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.

Vol. 51, No. 4 2013-4

Federal Air Surgeon's Medical Bulletin

From the Office of Aerospace Medicine
Library of Congress ISSN 1545-1518

Federal Air Surgeon
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The *Federal Air Surgeon's Medical Bulletin* is published quarterly for aviation medical examiners and others interested in aviation safety and aviation medicine. The Bulletin is prepared by the FAA's Civil Aerospace Medical Institute, with policy guidance and support from the Office of Aerospace Medicine. Authors may submit articles and photos for publication to:

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from the Federal Air Surgeon's

PERSPECTIVE...

by Fred Tilton, MD

New Obstructive Sleep Apnea Policy

Untreated obstructive sleep apnea is a disqualifying condition for airmen and air traffic control specialists.

I hope you all had a happy and really scary Halloween, and that you will have a wonderful Thanksgiving. The purpose of this editorial is to alert you to a policy that we will be releasing shortly on obstructive sleep apnea (OSA). OSA is almost universal in obese individuals who have a Body Mass Index (BMI) over 40 and a neck circumference of 17 inches or more, but up to 30% of individuals with a BMI less than 30 have OSA.

OSA inhibits restorative sleep, and it has significant safety implications because it can cause excessive daytime sleepiness, cognitive impairment, cardiac dysrhythmias, sudden cardiac death, personality disturbances, and hypertension, to cite just a few. Untreated OSA is a disqualifying condition for airmen and air traffic control specialists (ATCSs), and it is a concern for the other modes of the Department of Transportation. It has also been a hot issue at the National Transportation Safety Board for several years.

Dr. **Nick Lomangino** has been working on this policy for quite a while, and I think he has developed an outstanding product. We have purposely moved slowly because we wanted to give everyone an opportunity to learn about some of the issues before we added major changes to the medical certification process. We began by publishing educational OSA pamphlets, talking about the issues at flying safety meetings, and adding an OSA session to the curriculum of aviation medical examiner (AME) seminars.

The next step will be to require AMEs to calculate the BMI for every examinee (both airman and ATCS) by using a formula that is located in the examination techniques section of the *AME Guide* and to record the results in Block 60 of FAA Form 8500-8. Airman applicants with a BMI of 40 or more will have to be evaluated by a physician who is a board certified sleep specialist, and anyone who is diagnosed with OSA will have to be treated before they can be medically certificated. Once we have appropriately dealt with every airman examinee who has a BMI of 40 or greater, we will gradually expand the testing pool by going to lower BMI measurements until we have identified and assured treatment for every airman with OSA. Note: We plan to implement the same assessment and treatment protocol for ATCSs, but we have to finalize some logistical details before we can proceed.

While this policy focuses on obstructive sleep apnea, you as AMEs must also be on the alert for other sleep-related disorders such as insomnia, parasomnias, or restless leg syndrome; or other physical anomalies such as a retrograde mandible, a large tongue or large tonsils, or neuromuscular or connective tissue disorders, because they could also be signs of problems that could interfere with restorative sleep.

I hope this editorial is of some use to you. I excluded a lot of detail because my intent was only to announce the new policy. The complete directions will be fully explained in the *AME Guide*.

Remember, you, as aviation medical examiners, are our front line, and your daily interaction with pilots and controllers has an enormous impact on the safety of the national airspace. Thank you so much for what you do for the Federal Aviation Administration, the flying public, and the individuals you examine.

—*Fred*

OSA is almost universal in obese individuals who have a body mass index over 40 and a neck circumference of 17 inches or more, but up to 30% of individuals with a BMI less than 30 have OSA.

Dr. Berry Receives OneDOT Award

By Kelly Vick

Regional Flight Surgeon **Daniel K. Berry**, of the Central Region, received the Department of Transportation's OneDOT Award as Manager of the Year for the Central Region.

Dr. Daniel Berry (r) receives OneDOT award from Central Region Administrator Joe Miniace

"Dr. Berry has changed the climate in the Aerospace Medicine Office in the Central Region," said Central Region Administrator **Joe Miniace**. "He was selected for his leadership and success in managing people and programs. He managed a remarkable turnaround in the region by reestablishing relationships with other FAA Lines of Business and with the medical examiners in the field."

Dr. Berry's leadership in managing the Aviation Medical Examiner (AME) Program resulted in the Central Region completing 154 of 170 AME site inspections in FY13. The region is on schedule to complete the remainder of the visits by the end of the year.

Dr. Berry collaborated with headquarters to develop a new sleep apnea policy for airmen and air traffic controllers. He recommended changes that were incorporated into the final policy that will soon be released to all FAA Regional Flight Surgeons. Another major revision he is working on is to the Airman Analyst Program Manual to incorporate new conditions under which AMEs may certify pilots. This represents the most significant change to the way the FAA administers airman medical certification in 10 years.

His focus on high quality and individualized service has resulted in a dramatic reduction in airmen complaint letters and congressional inquiries regarding airman medical certificates. His outreach through Congressional listening sessions, lectures to university aviation programs, pilot meetings and conferences, and interaction with individual aviators has contributed to improved customer satisfaction and understanding of the FAA medical process.

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Ms. Vick is the editor of the AVS Flyer in the FAA Office of Aviation Safety.

Aviation Medical Examiner Information Links

AME Guide
www.faa.gov/go/ameguide

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

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

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

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

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

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

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

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

FASMB Archives
www.faa.gov/go/fasmb

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

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

OAM Physicians On Call, Part 3

An Extension of Conditions AMEs Can Issue (CACI)

By Richard Carter, DO, MPH

Recap—In Part 1 of this series, we asked you to help us minimize our backlog of deferred examinations by issuing certificates when you can. In Part 2, we provided guidance for more complex cases: dispositions that would require a verbal authorization to issue. The case examples described circumstances that were straight forward enough, with adequate medical reports in hand, to allow you to issue with a verbal authorization from the Aerospace Medical Certification Division (AMCD) or your Regional Flight Surgeon (RFS).

In this paper, we circle back to the theme of **C**ases/conditions **A**ME **C**an **I**ssue (CACI) without a requirement to defer or call for verbal authorization. Part 1 provided a CACI list, and that list is again included with additional conditions and some revisions. New CACI guidelines do, indeed, involve more complex conditions, and we do need for you to collect information (medical reports) *that will allow you to issue*.

Issue when you can. A phone call to the AMCD is not always required. The *AME Guide* provides CACI instructions, primarily in three sections of the *Guide*: Protocol, Dispositions, and Worksheets.

The Protocol section of the *AME Guide*

Disease Protocols

lists some conditions allowable for you to initial issue (for example, a right BBB—in an otherwise healthy person 30 years of age or younger should not require a CVE; or diabetes controlled by diet/exercise, in both cases, AME may issue with notes in box 60). Complications can occur, and we invite you to call about abnormal labs, ECGs, etc. ECGs are still required for Class 1, so we need those, even if you regular issue (see the *10 Common ECG Issues,* page 5).

The Dispositions section of the *AME Guide*

Aerospace Medical Dispositions

also lists conditions for which you can issue (e.g., prostate cancer, without evidence of extra-capsular disease).

The *AME Guide* has recently added a worksheet section

certification worksheets

that provides more conditions for which you can issue (e.g., glaucoma worksheet, hypertension worksheet). Worksheets are checklists, so you do not need to forward them to the AMCD, but we do need a specific statement placed in block 60 from the worksheet if all criteria were met. You must use the worksheet in conjunction with the disposition table for that condition.

CACI up to date. So, what is new? Take a look at the Archives section of the *AME Guide* to find posted changes and dates of the changes

Archives and Modifications of the Guide for Aviation Medical Examiners

Example of Archives entry, " …revise dispositions table for prostate, renal, and testicular carcinomas. Introduce renal cancer worksheet with certification criteria under which you can regular issue."

CACI is a longer list. *(see CACI list on page 6).* Note, this is not a complete list of conditions that qualify for an Eligibility /CACI Letter, but a sample of typical questions/ conditions AMEs call about). The list includes many of the new changes in the *AME Guide*. The *AME Guide* has emphasized certain conditions, with the inclusion of worksheets. Current certification worksheets:

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

The *Guide* still lists many medical conditions that are initially disqualifying. Protocols, disposition tables, and worksheets all provide instructions to allow you to issue under specified conditions. Worksheets, for example, do not represent a special class of conditions that are somehow different in disposition. Worksheets are just another source of instructions to the AME. Not all applicants will meet CACI criteria (protocol, disposition tables, worksheets) or AASI criteria.

Complicated situations. You can call the AMCD or your RFS for questions regarding complicated situations when the *AME Guide* does not allow you to directly issue. AMEs that are given an initial Verbal Authorization to issue *must* send in the medical reports. Please, *do not* mail, fax, or otherwise send in duplicates of the same reports. Simply put, you can issue cases that allow for CACI/Eligibility Letter, or Regular Issue, and in general, do not need to send in medical reports for conditions that do not require a time-limited certificate, unless requested by AMCD/RFS or a letter.

Verbal authorization to issue. For uncomplicated cases that require a time limitation, you can call the AMCD number (405) 954-4821/option 6. Dedicated operators will route you to the medical officer on call. Please follow operator instructions. If we are not immediately available, we will try to call back the same day. We may also ask for an after-hours call-back number (usually your cell number), as we may return your call after normal working hours. The operators take calls from 0800 to 1615 CST.

When you call, we will want you to discuss the detailed written reports from the airman's clinical provider. We need a description of the medical condition, history, exam, tests, treatment plan, and prognosis. We also need your clinical description of how the airman is currently doing and if you have any concerns, since you actually see them in your clinic.

Even if you are not a pilot, ask yourself: *If I had to fly with this pilot, would I want to do it with this person in this condition?* Conditions acceptable for a verbal authorization include stable central serous retinopathy and stable obstructive sleep apnea. The vast majority of cases are ultimately granted a medical certificate. This is a tribute to the hard work of AMEs tracking

Continued on page 5

down reports of tests and procedures, and consulting with the airman's physicians to provide a satisfactory narrative of the current medical status and prognosis.

CACI case examples that may or may not require you to call AMCD

Example 1 (worksheet). Third-class, **thyroid cancer**, 6 yrs. ago, new, initial airman application, stable. Hypothyroid condition on Synthroid, with favorable reports (surgical report, hospital records, and updated current status), all with good prognosis. AME did call. Advised AME to issue regular certificate. AMCD will send the airman an Eligibility/ with warning only, for the history of thyroid cancer, and additional comment, "at the time of your next FAA physical exam, you will be required to bring current reports and/or test results to your follow-up with your AME regarding your history of hypothyroidism." This is a CACI letter. AASI is not required for the hypothyroid condition/medication, and we included a warning for the past thyroid cancer and surgery. So, you may perform subsequent exams and issue a certificate if the results and test reports continue to be favorable.

Example 2 (worksheet). Second-class airman, new diagnosis of **increased ocular pressure**, airman provided a summary report from the ophthalmologist, medication (Xalatan, prostaglandin analog) needed, no "true" glaucoma, as the visual fields are normal. The CACI worksheet allows you to issue if all worksheet checklist parameters are met. No reports need to be sent to AMCD. We do need specific comments in block 60, "Airman meets certification criteria for glaucoma." You may add additional information such as "favorable ophthalmologist report, medication (Xalatan), well tolerated, visual fields are normal." You do not need to call prior to transmitting the new exam. You can then issue a regular, non-time-limited certificate (if no other conditions) and transmit the exam.

Example 3 (Aerospace Medical Dispositions table). Third-class airman, history of new diagnosis, **prostate cancer**, status post-surgery, recovered without sequelae, PSAs are zero. The cancer was confined to the gland…good prognosis. You go to the *AME Guide* Disposition table (no worksheet) for prostate cancer, review a current status report, all pertinent medical reports (staging, PSA, metastatic workup, and operative report), and note prostate cancer confined to gland. You can regular issue, and it is not necessary to call prior to transmitting the new exam. You can then issue the regular, non-time-limited certificate (if no other conditions), put note in box 60 showing "PC stable, no mets," and transmit the exam.

Team effort. We really need your help to limit unnecessary deferrals. Many complex medical conditions do eventually get a waiver (special issuance or SODA), and we will help you with the certification process. Together, we can expedite the timely medical certification of pilots.

Next time. We will discuss more conditions and the specific information you should help your airman collect to expedite a medical certification decision.

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Dr. Carter, an AMCD Medical Review Officer, thanks Dr. Judy Frazier for her technical assistance with this article.

10 Common ECG issues

What to Do About Them When Performing Certification ECGs†

1. If an airman has a heart rate less than 50, have the airman exercise in place and repeat the ECG. If the heart rate goes up above 50, send us both ECGs (in case this happens again down the road), and you can clear the airman.
2. This also goes for a significant first degree AV block. Exercise the airman in place, and if the block becomes less, you may clear the airman.
3. If an airman has a rate over 110 (sinus tachycardia) perhaps have the airman relax a bit and repeat the graph. If the rate drops below 110, send us the graph and clear the airman.
4. Two or more premature ventricular contractions (PVCs) on an ECG require the applicant to have a maximal nuclear stress test. If this has been previously worked up, you do not need to provide a new evaluation. Premature atrial contractions (PACs) if not symptomatic, do not require a workup.
5. If the airman demonstrates new onset of left or right bundle branch block see Bundle Branch Block Protocol.
6. An airman who has an incomplete RBBB pattern on previous electrocardiograms, and then demonstrates a complete RBBB, does not require an evaluation.
7. An airman with a new onset of a complete left bundle branch block is to provide a cardiovascular evaluation and a pharmacologic nuclear stress test. This is one of the conditions where we will accept a pharmacologic stress test. Airmen with a LBBB demonstrate what appears to be an area of ischemia in the septum, and the pharmacologic stress test helps better determine if there is actual ischemia.
8. An airman with left anterior or posterior hemiblock must demonstrate an absence of coronary artery disease, so a maximal nuclear stress test is required.
9. Limb lead III is the most variable lead. This lead sometimes is affected by respiration, which can falsely indicate that the airman had a previous inferior infarction. So if you have a small R-wave with a deep S-wave in that lead, and even perhaps in lead aVF, you need to perform an ECG in inspiration and again in expiration. If the S-wave disappears and you get a larger R-wave, you can clear the airman—but don't forget to provide us all these graphs.
10. An airman who has ST- and T-wave changes that suggest ischemia or left ventricular hypertrophy requires an evaluation if one has not been previously performed for this reason.

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†***Important:*** Please provide applicant's correctly spelled name and two other identification criteria: DOB, SSN or psuedo SSN, PI, or MID no.

This article was previously published in the *Bulletin*.

Conditions AMEs Can Issue (CACI)

A-Z List of All Conditions and Medications That Apply

» **Arthritis**
—If only PRN NSAIDS and under good control: Issue (no worksheet required)
—If on acceptable medications (NSAIDS, methotrexate, hydrochloroquine (Plaquenil) – requires eye report): see disposition table and worksheet

» **Asthma**
—See disposition table and worksheet
—If only on PRN 1-2 days per week and good control: Issue (no worksheet required)
—If on daily albuterol or inhaled steroids: see worksheet

» **Benign Prostatic Hypertrophy (BPH)**
—On no medication—Issue
—On an acceptable medication (note AMCD does require comment in block 60 that medications are well tolerated)
—Avodart (dutasteride), Uroxatral/alfuzosin), Flomax (tamsulosin)
—Rapaflo (silodosin): up to 8 mg a day is acceptable—requires 2-week observation period.
—If used for other than BPH, Special Issuance
—Current policy change identifies the following medications as NOT acceptable (these will need to be deferred): Detrol (tolterodine), Ditropan (oxybutynin), Enablex (darifenacin), Vesicare (solifenacin), Sanctura (trospium)

» **Cholelithiasis, asymptomatic**
– Issue

» **Diabetes, diet controlled**
—See disposition table

» **Eardrum Perforation**
—Resolved: Issue

» **Erectile Dysfunction medications**
—AMCD requires comment in block 60 that medications are well tolerated:
- Viagra (sildenafil citrate): 6 hours no fly
- Levitra (vardenafil): 36 hours no fly
- Cialis (tadalafil): 36 hours no fly, daily form is DQ

» **Esophoria/Exophoria**
—No adverse complications, no diplopia (see Item 54 of the AME Guide)

» **Glaucoma**
—See worksheet (requires normal visual fields)

» **Gout on medication, examples**
—AMCD requires comment in block 60 that medications are well tolerated):
- Currently acceptable: Colcrys (colchicine), Uloric (febuxostat), Zyloprim (allopurinol), Benemid (probenecid)

» **GU cancers**
— > 5 years ago, no history of metastatic disease, stable: see disposition table

» **Hepatitis C**
—See worksheet

» **Hypertension**
—See worksheet

» **Hypothyroidism**
—See worksheet

» **Intraocular Lens, Multifocal**
—See Protocol for Binocular Multifocal and Accommodating Devices

» **Kidney Stone**
—Resolved, or nephrocalcinosis (fine granular mottling in the parenchyma) with favorable report: Issue

» **LASIK**
—Less than two years – we need completed Form 8500-7. If favorable — 0151: Issue
—more than two years – comment no adverse complications (AME comments block 60): Issue

» **Melanoma**
—(< .75 mm) complete excision, favorable report: Issue

» **Migraine and Chronic Headache**
—See worksheet

» **Motion Sickness**
—Resolved: Issue

» **Musculoskeletal injury**
—If condition resolved or does not cause functional impairment, we need description of current function in block 60

» **Myringotomy**
—Resolved: Issue

» **Nephrectomy (non-cancer)**
—Full recovery: Issue

» **Nephritis**
—Acute episode, s/p 3 months, resolved with favorable reports, Issue

» **Overactive Bladder**
—Myrbetriq (mirabegron) is allowed after 2 weeks if no side effects

» **Pneumothorax, Traumatic**
—s/p 3 months, resolved, with favorable reports: Issue

» **Polycystic Kidney Disease**
—Normal renal function and no HTN: Issue

» **Pre-Diabetes**
—(Metabolic syndrome): see worksheet

» **Prostate Cancer**
—No evidence of extra-capsular disease: Issue

» **Renal Cancer**
—See worksheet

» **Situational Stress (bereavement), or adjustment disorder**
—If stable, resolved, no associated disturbance of thought, no recurrent episodes, and psychotropic medication(s) used for less than 6 months, and discontinued for at least 3 month: Issue

» **Testicular Cancer**
—Treatment complete without sequela: Issue

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Updated 11/6/2013

DUI Reporting Requirements

Debunking the Myths

By Lesha Sloan-Thompson

Dr. **Richard Carter**, of the Civil Aerospace Medical Institute, recently visited with a representative of the DUI/DWI Program in regards to the dual reporting requirements for alcohol- and drug-related motor vehicle actions. Most airmen are aware that such actions must be reported on their application for Airman Medical, but there continues to be confusion regarding the 60-day reporting requirement defined by 14 CFR 61.15(c)(1)(2)(3), in addition to what specific actions are reportable on an Application for Medical Certificate, FAA Form 8500-8. Discussion centered on the confusion that even the most experienced pilot can have of the different reporting requirements, so we hope this article helps to debunk the myths and provide you with a greater understanding of the reporting requirements.

An airman has two separate reporting requirements involving alcohol-related motor vehicle actions; one report per Title 14 of the Code of Federal Regulations (CFR) 61.15(e) and one to you, the aviation medical examiner (AME), via the Application for Airman Medical, FAA Form 8500-8. To help clarify, the reporting requirements of both are summarized below:

What is reportable under 14 CFR 61.15(e)? Alcohol-related motor vehicle actions such as suspensions, revocations (hereafter referred to as administrative actions), and convictions for offense such as driving while under the influence, driving while impaired, operating under the influence, etc. Please note the suspension/revocation AND convictions are separate, reportable actions under this regulation—even though they may be related to the same incident. These reports must be received by the DUI/DWI office within 60 days of the alcohol-related motor vehicle action.

What is reportable on your application for Airman Medical, FAA Form 8500-8, specifically question 18v? (1) **Any arrest and/or conviction** involving driving while intoxicated/under the influence/while impaired, etc.; (2) any arrest and/or conviction and/or administrative action that resulted in the denial, suspension, cancellation, or revocation of your driving privileges (note: this is **not** limited to alcohol-related events); and any attendance at an educational or rehabilitation program.

We hope an airman will openly discuss details related to these events, along with any other information asked on the form, with his aviation medical examiner. However, as an AME, you may wish to discuss any "yes" response to Question 18v. with the applicant, as well as asking them if they have provided a written report to the Security Division regarding any administrative action and/or conviction associated with the alcohol-related motor vehicle incident.

Please note, if an airman answers "yes" and references "previously reported," they will not be in compliance with the regulations unless they have detailed the alcohol incident on the first application following the alcohol-related motor vehicle incident.

To address other questions you may have about DUI reporting requirements, please refer to the DUI/DWI Program website at

www.faa.gov/go/duidwi

or call the program office at (405) 954-4848 to speak with an investigator. All questions you may have concerning the issuance of a medical certificate should be directed to either your Regional Flight Surgeon or by contacting the Civil Aerospace Medical Institute in Oklahoma City (405) 954-7675.

Remember, you are our greatest asset in being able to educate your peers, applicants, and your surrounding aviation community of these important requirements.

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Lesha Sloan-Thompson manages the Regulatory Investigations Branch, AMC-760.

CME Credits a Bonus to Some

By Janet Wright

Hello aviation medical examiners! You probably know that your Basic and Refresher training seminars are awarded Continuing Medical Education credits.† What you may not know is that if your specialty is Aerospace Medicine, those same hours may also meet your Maintenance of Certification (MOC) requirement.

After each seminar you attend, you will receive a certificate showing that we are an accredited entity, how many hours you participated, and the name and date of the seminar. You should submit this to the board from which you are requesting MOC credit. You may or may not be asked to send the seminar agenda, so hang on to it. That's it; pretty simple!

If you have questions feel free to call or email me
405-954-4803
janet.e.wright@faa.gov

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Ms. Wright is the Aerospace Medical Education Division Team Lead for AME Education.

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

Vertebral Artery Dissection in an Airline Pilot

Case Report, by Dean M. Olson, MD, MS

Although rare in the general population, a pilot experiencing a vertebral artery dissection in flight would have significant and deleterious consequences. Vertigo, ataxia, dysarthria, and diplopia would be catastrophic in the context of airline transport. In this neurologic emergency, the lives of the pilot, the air crew, and the passengers would be at risk.

History

A 36-year-old male airline pilot experienced acute onset of aching pain in his right occipital region while sitting on a couch. His neck pain was followed quickly by numbness on the right side of his face and in both extremities especially on his right side. The pilot denied any loss of function but did experience difficulty ambulating when he got up to go to the bathroom. He felt as though he was listing to the right because of a lack of sensation of the floor in his right leg. He was worried that he "might be having a stroke" and subsequently called for an ambulance.

By the time the ambulance arrived, his symptoms had resolved. Throughout his experience, he denied any chest pain, heart palpitations, shortness of breath, or focal weakness. The pilot did relay to the emergency physician that the day before his symptoms occurred he did take part in a judo class and felt he was "beaten up" as he had multiple bruises over his body. He denied any specific injury to his head or his neck during his workout.

His medical history was negative. His family history was significant only for migraine headaches suffered by his mother. Socially, the pilot was a non-smoker, and he denied any allergies.

In the emergency room, his vital signs, including oxygen saturation, were normal except for a blood pressure of 140/98. His exam performed by the ER physician was normal and the patient stated that he was feeling normal at that time. An ECG demonstrated a normal sinus rhythm without any signs of ischemia; a CT scan of the brain was negative.

He was admitted to the hospital neurologic service and underwent carotid duplex imaging, which demonstrated an absence of normal flow in the right vertebral artery, suggestive of thrombosis or vertebral artery dissection. An MRA demonstrated absences of flow in the right vertebral artery without any intracranial abnormalities. The pilot was then started on anticoagulation therapy.

The pilot was discharged and remained on warfarin for a six-month treatment period and subsequently was treated with aspirin 81 mg daily. Nine months after his original symptoms,

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Etiology of VAD

Vertebral artery dissection (VAD) is a rare condition. The combined incidence with carotid artery dissection is 2.6 per 100,000 and has a mortality of 10% (3). It generally occurs in younger patients, with a median age of 40 years (1) and has a female to male ratio of 3:1 (3). The root lesion is a hematoma in the vessel wall or an intimal flap that develops at the inner lumen of the vessel. It may occur spontaneously or may be associated with trauma involving sudden extension or rotation of the neck. It has occurred following high-energy events such as high-velocity motor vehicle accidents and diving injuries but has also occurred following less energetic events such as chiropractic neck manipulation, sneezing, and coughing. It, as well, has been documented in mixed martial arts (4).

There are four segments of the vertebral artery (3):

1. Segment I begins at the subclavian artery and ends at the transverse foramina of C5 or C6.
2. Segment II is the section of artery from the transverse foramina of C5/C6 to C2.
3. Segment III is surrounded by muscle, nerve, and the atlanto-occipital membrane and is tortuous. It starts at C2 and travels around the posterior arch of C1, then between C1 and the occiput and ends at the foramen magnum.
4. Segment IV begins at the foramen magnum, pierces the dura matter, and travels laterally around the brainstem where the two vertebral arteries meet anteriorly, forming the basilar artery near the pons-medulla junction.

Hematoma and intimal flaps may form in any segment of the vertebral artery. Lesions of various sizes may result in minimal narrowing of the vessel, with minimal symptoms or result in complete occlusion with significant impairment. Intimal disruption and altered blood flow dynamics result in a thrombogenic environment. Clot formation with subsequent emboli may cause transient ischemia or significant infarct. Of special note, spontaneous VAD usually occurs in segment III and may extend into segment IV, causing intracranial pathology. A subadventitial dissection that occurs in segment IV may rupture and cause subarachnoid hemorrhage, which must be ruled out prior to initiating anticoagulation therapy. Patients suffering VAD typically present with occipital and/or neck pain, headache, vertigo, and may have symptoms of brainstem TIA or stroke. In these cases, urgent diagnostic imaging is required, as well as a referral to neurosurgery.

the pilot underwent a second MRA, which demonstrated a "diminutive" right vertebral artery that was filling in a retrograde fashion and was felt to be congenitally small, based on lumen size. During this period, he remained symptom-free.

Aeromedical Concerns

In the flight environment, the acute onset of vertebral artery dissection (VAD) would have a significant impact on a pilot's ability to safely operate the aircraft. It has been well established in aerospace physiology that vertigo can be disabling for a pilot leading to an inability to maintain proper aircraft attitude. Further complications of VAD, such as dysarthria, diplopia, transient ischemic attack, and stoke— even if transient—could result in a pilot's complete inability to operate the aircraft and would have disastrous results. The pilot's deficiencies could range from minimal functional deficit to full incapacitation, resulting in being unable to operate aircraft control surfaces, difficulty seeing the flight instruments, and an inability to operate avionics or speak to air traffic control. A pilot who experiences VAD while outside the flying environment and who suffers continued symptoms should be grounded for similar safety concerns.

Outcome

Although not specifically listed, vertebral artery dissection falls under the category of cerebrovascular disease in the online *Guide for Aviation Medical Examiners* (2). According to this section, a history or the presence of any neurological condition or disease that potentially may incapacitate an individual should be regarded as initially disqualifying. A medical certificate must not be issued, and the applicant's case should be deferred to the Aerospace Medical Certification Division or the Regional Flight Surgeon. The airman must submit all pertinent medical records, including neurologic reports, imaging studies, and medication dosages and side effects.

The pilot complied with all requests for documentation. The policy for such an event is that the airman be grounded for 12 months. This airman was over 12 months when he presented for consideration for a medical certificate. Given that he underwent 6 months of anticoagulation therapy on warfarin and remained symptom-free, the pilot was issued a Class-1 Special Issuance with a return to full flight status. He was given a time-limited authorization of 12 months, requiring an annual status report from his physicians and an MRA of the brain at that time.

References

1. Denny CJ, Schull MJ. Headache and facial pain**.** In: Tintinally JE, ed. *Emergency medicine: A comprehensive study guide.* New York: McGraw Hill, 2004:1375-81.
2. Federal Aviation Administration (2011). *Guide for aviation medical examiners: Aerospace medical disposition*, www.faa.gov/go/ameguide/
3. Lang ES, Afilalo M. *Vertebral artery dissection*, Jan 12, 2010. Accessed online Nov 23, 2011 at http://emedicine.medscape.com/article/761451-overview#
4. Slowey M, Maw G, Furynk J. Case report on vertebral artery dissection in mixed martial arts. *Emergency Medicine Australasia*, 2011, DOI: 10.1111/j.1742-6723.2011.01496.x

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Thiazide-Induced Hyponatremia Associated With Acute Mental Status Changes

Case Report, by Susan R. E. Fondy, MD, MPH

Thiazide diuretics are frequently used to control hypertension in airmen. A small percentage of individuals treated with thiazides will develop thiazide-induced hyponatremia, a side effect that can cause generalized, musculoskeletal, and neurologic symptoms ranging from mild to profound. Familiarization with these side effects will allow the aviation medical examiner to recognize, avoid, and treat this condition in airmen.

Case Presentation

A 64-year-old commercial airline captain with approximately 16,000 hours of flight time presents for clearance following an episode of acute mental status change. The airman has a history of obstructive sleep apnea (OSA) and recently diagnosed hypertension. He is presently on 25 mg hydrochlorothiazide once daily and uses a nasal continuous positive airway pressure device nightly.

On the day in question, the airman failed to arrive at the airport for a scheduled flight. After calling his hotel room and receiving no answer, the first officer entered his room with a hotel staff member and physically shook the captain awake. At the airfield, the first officer reported to the aircraft while the captain used the computer for preflight checks. The captain was noted to have difficulty with this very familiar task, requiring the assistance of airfield staff to log on and obtain the required information. He complained of being very tired and stated that he felt like he could sleep "all day." He was observed by the airfield staff to have difficulty with coordination and balance while walking to the aircraft, staggering on several occasions, and stumbling on the stairs. He behaved in a disengaged manner once on board the aircraft and failed to begin his portion of the preflight checklist. The airfield manager was sufficiently concerned by this observed behavior that, after talking with the captain and the crew, he grounded the flight. Evaluation by a local police officer was significant for poor ocular pursuit though not true horizontal gaze nystagmus, and was negative for the smell of alcohol on the captain.

Following the grounding of the flight, the first officer brought the captain to a local hospital emergency department, where he was noted to have poor cognition, memory, and was ataxic. He was unable to remember many of the events that had just transpired. His serum sodium was found to be 117. An MRI of his brain showed questionable mild cerebral edema. Initially, he had limited response to attempts to increase his serum

Etiology

Thiazide diuretics have been used to control blood pressure for over 50 years.[1] They are used alone or in conjunction with other agents and have been remarkably successful in reducing hypertension-related morbidity and mortality.[2] They are known, however, to cause electrolyte disturbances in a certain percentage of patients.

Thiazide diuretics function at the level of the distal convoluted tubule in the kidney by inhibiting the sodium-chloride symporter. This increases the sodium load in the urine and consequently, by osmosis, increases water excretion. Because the function of thiazide diuretics is on the distal tubule, they normally do not significantly affect the overall sodium content of the body; however, a certain percentage of the population will have an unusually large sodium loss. The increase in sodium concentration delivered to the distal portion of the distal tubule promotes potassium secretion into the urine. This potassium secretion exacerbates the sodium loss by promoting a net flow of sodium into the intracellular space, increasing the likelihood of hyponatremia.[3]

Hyponatremia as a consequence of thiazide diuretic use is well described in the literature. While it is not exceptionally common, a large Chinese study found that it occurred within eight weeks of the initiation of thiazide diuretics in 5.9% of their study population.[4] These incidences were positively associated with male gender, older age, and use of thiazide as opposed to other diuretics in the 2009 study by Jiang et al. [4] Interestingly, however, Assen and Mudde note the incidence of hyponatremia to be more prevalent in older females with low body weight in their 1999 case report.[3]

Hyponatremia can cause severe neurocognitive deficits, with the most concerning symptom being cerebral edema.[5] As the brain swells, the patient can experience nausea, vomiting, confusion, lethargy, fatigue, decreased appetite, restlessness, irritability, seizures, alteration in consciousness, and coma.[5] The more rapid the onset of the hyponatremia, the less time the brain will have to undergo adaptive electrolyte loss to prevent cerebral edema; therefore, acute onset hyponatremia is more likely to lead to neurologic damage and death. Even modest levels of hyponatremia in the range of 126–134, once thought to be benign, have been shown to cause ataxia, cognitive impairment, increased falls, fractures, and inpatient mortality.[6] Of patients with severe hypotonic hyponatremia, 41% can be attributed to thiazide and indapamide diuretics.[7] In addition to cerebral edema and its associated symptoms, hyponatremia can also cause muscle spasms, cramps, and weakness due to inefficiency of the sodium-potassium pumps within the muscle.

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sodium level. The following day, his hydrochlorothiazide was discontinued, and he was changed to an antihypertensive from a non-thiazide class. His sodium improved and then normalized after the medication change. Polysomnogram and maintenance of wakefulness test were remarkable for well-treated OSA. EEG and 24-hour EEG were normal. Alcohol level was negative.

Aeromedical Concerns

The primary aeromedical concern with thiazide-induced hyponatremia is neurologic alteration, which can range from very subtle findings to the profound impairment that was seen in this case. As with any new medication, airmen initiating the use of thiazide diuretics should be monitored closely, especially in the early stages of treatment. Frequent electrolyte studies will allow the early diagnosis of hyponatremia, and such laboratory evaluations should be completed after initiating the medication and prior to the airman being cleared to return to flight. Electrolyte monitoring is critical because the neurologic abnormalities that occur in the mildly hyponatremic range can be more subtle, and at times, subtle enough to be diagnosed only by specific neurological testing. While it is more common for hyponatremia to occur soon after starting thiazides, delayed hyponatremia can occur after months or even years, so monitoring should be continued as long as the airman continues to take thiazides.

Additionally, the aeromedical examiner must be aware, especially after an acute episode such as this one, that persistent neurological deficits can occur. These can be a consequence of cerebral edema, demyelinization, or overly aggressive correction of profound hyponatremia. A complete work up, including MRI, EEG, neurologic evaluation, and neuropsychiatric evaluation must be completed prior to restoring flight status. If these are all normal or within acceptable aeromedical tolerance, the airman may receive an eligibility letter or may be given special issuance if follow-up is needed.

Outcome

The airman in the case was admitted to the hospital where he underwent extensive testing to ensure that there were no other causes for his hyponatremia. He was switched to another antihypertensive medication, and his sodium levels and neurological function improved. A repeat MRI, following the medication change and normalization of serum electrolytes, was normal. After hospital discharge, he was observed on his new medication for a period of three months and was found to have good blood pressure control. A neurocognitive examination showed that he had returned to full normal function, so he was cleared to return to flight.

References

Freis ED, Wanko A, Wilson IM, Parrish AE. Treatment of essential hypertension with chlorothiazide (diuril); its use alone and combined with other antihypertensive agents. *J Am Med Assoc* 1958; 166:137-140.

Hwang KS, Kim GH. Thiazide-induced hyponatremia. *Electrolyte Blood Press* 2010; 8:51-57.

van Assen S, Mudde AH. Severe hyponatraemia in an amiloride/hydrochlorothiazide-treated patient. *Neth J Med* 1999; 54:108-13.

Jiang JY, Wong MCS, Ali MK, et al. Association of antihypertensive monotherapy with serum sodium and potassium levels in Chinese patients. *Am J Hypertens* 2009; 22:243-9.

"Hyponatremia symptoms." Mayo Foundation for Medical Education and Research. Accessed June 15, 2011, at: www.mayoclinic.com/health/hyponatremia/DS00974/DSECTION=symptoms

Sterns RH, Hix JK, Silver S. Treatement of hyponatremia. *Curr Opin Nephrol Hypertens* 2010; 19:493-8.

Vu T, Wong R, Hamblin PS, Zajac J, Grossmann M. Patients presenting with severe hypotonic hyponatremia: Etiological factors, assessment, and outcomes. *Hosp Prac* 2009; 37(1):128-131.

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Primary Sclerosing Cholangitis

Case Report, by David B. Trant, MD, MPH

Primary sclerosing cholangitis (PSC) is a chronic, progressive disease that is characterized by inflammation, fibrosis and stricturing of the intra- and extrahepatic bile ducts. It is likely immune-mediated in etiology, leads to progressive cirrhosis and liver decompensation in the majority of patients, and is one of the most common chronic liver disorders leading to orthotopic liver transplantation. A case report of an Airline Transport Pilot with a history of PSC is presented, along with a brief review of the disease and its aeromedical concerns.

History

A 59-year-old male Airline Transport Pilot with over 13,000 hours of flight time applied for consideration of renewal of a special issuance first-class medical certificate following liver transplantation 8 years previously due to end-stage liver disease. His liver disease was secondary to primary sclerosing cholangitis (PSC) associated with ulcerative colitis. He had been diagnosed with PSC in 2001 when he was found to have abnormal liver tests and jaundice, and shortly thereafter he developed weight loss. As part of his evaluation, he underwent colonoscopy. Pancolitis was noted at that time, and he was ultimately diagnosed with asymptomatic ulcerative colitis. He subsequently developed mild hepatic encephalopathy and a rise in his CA 19-9 titer (which is worrisome for cholangiocarcinoma in patients with PSC) and underwent liver transplantation. No hepatic cancer was found, and his encephalopathy and weight loss quickly resolved after surgery.

The airman reported no symptoms at the time of his recent exam. Specifically, he denied any bleeding, abdominal pain, itching and swelling, shortness of breath, diarrhea, weight loss, or jaundice. His post-liver transplantation course was complicated by biliary strictures that were treated with dilation and stent placement approximately 5 years after surgery (3 years ago). He had not had any further symptoms of hepatic encephalopathy and was noted to be fully active and independent. Studies done during his most recent liver transplant follow-up visit (within 2 months of presentation) showed no evidence of cirrhosis by CAT scan, but splenomegaly was noted. He underwent liver biopsy, which showed no evidence of rejection, but there was chronic hepatitis with mild portal inflammation and scattered focal bile duct damage consistent with recurrent primary sclerosing cholangitis. Colonoscopy performed 1 year ago showed no lesions, and pathology reports were unremarkable. Laboratory was remarkable for a normal bilirubin, platelets chronically diminished at 50k (attributed to hypersplenism), INR 1.1 (0.8-1.3), alk phos 156 U/L (28-110), AST 61 U/L (7-40), ALT 40 U/L (7-56), and GGTP 45 U/L (12-58).

His medications were mesalamine, tacrolimus, ursodiol, Vitamin K, allopurinol, and ranitidine.

Primary Sclerosing Cholangitis (PSC)

PSC is a chronic, progressive disease that is characterized by inflammation, fibrosis, and stricturing of medium and large intrahepatic and extrahepatic biliary ducts, leading to the formation of multiple bile duct strictures. The estimated incidence in the United States is 0.9 to 1.3 cases per 100,000 population, and there is a strong 70% male predominance of affected individuals. The average age at diagnosis is in the fourth decade, but age at presentation can range from 1 to 90 years (*3*).

While the etiology of PSC is unknown, it is likely an immune-mediated progressive disorder that eventually develops into cirrhosis, portal hypertension and hepatic decompensation in the majority of patients (*5*). PSC often presents as an asymptomatic elevation of liver enzymes, and only 50% of patients have abnormal physical findings (jaundice, hepatomegaly, splenomegaly). Symptoms, when present, include right upper quadrant abdominal pain, pruritus, jaundice, fatigue, weight loss, and fever (*3*). Inflammatory bowel disease (IBD) is a common associated finding, occurring in 60-80% of PSC patients. Ulcerative colitis is the most frequent type of IBD associated with PSC (*1*).

The diagnosis of PSC is usually made by finding multifocal, diffusely distributed strictures with intervening segments of normal or dilated ducts, producing a beaded appearance on endoscopic retrograde cholangiopancreatography (ERCP) or magnetic resonance cholangiopancreatography (MRCP; *1,2*).

Ursodeoxycholic acid (UDCA) has been shown in some studies to decrease the symptoms of PSC (especially pruritus) along with improving liver biochemistries in patients with PSC, but its overall impact on disease progression and prognosis has been inconclusive. High-dose ursodeoxycholic acid has recently been shown to increase the adverse events rate (*6*). Immunosuppressive therapy has shown little benefit. The mainstay of treatment for patients with PSC who have advanced disease is liver transplantation (*9*). Osteoporosis and fat-soluble vitamin deficiencies are associated with PSC, and appropriate replacement therapy is recommended. Calcium and Vitamin D supplementation are the primary drugs for treatment of osteopenia or osteoporosis. Oral bisphosphonates may be considered, but must be used with caution in patients with portal hypertension and esophageal varices (*5*).

Recently, there has been increasing evidence that PSC recurs after liver transplant. The diagnosis of recurrent PSC is a challenge because biliary strictures in the allograft might also be caused by medications, infections, ischemia, chronic rejection, or bile duct anastomosis stricture. The recurrence rate of PSC after liver transplant is estimated to be between 5% and 37% (*3*).

Median survival from time of diagnosis to death or liver transplantation for patients with PSC is estimated to be between 9 and 18 years. Patients who are asymptomatic at the time of diagnosis have a significantly better prognosis (*3*).

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Aeromedical Issues

This case obviously presents with numerous potential aeromedical concerns related to his multiple diagnoses (PSC, ulcerative colitis, hypersplenism, thrombocytopenia), and their treatment. For purposes of the remainder of this discussion, we will focus on the primary sclerosing cholangitis.

PSC aeromedical concerns include fatigue, pruritis, and abdominal discomfort, as well as progressive liver failure and the resulting potential for hepatic encephalopathy, gastrointestinal hemorrhage, and metabolic bone disease, also known as hepatic osteodystrophy (*1*,*2*) . PSC is frequently associated with inflammatory bowel disease, especially ulcerative colitis (*1*,*2*,*3*), and this condition may also cause symptoms of aeromedical significance. Fat soluble vitamin deficiencies may occur, and should be treated with replacement therapy. Patients with PSC are susceptible to repeated episodes of bacterial cholangitis and are also prone to develop pigmented biliary stones (*4*).

The most worrisome complication of PSC is cholangiocarcinoma, which occurs in 8%-14% of patients, and can be very difficult to detect. PSC can recur after liver transplant, with an estimated recurrence rate of between 5% and 37% (*3*).

There are several medications that have been studied in the past for this disorder, such as Ursodeoxycholic acid (UDCA, ursodiol), colchicine, tacrolimus, steroids, and methotrexate, but none has been proven effective in slowing the progression of this disorder (*5*,*6*). Should the aviator be receiving any medications, the potential side effects of such medications should be considered, and the AME should consider contacting the Regional Flight Surgeon or the Aerospace Medical Certification Division.

Role of the AME

Title 14 CFR Parts 67.113, 67.213, and 67.313 describe the general medical standards for first-, second-, and third-class medical certification and states that there be no other organic, functional, or structural disease, defect, or limitation that may reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges (*7*).

While the *Guide for Aviation Medical Examiners* (*8*) does not specifically mention PSC, it does describe the data needed for associated conditions, such as cirrhosis, liver transplant, ulcerative colitis, and malignancy. An airman presenting for medical certification with PSC should have his certificate deferred, and all records relating to his condition, treatment, and prognosis should be forwarded to the FAA to support an issuance of an airman medical certificate.

Outcome

Based on favorable consultant reports, this airman was granted a special issuance first-class medical certificate valid for 6 months. It was recommended that he continue close follow-up with his physicians to observe for evidence of liver failure, and should he develop any hyperbilirubinemia or evidence of encephalopathy that he be immediately suspended from flying.

References

1. Greenberger, N.J., Paumgartner, G. Diseases of the gallbladder and bile ducts, Ch. 305. In *Harrison's Principles of Internal Medicine,* 17th ed.; McGraw-Hill Professional: New York, 2008; pp 1991-2017.
2. Silveira, M.G., Lindor, K.D. Clinical features and management of primary sclerosing. *World J Gastroenterol* 2008**,** *14* (21), 3338-3349.
3. Tischendorf, J.J.W., Geier, A., Trautwein, C. Current Diagnosis and Management of Primary Sclerosing Cholangitis. *Liver Transplantion* 2008, *14* (6), 735-746.
4. Mendes, F.D., Lindor, K.D. Primary sclerosing cholangitis. *Clin Liver Dis* 2004, *8,* 195-211.
5. Chapman, R., Fevery, J., Kalloo, A., Nagorney, D.M. AASLD Practice Guidelines: Diagnosis and Management of Primary Sclerosing Cholangitis. *Hepatology* 2010, *51* (2), 660-678.
6. Sinakos, E., Lindor, K. Treatment options for primary sclerosing cholangitis. *Expert Rev Gastroenterol Hepatol* 2010, *4* (4), 473-488.
7. U.S. Government Printing Office. Title 14, Part 67. Electronic Code of Federal Regulations. http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=6d72bde787c83b9c1e0be1f5ceaad117&rgn=div8&view=text&node=14:2.0.1.1.5.2.1.7&idno=14 (accessed May 12, 2011).
8. Federal Aviation Administration. *Guide for Aviation Medical Examiners,* 2011. http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/guide.pdf (accessed May 12, 2011).
9. Michaels, A., Levy, C. The medical management of primary sclerosing cholangitis. *Medscape J Med* 2008**,** *10* (3), 61.

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2013 AME Seminar Schedule		
November 15–17	Sacramento, California	CAR (3)
2014 AME Seminar Schedule		
February 21-23	Atlanta, Georgia	NEU (3)*
March 24-28	Oklahoma City, Oklahoma	Basic (2)
May 12-15	San Diego, California	AsMA (1)
July 14-18	Oklahoma City, Oklahoma	Basic (2)
August 8-10	Bethesda, Maryland	OOE* (3)
October 9-11	Reno, Nevada	CAMA (4)
October 27-31	Oklahoma City, Oklahoma	Basic (2)
November 21-23	San Antonio, Texas	CAR (TBD)*
	*SEMINAR IS TENTATIVE	

NOTES

(1) A 3½-day theme AME seminar held in conjunction with the Aerospace Medical Association (AsMA). This seminar is a Medical Certification theme, with aeromedical certification lectures presented by FAA medical review officers, in addition to other medical specialty topics. Registration must be made through AsMA at (703) 739-2240. A registration fee will be charged by AsMA to cover their overhead costs. Registrants have full access to the AsMA meeting. CME credit for the FAA seminar is free.

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

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

(4) This seminar is being sponsored by the Civil Aviation Medical Association (CAMA) and is sanctioned by the FAA as fulfilling the FAA recertification training requirement. Registration will be through the CAMA Website:

WWW.CIVILAVMED.COM.

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