace medicine for strategic planning and ensuring continued customer focus by filling key staff positions at the Institute quickly.

"I believe that Dr. Johnson is an exceptional choice as our new deputy director," says Dr. Antuñano. "He has been a military flight surgeon, a civilian aviation medical examiner, an administrator, and an academician. He will bring a new perspective to the aerospace medical programs at CAMI that will immediately be felt," he continued.



NEW DEPUTY CAMI DIRECTOR.  
Dr. Johnson (l.) and Dr. Antuñano.

Dr. Johnson began his medical career as a Hospital Corpsman in the U.S. Navy. He went on to earn a medical degree from the Uniformed Services University of the Health Sciences School of Medicine, a masters degree in Public Health and Epidemiology from Yale University, a masters degree in Business Administration from the University of Texas, and completed his Residency in Aerospace Medicine at the USAF School of Aerospace Medicine. He is board certified in General Preventive Medicine and Public Health, as well as in Aerospace Medicine.

He has had extensive clinical aerospace medicine and leadership experience at the USAF Armstrong Laboratory, the USAF School of Aerospace Medicine, Wilford Hall USAF Medical

Center, and the University of Texas Medical Branch. He was a co-editor of the 4<sup>th</sup> edition of the textbook, *Fundamentals of Aerospace Medicine*. He also had experience in medical program evaluation for the Headquarters Air Force Inspection Agency.

He is no stranger to aviation. While not a private pilot, as a flight surgeon, Dr. Johnson has logged nearly 900 flying hours in numerous aircraft, including the F-111, F-16, C-130, T-1A, and the Cessna 172. He retired from the Air Force as a colonel in 2005.

Dr. Johnson believes that certification decisions should be "focused on safety, medically reasonable, evidenced based, and consistent." He says he hopes to support the process by making it more "user-friendly" and free of unnecessary bureaucratic technicalities. "As an AME, I always thought of myself as being *in the breach* of the certification process, helping the airman with certification, and applying the regulations in a thoughtful and medically sound manner," he stated.

He and his wife have three grown children and live in nearby Mustang, Okla.



# Retinitis Pigmentosa in a Naval Aviator

Case Report, by Sean Hollonbeck, MD, MPH, and Thomas Webster MD, MPH

*Retinitis pigmentosa is a major worldwide genetic cause of human blindness due to progressive degeneration of retinal photoreceptor cells. It is a family of inherited ocular diseases collectively known as retinitis pigmentosa. This article discusses an early presentation of retinitis pigmentosa in a student naval aviator, an overview of the disease, and a discussion as to the issuance of a Federal Aviation Administration third-class medical certificate.*

## Clinical History

**T**HE AVIATOR IS a 23-year-old female U.S. Marine Corps officer who had completed Aviation Preflight Indoctrination (API) at Naval Air Station Pensacola, Fla. API is a prerequisite for all Student Naval Aviators (SNAs).

Prior to her annual flight physical, the SNA had accumulated 39 hours in the T-34C and 25 hours in general aviation aircraft. On vision screening, her left eye could not correct to better than 20/25. An initial diagnosis by the treating optometrist was macular degeneration. The SNA was referred to the Naval Aviation Ophthalmologist for further work-up.

Questioning from the ophthalmologist uncovered a history of difficulty driving during the evening hours and

participating in night exercises at Marine Corps Officer Basic School. Further discussion brought forward a family history of retinitis pigmentosa (RP). The SNA noted that her father and maternal grandmother had RP.

An ophthalmic exam revealed cystoid macular edema, which was to be treated with a trial of Acetazolamide. A provisional diagnosis of RP was made, as a formal diagnosis requires a confirmation by electroretinogram (ERG). ERG confirmed the diagnosis of RP and the SNA was disqualified from Naval aviation. The SNA currently holds a Federal Aviation Administration third-class physical and is now disqualified under the general condition of Title 14 CFR §61.53 and §67.303d.

The SNA was seen at follow-up by the Naval Aviation ophthalmologist with funduscopy performed during the visit. Her visual acuity had returned to 20/20 bilaterally, and the cystoid macular edema was reduced. She was advised to continue with the Acetazolamide. The SNA decided to add vitamin A to her daily medications.

## Clinical Presentation

The symptoms and signs of retinitis pigmentosa are well known and have been described in the literature since 1855 (Donders, 1855; Duke-Elder & Dobrie, 1967). Clinical presentation is varied but may include symptoms of night blindness with elevated dark adaptation thresholds of rods and cones. In general, patients report a family history, impaired adaptation, night blindness, and difficulty with vision in the mid peripheral visual field in adolescence (Berson, 1993).

On fundoscopic examination, abnormal retinal pigmentation, including mid-peripheral bone spicules, arterial narrowing; optic nerve pallor, predisposition to myopia, posterior subcapsular cataract, and vitreous changes, are

*Continued* →

## EPIDEMIOLOGY

Retinitis pigmentosa encompasses a heterogeneous group of inherited ocular diseases representative of the most frequent retinal dystrophies. It has a worldwide prevalence of 1:3000 to 1:5000, with a combined incidence of 1:3500 (Haim, 2002; Inglehearn, 1998). Inherited forms of retinal degeneration are largely focused on gene mutations within photoreceptors or retinal pigment epithelium (RPE) cells, leading to overwhelming loss of visual function. The disease is known to progress to functional blindness. The principal gene mutations leading to the RP phenotype relate to defects in the activation/de-activation of the visual pigment or pathways involved in the visual photo transduction cascade (Kalloniatis and Fletcher, 2004)

The inheritance patterns in RP are classified into autosomal

dominant, X-linked, simplex and multiplex (Haim, 2002). Data from a meta analysis showed that RP could be classified as autosomal recessive in about 31 per cent of cases, autosomal dominant in approximately 16 per cent, X-linked in around 9% and simplex/multiplex in approximately 44% (Heckenlively, Boughman and Friedman, 1988).

The age at which symptoms become clinically apparent is correlated with the mechanism of inheritance. X-linked RP, autosomal recessive RP, and autosomal dominant RP generally have their onsets at successively greater ages, although the age range overlaps considerably. Frequently, a case may present with visual symptoms in late adolescence. There are 19 known RP genes grouped into functional categories. At least 17 additional uncharacterized RP genes are thought to exist by mapping data (Phelan & Bok, 2000).

## ETIOLOGY

Retinitis pigmentosa is the label of a number of related dysfunctions of the retina. Many forms of these diseases are described with a variety of partial and complete synonyms for the term "retinitis pigmentosa" appearing in the literature (van Soest, 1999). The similarities leading to the common grouping of these diseases are based on clinical symptoms, electroretinographic phenotype, and/or genetics. In typical cases, known as rod-cone RP, the rods are the predominantly affected photoreceptor cells (Weleber, 1994). This generates a number of characteristic, clinical symptoms including night blindness at an early age or stage of the disease, and bilateral symmetric loss of the mid-peripheral visual fields.

common (Pagon, 1988; Kanski, 2003; Birch, 1993). "Bone-spicule formations" are pigment granules accumulate in perivascular clusters, and are due to their morphological appearance, in the neural retina. Early in the disease, the fundus develops a mottled or granular appearance, followed by the development of bone-spicule pigmentary deposits overlying the depigmented fundus. The course of the disease is varied, with early detection and treatment often resulting in minimal to no vision loss for decades. It is notable that no risk of sudden vision loss or incapacitation exists (Berson, 1993).

### Diagnosis

Central to the diagnosis and classification of RP is the ERG. This procedure requires the photoreceptor cells to be either dark adapted (scotopic ERG) or adapted to a specific level of light (photopic ERG), and then stimulated with a brief flash of light. The response is summed and recorded extraocularly with a contact lens electrode. Stereotypical RP, a disease of the rod-cones, manifests initially as alterations of the scotopic ERG and shows a proportional loss of the photoreceptor cell and post-photoreceptor components of the ERG. In the opposite disease, cone-rod dystrophy, photopic ERG changes precede those of the scotopic ERG. Eventually, the rod response is affected. Cone dystrophy presents with a disrupted photopic ERG and stable scotopic ERG (Phelan and Bok, 2000).

Ophthalmic exam may reveal abnormal retinal pigmentation, including mid-peripheral bone spicules, arterial narrowing, optic nerve pallor, predisposition to myopia; posterior subcapsular cataract and vitreous changes are also common (Pagon, 1988; Kanski, 2003; Birch, 1993). Refractive errors, including myopia and astigmatism, are common (Sieving & Fishman, 1978). Atypical dark adaptation, night blindness, loss of the visual fields, loss of central visual acuity, attenuation of the retinal vasculature, and changes to the optic nerve head during the course of the disease may also be seen but are not required for definitive diagnosis (Phelan & Bok, 2000)

### Prognosis

As the condition progresses, patients develop a tendency to blue blindness, lose far peripheral field, and eventually lose central vision as well. Patients can have a normal fundus appearance in the early stages. In more advanced stages, signs include attenuated retinal vessels, intraretinal pigment, and waxy pallor of the optic discs. The intraretinal pigment is distributed circumferentially around the mid periphery in the zone where rods normally are at maximum concentration. Cataracts develop in most cases and some have cystoid macular edema (Fetkenhour et al., 1977; Fishman, 1977). Some patients have the potential to be legally blind as early as age 30, with the majority legally blind by age 60 with a central visual field diameter < 20° (Berson, 1993).

### Treatment

Treatment options remain controversial in ophthalmology specialty fields. The consensus is that the use of vitamin A may prolong useful vision by up to seven years. A large double-masked treatment trial of vitamin A and/or vitamin E by Berson et al. demonstrated a small but significant slowing in the progression of RP secondary to vitamin A – 15,000 IU daily. The use of vitamin E, 400 IU, is considered detrimental (Berson et al., 1993).

No effective approach to prevention, stabilization, or reversal exists for the majority of RP cases.

### Discussion

The FAA Aviation Medical Examiner's (AME) guide states the retina and choroid will be examined for evidence of coloboma, choroiditis, detachment of the retina, diabetic retinopathy, retinitis, retinitis pigmentosa, retinal tumor, macular or other degeneration, toxoplasmosis, etc. (AME Guide, accessed 3/21/07 at /www.faa.gov/about/office\_org/headquarters\_offices/avs/offices/aam/ame/guide/).

Per the AME Guide, our SNA is no longer eligible for her third-class airman medical certificate. The Aerospace Medical Certification Division at the FAA is responsible for reviewing applicants for special issuance of airman medical certificates. Considering the SNA currently has 20/20 vision and

with an understanding of the natural course of the disease, it is feasible to expect the issuance of a third-class medical certificate limiting her to daytime flying only. It is not unreasonable for the FAA to require a statement of demonstrated ability. RP visual acuity decreases slowly over decades and is not suddenly incapacitating.

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# Vasovagal Syncope

Case Report, by Howard Givens, MD, MPH

*Neurocardiogenic syncope (vasovagal syncope) may be diagnosed by history and physical exam alone. However, such an evaluation is insufficient to clear an airman for flying duties after a syncopal event. This case report focuses on the evaluation necessary to clear an airman for flying duties when neurocardiogenic syncope is suspected.*

## History and Physical Findings

**A** 37-YEAR-OLD male first officer for a large, commercial cargo company was taking a short break from a routine simulator training session when he suddenly began to “twitch like a puppet on a string” and collapsed to the floor. Fortunately, the simulator instructor was standing next to him and was able to lower him to the floor without injury. From about six feet away, a support pilot observed the pilot had been leaning against a sink and suddenly began banging his head back into the towel dispenser before collapsing and “was definitely experiencing uncontrolled muscle spasms.”

Both the instructor and the support pilot agree that their trainee was “coherent” and “responding appropriately to our questions” within a minute of reaching the supine position. They noted that he did not recall banging his head against the towel dispenser or “twitching” but complained that he had felt “faint.” The pilot asked for assistance to stand, and was helped back to a standing position (leaning against the sink), where he quickly “turned very pale and started to twitch again,” and his legs were noted to “buckle” beneath him. The observers quickly lowered him back to the floor, where he was once again coherent within minutes. The patient remained lying on the floor, talking to the observers until the Emergency Medical Service team arrived and transported him to a local emergency room (1).

According to the emergency room physician’s note, the patient reported (the witnesses did not accompany him to the ER) dizziness or lightheadedness, and “points of light” in his visual field, all of which had resolved when he knelt on one knee. He reported that the symptoms returned when he stood up, so he lay on the floor until EMS

arrived. Additionally, this airman had a normal physical exam. There was no significant change in vital signs with change of position (lying, sitting, and standing), and he exhibited normal alertness, cranial nerve function, peripheral sensation, motor strength, and cerebellar testing – including a normal Romberg test and normal gait.

Finally, the initial ER evaluation included a normal CT scan of the brain without contrast, and laboratory assessment to include glucose, electrolytes, CBC, and TSH (all normal). The patient was released without treatment.

Further outpatient evaluations included a normal waking EEG and a 24-hour Holter monitor, which demonstrated an average heart rate of 57 bpm. All of the preceding information was evaluated by a neurosurgery consultant for the Federal Aviation Administration, who concluded that the most likely diagnosis was “convulsive syncope” (a form of neurocardiogenic syncope), rather than a seizure. Since the duration of the episode was complicated by the patient’s premature return to an upright posture, the consultant recommended a more in-depth cardiovascular evaluation. The patient demonstrated his excellent physical conditioning by exercising a full 21 minutes of the Bruce protocol during an exercise stress test, with no symptoms and a completely normal ECG tracing. His echocardiogram revealed normal valve function and chamber wall motion, as well as a normal ejection fraction. According to the patient’s treating cardiologist, in the six months between the event and final consideration of the patient’s application for medical certification, he had no further symptoms or evidence of presyncope.

## Aeromedical Concerns

According to the Guide to Aviation Medical Examiners, disturbance of consciousness without satisfactory explanation of cause is a disqualifying condition for all classes of certification. This requires denial or deferral to the FAA Aerospace Medical Certification Division (AMCD) for consideration of special issuance. In this case, it is difficult to firmly establish a final diagnosis based solely on the history reported by the patient and the statements from the witnesses. Did the airman have a seizure or was it syncope? Was the patient’s visual symptom of “points of light” in his visual field a symptom of presyncope or an aura preceding a seizure? The brief prodrome (faintness), the sudden onset of symptoms (knees buckled), and the quick resolution of symptoms without apparent mental confusion, all suggest neurocardiogenic (vasovagal) syncope. However, while rhythmic, myoclonic movement (twitching) may occur with syncope, it is more commonly associated with seizure activity. Inappropriately diagnosing syncope as a seizure will result in unnecessarily grounding the airman for up to four years for observation; while mistakenly diagnosing a true seizure as syncope may have disastrous consequences should another seizure occur while the airman is at the controls.

Obviously, any sudden loss of consciousness in an airman during flight is an emergency, whether the etiology is cardiogenic, neurogenic, or vasovagal. It is essential that any airman with a loss of consciousness undergo an evaluation sufficient to establish a likely cause prior to resuming flight activities. Many physicians are comfortable making recommendations about when patients may resume driving a car or return to work after a syncopal event. While it may be hazardous for drivers or workers to experience recurrent syncope, there is at least a chance that they may survive the event and receive emergency medical attention in a timely manner. An airman in flight who experiences recurrent syncope has no chance to survive the event or receive emergency

Continued—→

medical attention, unless and until someone first lands the airplane.

**Role of the AME**

It is the role of the aviation medical examiner to recognize the aeromedical implications when their patients have symptoms similar to those described in this case. The AME can expedite a return to flight duties. In this case, the airman's treating physicians made a presumptive diagnosis of neurocardiogenic syncope and released the airman with no restrictions. If the airman had involved the AME in the initial evaluation process, the aeromedical concerns would likely have been addressed from the outset, greatly decreasing the time needed to medically certify the airman. Even if the AME was unsure of an approach to clearing the airman for flying duties, a call to the regional flight surgeon or the AMCD could have helped

identify potential concerns and helped guide the post-event evaluation.

**Outcome**

An increasingly common approach to diagnosing neurocardiogenic syncope involves upright tilt testing. Current FAA policy does not include tilt testing because, while the sensitivity may be as high as 80%, the sensitivity is low, and false positive results are created. Some tilt test protocols yield a positive result in 45% of people with no history of syncope (5). Also, the false negative rate may be as high as 30% so that a negative test does not exclude neurocardiogenic syncope. Finally, tilt test results are not sufficiently reproducible (even in the same person) to justify denial of a medical certificate solely on the basis of this one test. For these reasons, the FAA prefers a complete cardiovascular evaluation, to include a treadmill stress

test, a 24-hour Holter monitor, and an echocardiogram to reliably exclude the structural or electrical cardiac causes of syncope.

This airman had a current first-class medical certificate issued one month prior to the syncopal event. Since the event occurred at work, his employer appropriately restricted the airman from commercial flight duties, pending further medical evaluation. The FAA was notified one month after the event in a letter from a preventive medicine practice under contract with the pilot's union, stating that the airman had been released by his treating physicians. Ultimately, the AMCD determined that the diagnosis of neurocardiogenic syncope was sufficiently established in this physically fit young airman. He was found to be medically eligible for a first-class medical certificate.

NEUROCARDIOGENIC SYNCOPES		
Provoked by	Presyncopal Symptoms	Presyncopal Signs
Prolonged Standing	Weakness	Facial Pallor
Fear	Light-Headedness	Yawning
Emotional Distress	Diaphoresis	Pupillary Dilatation
Severe Pain	Visual Blurring	Nervousness
Vigorous Exercise (in warm environment)	Headache	
	Nausea	
	Feeling Warm or Cold	

**Table 1.** Neurocardiogenic Syncope. (Adapted from Grubb) (3).

**ETIOLOGY OF NEUROCARDIOGENIC (VASOVAGAL) SYNCOPES**

Syncopes of all types accounts for 3.5% of all emergency room visits and 1 to 6% of all hospital admissions in the United States each year (3). Three percent will have recurrences (6), and approximately 20% will have a neurocardiogenic etiology (4). It is often difficult to establish the cause of syncope and even more difficult to predict the odds of recurrence in a specific patient. A 2001 study found that of 337 patients with recent episodes of syncope, a definitive cause was established in 281 (82%) patients, while the cause of syncope remained unexplained in 60 (18%) patients (2).

Both the older (vasovagal) and newer (neurocardiogenic) terms are descriptive of likely pathogenic mechanisms of this common form of syncope. Numerous interactions between the nervous system and the cardiovascular system maintain a narrow window of acceptable perfusion pressure within the brain and other vital organs. Experts postulate that the central nervous system erroneously detects a sudden rise in perfusion pressure (similar to the perfusion pressure found in severe hypertension) and then initiates an equally sudden response to sharply lower perfusion pressure (3). The autonomic nervous system very effectively decreases peripheral vascular resistance and sometimes lowers heart rate in a misguided attempt to regulate cerebral perfusion pressure. The result is loss of consciousness and postural tone due to hypo-perfusion of the brain. As soon as the individual is horizontal, normal cerebral perfusion is restored. Since this occurs over a period of seconds, normal function is quickly restored.

**References**

- (1) All quotations in the first paragraph of the History are from E-mail accounts written by the two witnesses within 12 hours of the event.
- (2) Alboni P, Brignole M, Menozzi C, et al. Diagnostic value of history in patients with syncope with or without heart disease. *JACC* 2001; 37 (No 7): 1921-28.
- (3) Grubb B. Neurocardiogenic Syncope. *N Engl J Med* 2005; 352: 1004-10.
- (4) Kapoor W. Syncope. *N Engl J Med* 2000; 343: 1856-62.
- (5) Olshansky B. "Upright tilt table testing in the evaluation of syncope," December 27, 2006, <http://uptodateonline.com/utd/content/topic.do?topicKey=carrhyth/46365>, accessed on March 18, 2008.
- (6) Rumm M, Brenner B. "Syncope," July 13, 2006, [www.emedicine.com/emerg/TOPIC876.HTM](http://www.emedicine.com/emerg/TOPIC876.HTM), accessed on March 18, 2008.



**About the Author**

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## AME Satisfaction Survey: The Polls Have Closed!

'Room for Improvement' Seen

By Katrina Avers, PhD

**P**OLLS HAVE CLOSED and change is in the air! The Civil Aerospace Medical Institute (CAMI) recently distributed a survey to evaluate the degree of customer satisfaction provided to domestic, non-military Aviation Medical Examiners (AMEs) and identify specific areas of improvement for aerospace medical certification services.

Your votes have been counted and the verdict is in – aerospace medical certification services has room for improvement. Although the majority of AMEs (more than 89%) were satisfied with aerospace medical personnel, satisfaction with some of the products and tools was mixed (for example, EKG, more than 80% satisfied; Aerospace Medical Certification Internet Subsystem, 53% satisfied). AMEs provided a number of suggestions for improvement. Some of the most frequently identified suggestions include:

- ▶ Direct line to Aerospace Medicine Certification Division or Regional Flight Surgeon
- ▶ Online tracking for deferrals
- ▶ Frequently update medication database in AMCS
- ▶ Immediate notification of successful ECG transmission
- ▶ Easier navigation of on-line AME guide (e.g., keyword search)
- ▶ Greater focus on disqualifying parameters in training
- ▶ Reconsider the FAA's position on SSRIs as medically disqualifying in the standards and guidelines

Future issues of the *Federal Air Surgeon's Bulletin* will discuss how your suggestions are being used to improve aerospace medical certification services. A special thanks to all of you that responded to this survey – we appreciate your feedback!



*Dr. Avers is an industrial/organizational research psychologist in the Aerospace Human Factors Research Division at the Civil Aerospace Medical Institute.*

## Retinitis from page 9

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## About the Authors

MAJ(P) Sean Hollonbeck, MD, USA, MC, and CPT Thomas Webster, MD, MPH, USA, MC, were Residents in Aerospace Medicine when they wrote this case report during a clinical rotation at the Civil Aerospace Medical Institute. MAJ(P) Hollonbeck is currently serving as the Aviation Brigade Surgeon for Task Force 49 in Baghdad, Iraq, and as the unit Flight Surgeon for 4<sup>th</sup> Squadron 3rd Armored Cavalry Regiment out of Fort Hood, Texas. He is currently the Army Aerospace Medicine Consultant in theater. He will be returning and moving on to a position at Fort Rucker, Alabama. CPT Webster is completing his residency in Aerospace Medicine at the Naval Air Medical Institute, NAS Pensacola, Florida, and awaits his follow-on assignment.

## Aviation Medical Examiner Seminar Schedule

2009		
February 20 – 22	Orlando, Fla.	OOE (1)
March 2 – 6	Oklahoma City, Okla.	Basic (2)
May 3 – 7	Los Angeles, Calif.	AsMA (3)
June 5 – 7	San Antonio, Texas	CAR (1)
July 20 – 24	Oklahoma City, Okla.	Basic (2)
August 7 – 9	Washington, D.C.	N/NP/P (1)
October 14 – 17	Rochester, Minn.	CAMA (4)
November 2 – 6	Oklahoma City, Okla.	Basic (2)
November 20 – 22	Seattle, Wash.	OOE (1)

### CODES

**AP/HF** Aviation Physiology/Human Factors Theme

**CAR** Cardiology Theme

**N/NP/P** Neurology/Neuro-Psychology/Psychiatry Theme

**OOE** Ophthalmology-Otolaryngology-Endocrinology Theme

(1) A 2½-day theme AME seminar consisting of 12 hours of aviation medical examiner-specific subjects plus 8 hours of subjects related to a designated theme. Registration must be made through the Oklahoma City AME Programs staff, (405) 954-4830, or -4258.

(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 theme AME seminar held in conjunction with the Aerospace Medical Association (AsMA). Registration must be made through AsMA at (703) 739-2240. A registration fee will be charged by AsMA to cover their overhead costs. Registrants have full access to the AsMA meeting. CME credit for the FAA seminar is free.

(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 Web site: [www.civilavmed.com](http://www.civilavmed.com).

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