Federal Air Surgeon's Medical Bulletin

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FROM THE FEDERAL AIR SURGEON: BASICMED 2019

by Michael A. Berry, MD

I would first like to apologize to all for the long time that has elapsed since the last *Federal Air Surgeon's Medical Bulletin* was published. I will blame it partially on the retirement of our previous Editor, Michael Wayda, who persistently ensured that a quarterly *Bulletin* was published. In addition, a large workload of issues hit me when I took over as the new Federal Air Surgeon. I want to express my gratitude and commend our new Editor of the *Bulletin*, Gena Herndon, for her perseverance in putting together and publishing this edition of the *Bulletin*.

Choosing from among the many issues with which the Office of Aerospace Medicine (AAM) has been dealing over the past year, I decided to devote my first Editorial to BasicMed because it seems that not a week goes by that AAM is dealing with some aspect of this program. If you have been to an Aviation Medical Examiner Refresher Seminar in the last two years, you will have heard some of this information. However, BasicMed had its second birthday on May 1, 2019, and the subject deserves an update.

The appropriations bill (Public Law 114-190, the FAA Extension, Safety, and Security Act of 2016, Section 2307, Medical Certification of Certain Small Aircraft Pilots) was enacted on July 15, 2016. This law directed the FAA to "*issue or revise regulations to ensure that an individual may operate as pilot in command of a covered aircraft" without having to undergo the medical certification process under 14 CFR part 67, if the pilot and aircraft meet certain prescribed conditions*." This resulted in a rule published in the *Federal Register* on January 11, 2017, titled "Alternative Pilot Physical Examination and Education Requirements." The rule created a new Part 68 (now known as BasicMed), and attendant changes in Parts 61 and 91. BasicMed went into effect on May 1, 2017.

To refresh everyone's memory, following are some of the basic provisions of the new rule:

- Possess a valid driver's license;
- Have held a medical certificate at any time after July 15, 2006;
- Have not had the most recently held medical certificate revoked, suspended, or withdrawn;
- Have not had the most recent application for airman medical certification completed and denied;
- Have taken a medical education course within the past 24 calendar months;
- Have completed a comprehensive medical examination within the past 48 months;
- Be under the care of a physician for certain medical conditions;
- Have been found eligible for special issuance of a medical certificate for certain specified mental health, neurological, or cardiovascular conditions;
- Consent to a National Driver Register check;
- Fly only certain small aircraft, at a limited altitude and speed, and only within the United States; and
- Not fly for compensation or hire.

If you would like to review all of the specific provisions of Part 68, I refer you to https://www.ecfr.gov/cgi-bin/text-idx?SID=ca51d1582e84daf88bab9afdea9e1a97&mc=true&node=pt14.2.68&rgn=div5. The link to the BasicMed FAQ's: www.faa.gov/go/BasicMed.

I want to emphasize that Part 68 is an "operational" rule. It is not medical certification, but an alternative. Therefore Part 68 (BasicMed) is the responsibility of the FAA Flight Standards Service (AFS). AAM supports and collaborates with AFS on the medical issues that arise with BasicMed. Unfortunately, Public Law 114-190, Section 2307, Medical Certification of Certain Small Aircraft Pilots did not adequately define many of the provisions of the law. AFS, AAM, and the Office of the General Counsel are currently working on protocols and processes for consistent handling of BasicMed issues in the following areas:

- Airmen reported as having a DUI within the last 2 years on the National Drivers Registry;
- Hotline complaints alleging airmen to have conditions that would make them ineligible for BasicMed;
- Airmen who have never had a prior FAA airman medical certificate, or whose last certificate expired prior to the eligibility date set by Congress (i.e., July 15, 2006);
- Airmen not eligible based on denial, revocation, or suspension of their most recent application or withdrawal of their most recent Authorization for Special Issuance of a medical certificate;
- Airmen found to have falsified their most recent application for airman medical certification;
- Airmen who submit (without any need) to the FAA, their BasicMed Comprehensive Medical Examination Checklist (CMEC), which shows that they have a condition disqualifying for airman medical certification;
- State licensed physicians calling to report that they signed off on a BasicMed CMEC, only to realize that the airman did not reveal all medical conditions or medications documented in the health care systems electronic healthcare records system;
- How an airman with an unrestricted airman medical certificate can transition to BasicMed;
- How an airman with an Authorization for Special Issuance of a medical certificate can transition to BasicMed; and
- Re-examination of an airman's qualifications for BasicMed if urgent and credible information is received suggesting that they may have one of the conditions requiring evaluation by the FAA special issuance process.

As of June 10, 2019, 48,512 airmen have received a physical examination, taken one of the two available medical education courses, and are now eligible to fly under BasicMed. As one might have expected, the rush to "sign up" for BasicMed was extremely high in the first several months of the

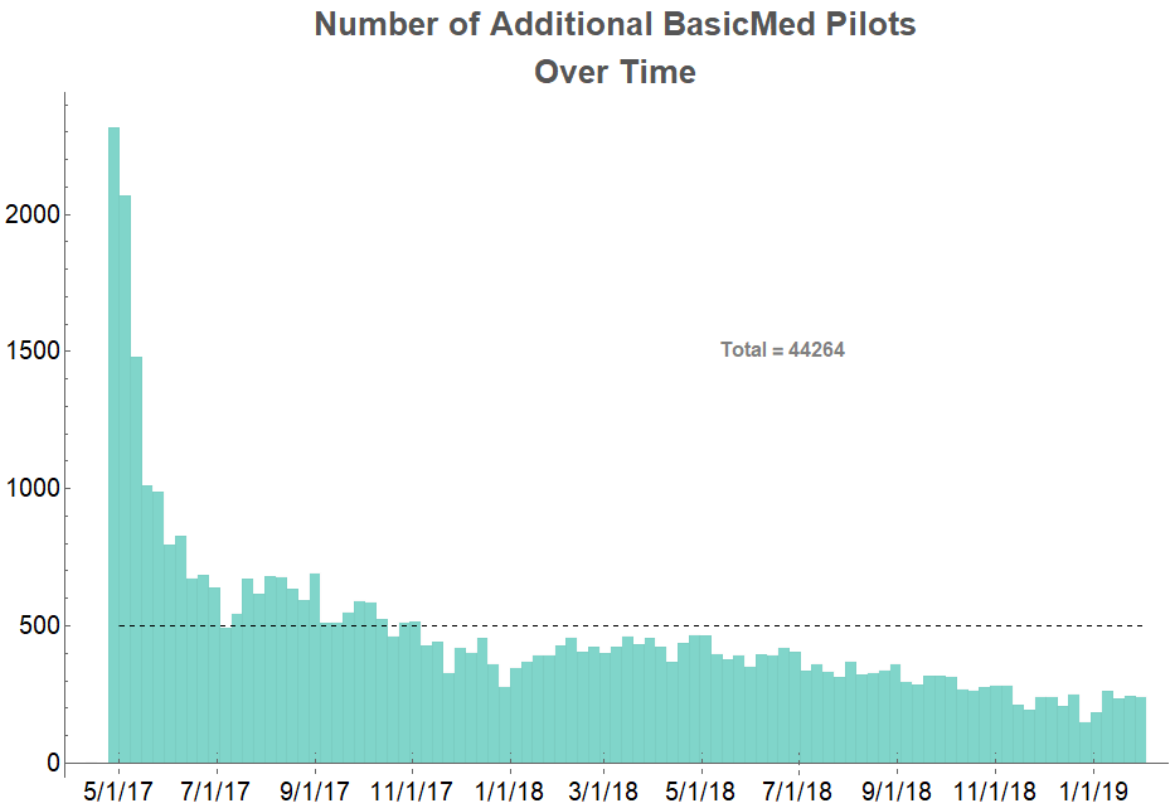
enactment of Part 68, with approximately 2,300 airmen registering weekly. By the end of the first year, this tapered to approximately 450 airmen a week, and now at two years that number has somewhat stabilized at 200 airmen a week.

BasicMed Pilot's Statistics

A question I am frequently asked is, "Who are the pilots signing up for BasicMed?" As of 2/01/2019, the BasicMed program had been in effect for 21 months. The number of BasicMed pilots at that time was 44,264. Following is a summary of some of the data from that group of BasicMed pilots.

Number of New BasicMed Pilots Over Time

The following chart shows the number of new BasicMed pilots added per week since the implementation of the program.



Class Issued for Last FAA Exam

Of the 44,246 pilots with data available at the last FAA medical exam:

- 38,172 (86.2%) had third-class exams
- 4,649 (10.5%) had second-class exams
- 901 (2.0%) had first-class exams
- **353** (0.8%) were denied at last exam. They are not eligible to fly BasicMed.
- 171 (0.4%) were deferred by the aeromedical examiner at their last exam, but not yet issued or denied by the FAA. These pilots are eligible for BasicMed.

Highest Airman Certificate Held By BasicMed Pilots

	Count	Percent
Private Pilot	29943	67.7
Commercial Pilot	9050	20.4
Airline Transport Pilot	4053	9.2
Student Pilot	1111	2.5
Recreational Pilot	52	.1
Sport Pilot	55	.1

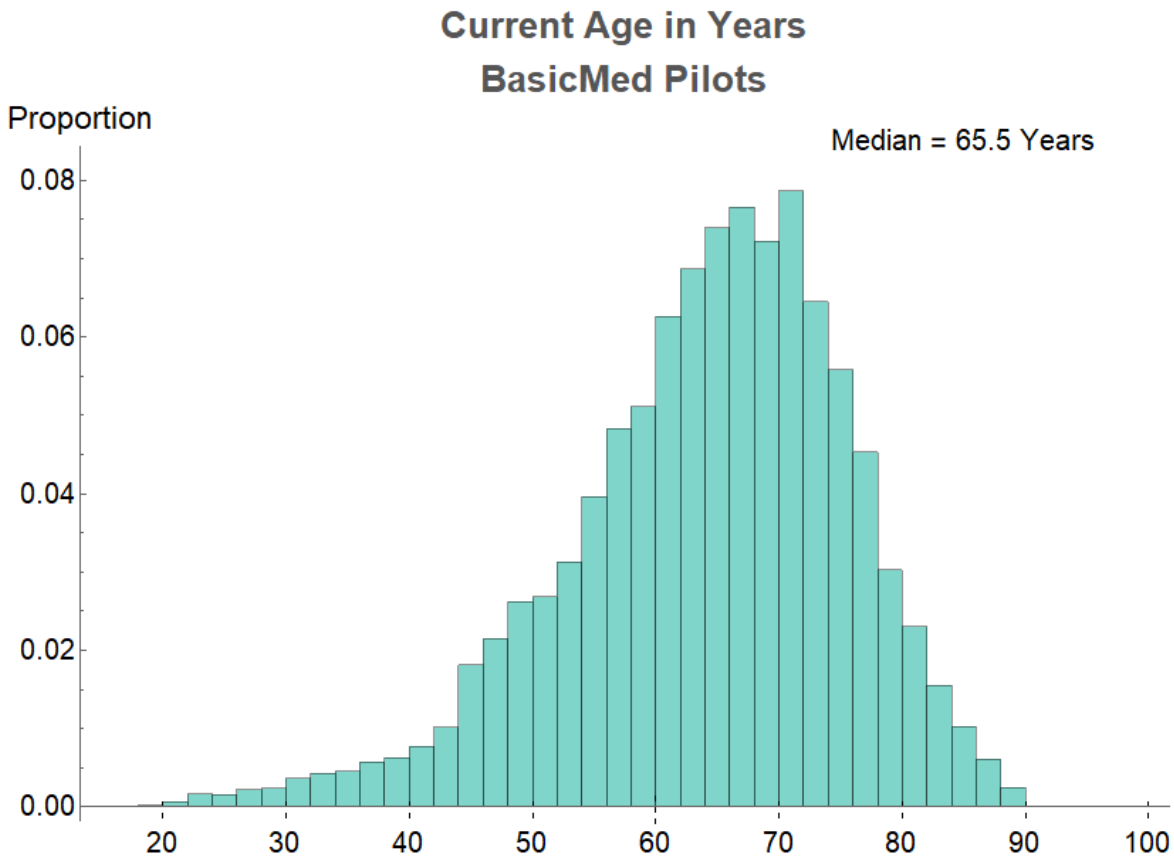
Note that some of the Student Pilots and Sport Pilots also have a Private Pilot (Foreign Based) certificate. We reported the highest FAA certificate in these cases.

Gender of BasicMed Pilots

There were 42,947 men (97.1%) and 1,299 (2.9%) women BasicMed pilots with gender data available. This compares to 7.8% women for pilots who are not BasicMed and hold a valid third-class medical certificate.

Age of BasicMed Pilots

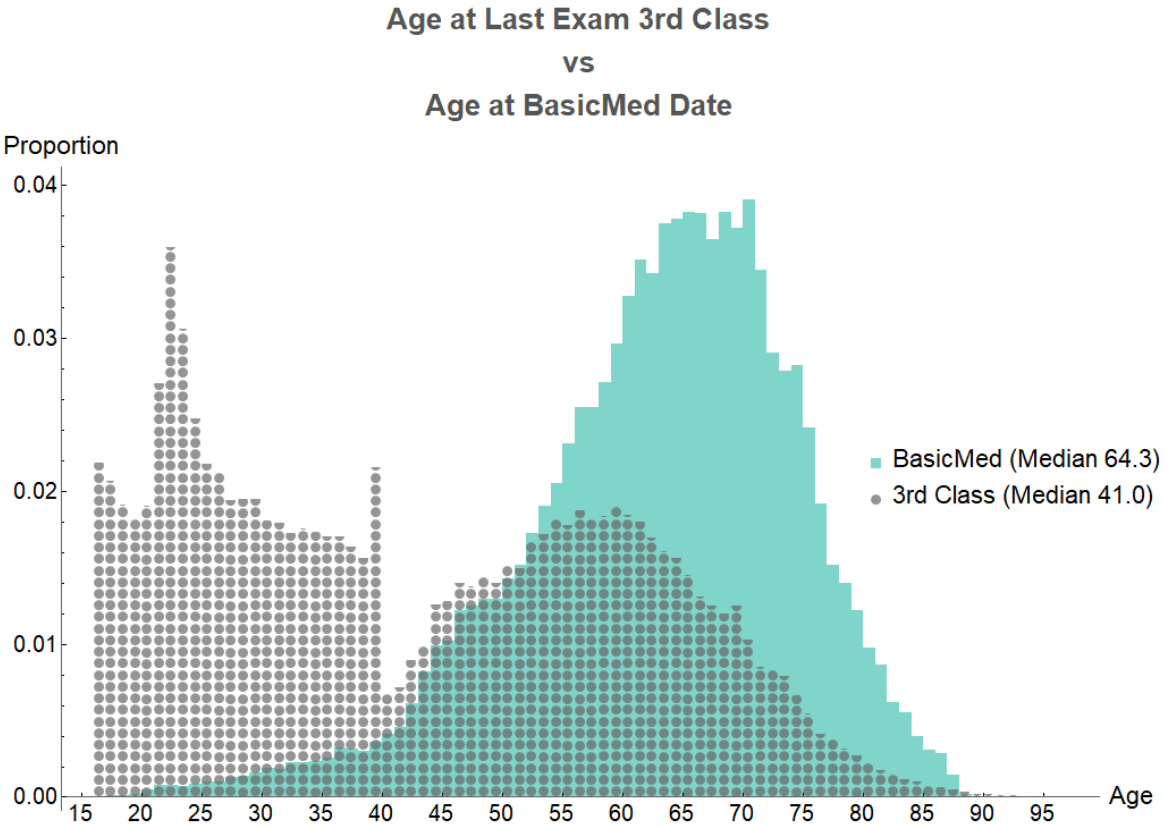
The maximum current age is 100.56 years, and the minimum age is 17.1 years. The age histogram below shows the median current age of the BasicMed pilots, as of 2/01/2019, was 65.5 years old.



We created a third-class medical comparison group of pilots consisting of the 222,181 pilots who were issued a third-class medical certificate that was valid on 12/31/2017. This also included 6,383

pilots who were also on the BasicMed list. These pilots were removed, leaving 215,798 pilots in our third-class medical comparison group.

The chart below displays the age distribution of BasicMed pilots and the distribution for pilots who are not BasicMed but in the third-class medical comparison group. The median age for BasicMed pilots is 64.3 years compared to 41.0 years for the third-class comparison group. This comparison may be somewhat misleading due to the bimodal distribution of age for the third-class group, but the BasicMed pilots as a group are certainly older.



Special Issuances at Last FAA Exam

Of these BasicMed pilots with data, 12,427 (28.1%) required a special issuance waiver at their last FAA medical certificate. This is much higher than the 6.2% of pilots in the third-class comparison group described above. Older pilots require a higher proportion of special issuance waivers due to the association of significant health problems with older age.

The table below presents the counts of BasicMed pilots who carry a few selected current/historical diagnoses. Keep in mind that these pilots received a Special Issuance Medical Certificate for these conditions, so at the time of issuance, each of these pilots were determined to be safe to continue flying within the specific conditions of their Special Issuance Authorization. The proportion of BasicMed pilots with these Special Issuances continues to slowly trend down.

Counts of Selected Known Conditions in BasicMed Pilots as of 2/01/2019

Description	BasicMed Pilots
Coronary Artery Disease (50% or greater)	3,942 (8.9%)
Pacemaker	283 (0.6%)
Atrial Fibrillation	1,906 (4.3%)
Head Trauma, Coma (30 minutes or more)	1,126 (2.5%)
Stroke and Related Conditions	559 (1.3%)
Diabetes Treated with Insulin	405 (0.9%)
Diabetes Treated with Meds (not Insulin)	3,310 (7.5%)
Sleep Apnea	2,829 (6.4%)
Alcohol-Related Offenses	2,070 (4.7%)

BasicMed Accidents

The list of BasicMed pilots we receive from ASIAS[1] includes matching accidents from the NTSB[2] database. The number of accidents that occurred on or after the pilot's BasicMed Course was 179. Two pilots have each had two accidents since their BasicMed dates. Of all accidents, 34 have been fatal accidents with a total of 37 fatalities. I must emphasize that these are only counts of accidents and fatalities. They are not accident or fatality rates. We currently have no denominator with which to calculate rates. The causes of these accidents are still under investigation.

1. The Aviation Safety Information Analysis and Sharing (ASIAS) System is a resource capable of providing operational and research queries and analysis over a large number of data sources, including the NTSB accident data and FAA Airman Registry data. The FAA component belongs to the Office of Accident Investigation and Prevention, AVP-200.

2. The National Transportation Safety Board (NTSB) Aviation Accident Database contains the investigation details of most U.S. accidents since 1962—both fatal and nonfatal. There is a significant lag for some accidents before they are visible to ASIAS in this system.

BasicMed Reports

Public Law 114-190, Section 2307, Medical Certification of Certain Small Aircraft Pilots
Stated: *Not later than 5 years after the date of enactment of this Act, the Administrator, in coordination with the National Transportation Safety Board, shall submit to the appropriate committees of Congress a report that describes the effect of the regulations issued or revised under subsection (a) and includes statistics with respect to changes in small aircraft activity and safety incidents.*

The FAA Associate Administrator for Aviation Safety has determined that interim reports will be generated in addition to the final congressionally mandated Five Year Report. AAM, AFS, and the Office of Accident Prevention (AVP) are actively working on an interim report. Interim reports are planned for the 3-year and 4-year marks, as well as the formal Five Year Report in approximately July 2021. ♦

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MARIJUANA AND DERIVATIVES: WHAT ARE THE AEROMEDICAL IMPLICATIONS?

by Michael A. Berry, MD

This article was originally published in the FAA Safety Briefing magazine.

The Federal Air Surgeon's office has received a number of inquiries about marijuana due to the recent increase in the number of states around the country that have approved its use for medical and recreational purposes. Specifically, airmen are concerned about the safety of cannabidiol (CBD) oil use and how such use impacts an airman's medical certificate. Be aware that federal law — not state law — governs FAA medical and pilot certification.

First, we should note that commonly used terms within the context of marijuana can be confusing. The marijuana or cannabis plant contains more than 400 different chemicals and 60 cannabinoid compounds, all of which are absorbed when the whole leaf is smoked or ingested. The compound responsible for the euphoric, mind-altering effect is tetrahydrocannabinol (THC). Although the use of cannabis is legal for medical and/or recreational use in many states, the United States Drug Enforcement Agency (DEA) continues to classify the whole cannabis plant as a Schedule I controlled substance, which is defined as "drugs with no currently accepted medical use and a high potential for abuse." The U.S. Department of Transportation (DOT) drug test includes THC, and its presence at defined levels constitutes a positive drug test.

More recently, interest has grown in other compounds derived from the cannabis plant that may have positive health benefits, but without the mind-altering features of THC. One such compound being widely marketed is CBD oil. In 2018, the FDA announced the approval of Epidiolex (cannabidiol), purified pharmaceutical grade CBD extract from the cannabis plant, for the treatment of seizures associated with two rare and severe forms of epilepsy. As an FDA approved medication, it is subject to strict quality control. In other words, you know what you are getting. Commercially available CBD, by contrast, is not regulated and may be contaminated with a variety of substances, most significantly, THC. Product labels are often inaccurate. Although most CBD products claim to have under 0.3 percent THC, they could contain high enough levels of THC to make a drug test positive. Use of CBD oil is not accepted as an affirmative defense against a positive drug test.

Furthermore, despite legalization in some states, it remains uncertain whether marijuana has therapeutic benefits that outweigh its health risks. There is evidence that marijuana adversely affects brain function both acutely and chronically, especially in younger individuals. It is generally agreed that currently available marijuana products are more potent than those used in older research, which casts doubt on the reliability of that research. We need to understand much more before considering the use of marijuana and its derivatives for airman certificate holders. Please also be aware that no special issuances have been granted for conditions treated with medical marijuana. ♦

Dr. Michael A. Berry is the Federal Aviation Administration's Federal Air Surgeon in the Office of Aerospace Medicine in headquarters, Washington, D.C.

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DRUGTALK: ANTIHISTAMINES AND FLYING

by Allison Veitenheimer, PhD & Russell Lewis, PhD

Allergies are the 6th leading cause of chronic illness in the United States with more than 50 million Americans suffering from allergies each year. Some of the most common forms of allergies include rhinitis (hay fever), urticaria (hives), dermatitis, and sinusitis. Allergies typically cause symptoms such as runny nose, nasal congestion, sneezing, watery eyes, coughing, and itching, and can be seasonal or perennial in nature. Over-the-counter (OTC) antihistamine medications are typically the first line of treatment for most allergic conditions. However, many OTC medications used to treat allergy symptoms have detrimental side effects that can result in significant impairment.

In response to an allergen, the body's local immune response causes a release of a chemical called histamine. It is this chemical's effects on the surrounding tissues that results in the unpleasant symptoms associated with allergies. Histamine, and its receptors, are found throughout the body, and its function depends on where it is released. In addition to its role in the immune system's response to allergens, histamine acts as a neurotransmitter in the brain, stimulates acid secretions in the stomach, and accelerates heart rate. Antihistamine medications treat histamine-related allergy symptoms by blocking histamine-1 receptors (H_1 receptors) in the body; thus, inhibiting the effects of histamine.

Due to the ease of purchase and the effectiveness of OTC antihistamines, they are some of the most commonly used drugs on the market. Additionally, since these medications are available over-the-counter, pilots are likely to believe that they are safe to take. Unfortunately, this is not always the case, as some antihistamines can produce significant cognitive impairment.

OTC antihistamines can be separated into two groups: first-generation and second-generation. First-generation antihistamines, such as diphenhydramine (Benadryl), doxylamine (Unisom), chlorpheniramine (Chlor-Trimeton), hydroxyzine (Vistaril), and others, are effective at reducing allergy symptoms; however, they can and do produce drowsiness and cognitive impairment. This group is often referred to as sedating antihistamines for this reason. In addition to exerting their effects in the peripheral areas of the body, first-generation antihistamines readily cross the blood-brain barrier where they bind to H_1 receptors in the brain, resulting in sedation and diminished cognitive and psychomotor performance. These effects can dramatically impair individuals performing tasks that require sustained vigilance such as driving, operating an aircraft, or performing other critical safety functions. As an example, a research study conducted at the University of Iowa found that diphenhydramine (Benadryl, a first-generation antihistamine) may cause similar impairment as that observed when an individual is driving legally drunk (blood alcohol concentration of 0.08% or greater). Additionally, researchers have shown that there may be little self-awareness of impairment during the time when the drugs are exerting their maximal effects.

First-generation antihistamines have posed problems for pilots in the past, with accident reports documenting pilot impairment from these over-the-counter drugs. In fact, sedating antihistamines are the most prevalent drug class identified during toxicological evaluations of aircraft accident fatalities, with diphenhydramine being the most commonly encountered drug in the Federal Aviation Administration's Forensic Sciences Laboratory (8.1% of fatal accident cases submitted in 2016).

Second and third-generation antihistamines, also known as non-sedating antihistamines, produce significantly less impairing side effects compared to first-generation antihistamines. Their chemical structures make them less likely to cross the blood-brain barrier and exert their effects in the brain. Non-sedating antihistamines include such drugs as loratadine (Claritin), desloratadine (Clarinex), fexofenadine (Allegra), cetirizine (Zyrtec), and levocertirizine (Xyzal). When taken at the recommended dose, non-sedating antihistamines are generally favored over first-generation

antihistamines, especially for people performing safety critical activities. Research has demonstrated that second and third-generation antihistamines have fewer side effects, particularly sedation. When taken at higher doses, sedative effects have occasionally been observed with select second-generation antihistamines, although they are less pronounced than with first-generation antihistamines.

In conclusion, first-generation antihistamines can have detrimental effects on cognitive function and psychomotor performance and, thus, non-sedating second or third-generation antihistamines should be selected when performing everyday activities at home or work, and especially when performing tasks such as driving or flying. Airmen should recognize that, even though newer, less sedating OTC antihistamines such as Xyzal are becoming available, not all have been approved for flight. According to the *FAA's Guide for Aviation Medical Examiners*, "The non-sedating antihistamines loratadine, desloratadine, and fexofenadine may be used while flying if, after an adequate initial trial period, symptoms are controlled without adverse side effects. Applicants with seasonal allergies requiring any other antihistamine (oral and/or nasal) may be certified by the examiner only as follows: with the stipulation that they do not exercise the privileges of airman certificate while taking the medication, AND wait after the last dose until either: at least five maximal dosing intervals have passed (for example, if the medication is taken every 4-6 hours, wait 30 hours (5x6) after the last dose to fly); OR at least five times the maximum terminal elimination half-life has passed (for example, if the medication half-life is 6-8 hours, wait 40 hours (5x8) after the last dose to fly)." ♦

Dr. Allison Veitenheimer is a Research Toxicologist in CAMI's Forensic Sciences Section of the Bioaeronautical Sciences Research Lab, and Dr. Russell Lewis is the Manager of CAMI's Forensic Sciences Section of the Bioaeronautical Sciences Research Lab.

Sources and continued readings:

American Academy of Allergy, Asthma, & Immunology.
https://www.aaaai.org/conditions-and-treatments/allergies

The American Academy of Otolaryngic Allergy
http://www.aaoallergy.org/patient-resources/

Federal Aviation Administration - Guide for Aviation Medical Examiners
https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/pharm/antihist/

Effects of Fexofenadine, Diphenhydramine, and Alcohol on Driving Performance – A Randomized, Placebo-Controlled Trail in the Iowa Driving Simulator. J.M. Weiler, et al. Ann Intern Med. 2000

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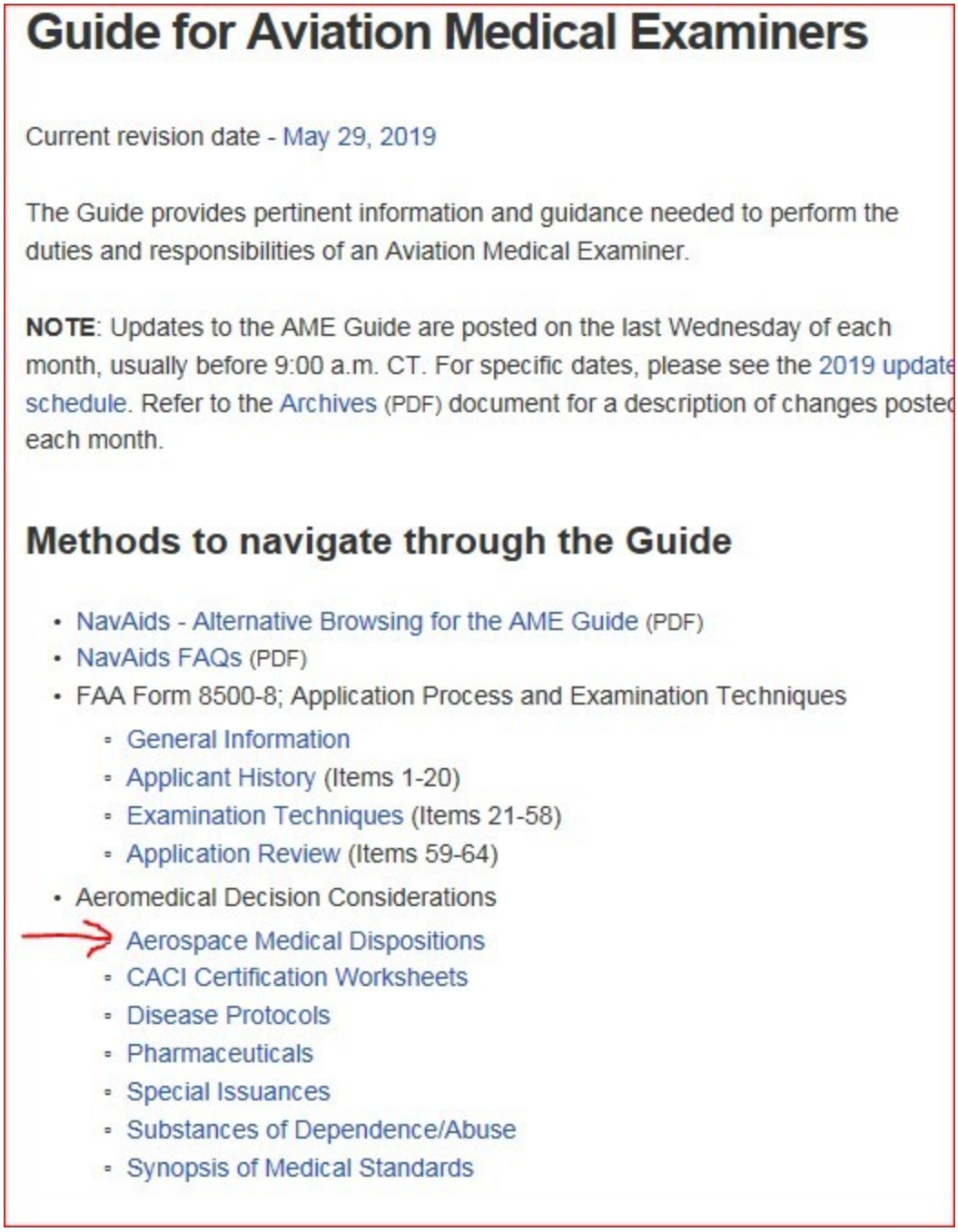
SEARCHING THE AME GUIDE

by Warren S. Silberman, DO, MPH

I chose to write this article to assist AMEs in searching the online guide. It will also help when taking the Multimedia Online Refresher course.

A 50 y/o male first-class pilot presents to the AME for an FAA Flight examination. This was the first time he has seen this AME. He needs this first-class examination as he was applying for a flight job with one of the major carriers. The AME reviewed his MedXPRess history and noted a history of adenocarcinoma of the sigmoid colon one-year ago and a history of hypertension. The pilot had consulted one of the pilot advocacy organizations to find out what records and testing he would need to have in order to be considered for a special issuance.

You review the reports from the diagnosis of the cancer. The colon cancer was adenocarcinoma, and it was discovered on routine colonoscopy. The pilot had a low anterior resection with end to end anastomosis. Pathology showed the tumor to be the adenocarcinoma as previously mentioned and a Dukes B, as the tumor had grown through the muscle layer of the bowel, but there was no lymph node spread. The pathologist noted that it had just penetrated slightly the wall of the colon. The consulting oncologist recommended just observation. So, the first thing you need to do is to check the online *Guide for Aviation Medical Examiners*. I recommend you use the www.faa.gov/GO/AME link taking you to all the medical information. Click on the link to the *Guide*. At this point, you need to locate the Disposition Table, so click the link to *Aerospace Medical Dispositions*:



Guide for Aviation Medical Examiners

Current revision date - May 29, 2019

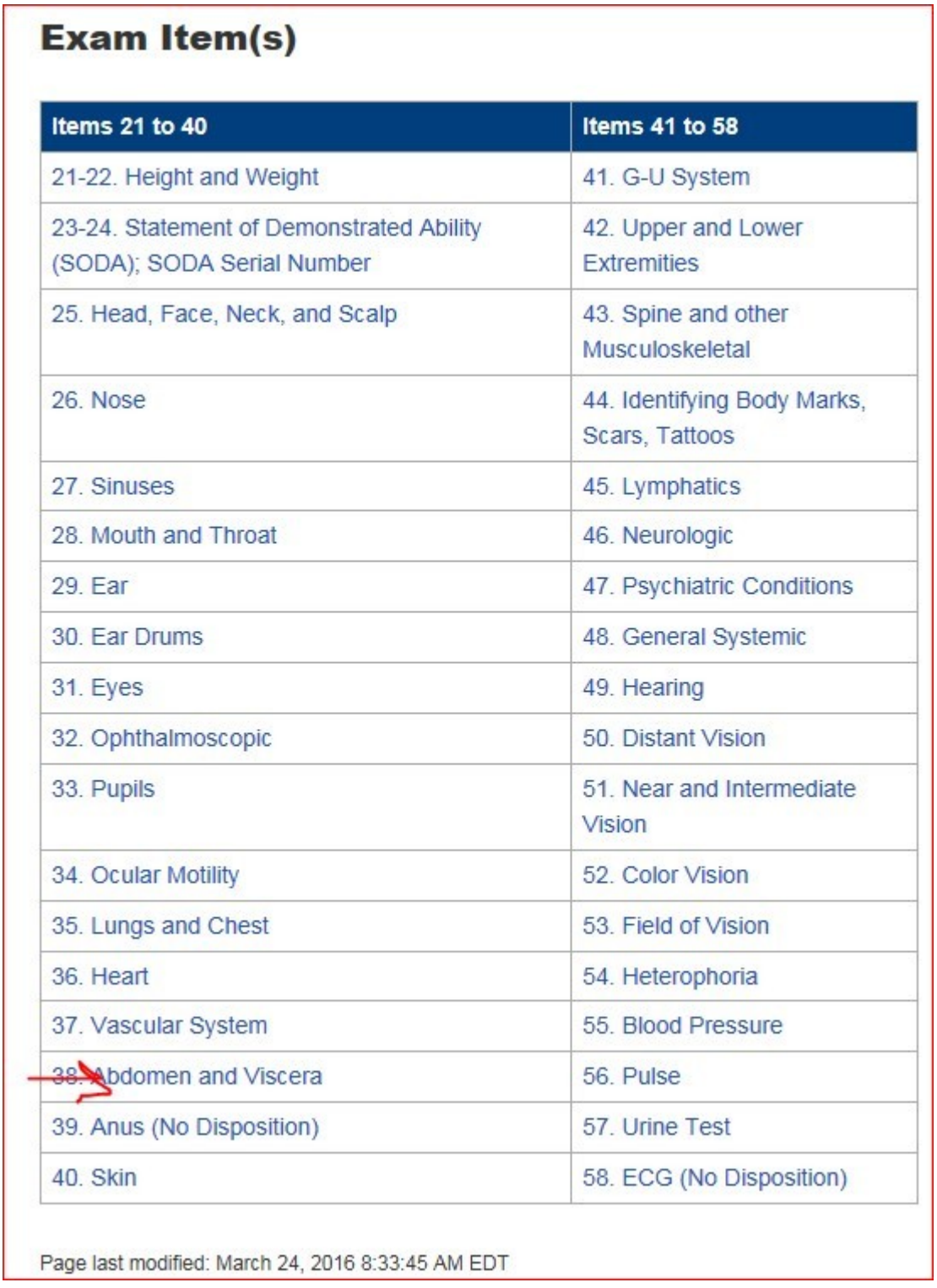
The Guide provides pertinent information and guidance needed to perform the duties and responsibilities of an Aviation Medical Examiner.

NOTE: Updates to the AME Guide are posted on the last Wednesday of each month, usually before 9:00 a.m. CT. For specific dates, please see the 2019 update schedule. Refer to the Archives (PDF) document for a description of changes posted each month.

Methods to navigate through the Guide

- NavAids - Alternative Browsing for the AME Guide (PDF)
- NavAids FAQs (PDF)
- FAA Form 8500-8; Application Process and Examination Techniques
  - General Information
  - Applicant History (Items 1-20)
  - Examination Techniques (Items 21-58)
  - Application Review (Items 59-64)
- Aeromedical Decision Considerations
  - Aerospace Medical Dispositions
  - CACI Certification Worksheets
  - Disease Protocols
  - Pharmaceuticals
  - Special Issuances
  - Substances of Dependence/Abuse
  - Synopsis of Medical Standards

Then click on the link for *38. Abdomen and Viscera*:

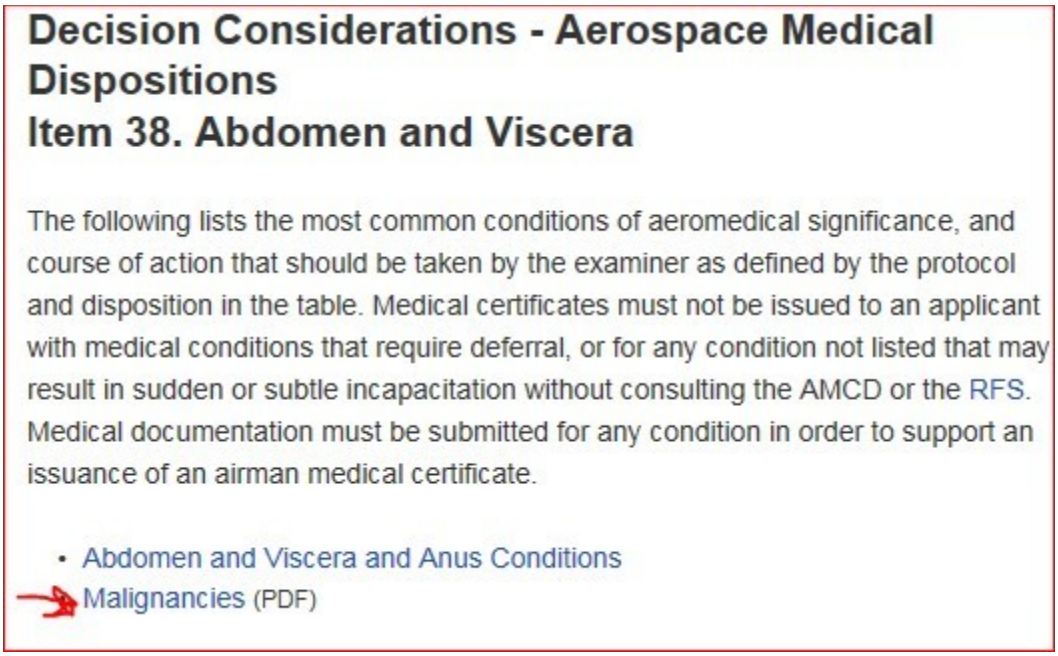


Exam Item(s)

Items 21 to 40	Items 41 to 58
21-22. Height and Weight	41. G-U System
23-24. Statement of Demonstrated Ability (SODA); SODA Serial Number	42. Upper and Lower Extremities
25. Head, Face, Neck, and Scalp	43. Spine and other Musculoskeletal
26. Nose	44. Identifying Body Marks, Scars, Tattoos
27. Sinuses	45. Lymphatics
28. Mouth and Throat	46. Neurologic
29. Ear	47. Psychiatric Conditions
30. Ear Drums	48. General Systemic
31. Eyes	49. Hearing
32. Ophthalmoscopic	50. Distant Vision
33. Pupils	51. Near and Intermediate Vision
34. Ocular Motility	52. Color Vision
35. Lungs and Chest	53. Field of Vision
36. Heart	54. Heterophoria
37. Vascular System	55. Blood Pressure
38. Abdomen and Viscera	56. Pulse
39. Anus (No Disposition)	57. Urine Test
40. Skin	58. ECG (No Disposition)

Page last modified: March 24, 2016 8:33:45 AM EDT

You are then taken to **Exam Techniques and Criteria for Qualification Item 38. Abdomen and Viscera**. Here again, you see *Aerospace Medical Dispositions*, but this time when you click on that you are taken to another page, and note the choice *Malignancies*.



Clicking on that link takes you to the Colon Cancer Disposition table. Under "C." on the table, you note *Non metastatic and no High-Risk features. Treatment completed* ***Less than 5 years ago***. Looking across the disposition refers you to the CACI-Colon Cancer Worksheet. Checking each box appears to fit your pilot until you come to CEA at diagnosis was less than 5 ng/ml. Your pilot has given you some lab results performed prior to his surgery and note that his CEA at that time was 4 ng/ml, so he fits that item. Next, the pilot must have a CEA within the previous 90 days that is normal. You also have a CEA performed just one-month prior and was 1.5 (Lab values: 0 - 2.5), so you can check that one off. Lastly, the pilot must have a hemoglobin level greater than 11 performed within the last 90 days. Your pilot's was 12, done at the same time as the CEA, so your pilot meets all the criteria for issuance as a CACI.

Now you need to work the pilot's history of hypertension. You immediately recall that this is a CACI condition. The pilot gives you a list of his current medications. They are HCTZ, Lisinopril, Metoprolol, and Cardizem. Therefore, he is taking 4 medications. You question him why he is on 4 medications. He says it has been difficult to control his blood pressure. He tells you that during all of this they wanted to make sure he did not have Sleep Apnea, so he was tested and it was negative.

The blood pressure in your office that morning was 122/74, a very acceptable value. The issue is that when you review the disposition table you note that under "C", treatment with 4 or more medications, you cannot issue and must obtain permission from AMCD for a special issuance.

So after typing CACI QUALIFIED COLON CANCER and NOT CACI qualified hypertension, you defer the issuance to the Certification Division. ♦

Dr. Warren Silberman is the Manager of CAMI's Occupational Health Division.

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CASE REPORT: PULMONARY EMBOLI AND SECONDARY SEQUELAE

by Arpan Kothari, DO

The prevalence of venous thromboembolism is significant in the United States, and can pose a serious threat to aviators. The most significant aeromedical concern for aviators, is sudden incapacitation; but pulmonary thromboembolism can lead to other detrimental disease processes that jeopardize the pilot's ability to perform. Therapies typically involve anti-coagulation, and usually additional work up is needed to better understand causation or progression of the disease process, in an individual.

History

An 18-year-old applicant came in for an initial medical examination for a first class medical. He has a history of a low back injury that occurred after wrestling in 2012. He initially received conservative management with physical therapy. After little resolution, he underwent a surgical repair of his L5-S3 spondylolisthesis, on March 11, 2014. After the surgery, the airman developed chest pain and dyspnea. Due to the nature of his symptoms and findings, the patient was sent to have a CT scan completed of his chest. This lead to the finding and diagnosis of pulmonary emboli with secondary pulmonary infarct. He underwent anti-coagulation therapy, which resolved the embolic issue. He also was seen by a pulmonologist who monitored his progression and therapy. At the time of the AME examination, the patient had been off the anti-coagulation for over a year, and had no other complications or symptoms from his prior pulmonary emboli or back surgery. Given his complicated history with thrombo-embolus, the AME deferred his case for further evaluation.

Aeromedical Concerns

The development of pulmonary emboli pose a significant risk to airmen, as it can lead to potential sudden incapacitation or inability to perform required duties. Some of the more serious presentations that can occur in individuals with pulmonary emboli can include, syncope, hypotension, cardiovascular collapse, arrhythmia, and dyspnea.[1,2,3] Aside from the obvious issues with the above-mentioned presentation, simple presentation of dyspnea and chest pain can also pose as a serious distraction to pilots.

In addition to addressing the main issue at hand, the pilot in this situation also had a pulmonary infarct, which caused a 20% loss in function of the affected lung. This brings up issues similar to that of individuals with restrictive lung disease or asthma. Applicants with respiratory issues need proper lung exams, as outlined by the *AME Guide*.[4] The airman typically requires further studies to ensure that pulmonary function is not compromised as a sequela of the pulmonary emboli.

Role of AME

As with any other pilot, the AME needs to follow the AME Guide on examination procedures to evaluate the airman, with greater emphasis on the heart, lungs, and vascular system.[4,5,6] In general, the AME must ensure the airman does not have any organic, functional, or structural disease, or defect, or limitation based on the history and examination, that would prohibit the airman from completing their duties.

The online *Guide for Aviation Medical Examiners*, Aerospace Medical Dispositions for thromboembolic events, requires submission of multiple reports and tests that airman must complete prior to consideration for certification.[7] The airman will need a hospital admission and discharge summary, a status report including: detailed family history of thromboembolic disease, neoplastic

workup (if clinically indicated), and lab work (PT/PTT, Protein S & C, Leiden Factor V). If the airman is still anticoagulated with warfarin (Coumadin), they must submit all (no less than monthly) INRs from time of hospital discharge to present. For any applicant who is just beginning warfarin (Coumadin) treatment, the following is required: a minimum observation time of 6 weeks after initiation of warfarin therapy; and must also meet any required observation time for the underlying condition; and 6 INRs, no more frequently than 1 per week.[7] The FAA also accepts all the NOACs (Dabigatran [Pradaxa], Rivaroxaban [Xarelto], Apixaban [Eliquis], and Edoxaban [Savaysa]). A pilot who is taking a NOAC will be required to have the treating physician comment on any side-effects. This applies typically with an active disease process, as the AME would submit all the above information for a special issuance, and deferment is required for all initial cases.[8] This data would also be relevant to have all together, if submitting as part of a pilot's medical history.

In addition to this, if the airman, has any form of pulmonary compromise, they can be treated like an individual that may have a restrictive or reactive lung process. The protocol to follow would be similar to the guidelines set forth, for a COPD special issuance. For airmen that may need to submit data for their lung disease, the Aviation Medical Examiners Guide, has listed the required documents to obtain an AME Assisted Authorization for Special Issuance (AASI) for individuals with COPD.[8] All initial exams are deferred to AMCD, but the AME should submit: a statement regarding symptomatology of the condition; a statement addressing any associated illnesses, such as heart failure; the name and dosage of medication(s) used for treatment and/or prevention, with comment regarding side effects; and a pulmonary specialist evaluation that includes the results of a current pulmonary function test, performed within last 90 days.[9] Again this applies to active disease processes, but in the event that there is a history of pulmonary disease with no active process, the above guidelines could be used to submit as a part of the airman's medical history.

Outcome

This AME deferred the airman's certification based on the Aviation Medical Examiners Guide for AASI requirements in those with history of venous thrombosis.[8] The patient's complete history and physical and hospital visits were submitted as well as the recommendations and visits with the specialists, including his orthopedic surgeon, pulmonologist, and hematologist.

As I noted above, the airman had complete resolution of his thrombotic event and had been symptom free for a year. The airman also was not on any medication at the time of the AME exam that would prohibit his certification. A complete hyper-coaguable study was done with no significant findings. The hematologist cleared the airman and was not concerned for any further development of thrombotic events. The patient was also evaluated by the pulmonologist, who assessed the patient's pulmonary function. Patient's PFT showed the his FEV1/FVC ratio was 102% and FEV1 was 85%.

Based on his findings, it was determined that the airman no longer posed a risk for venous thrombotic emboli, and he submitted all pertinent reports and studies to support this claim. The Airman was issued his first-class medical certificate with warning to report any new events to the Aerospace Medical Certification Division.

Etiology of Pulmonary Thrombotic Emboli

Acute pulmonary embolism, also known as a form of venous thrombotic emboli, has been shown to have a prevalence of 0.38 per 1000 person years, in some recent studies.[10] The presentation of the disease can vary from mild dyspnea and chest pain, to severe symptoms like syncope, hypotension, cardiovascular collapse, and arrhythmia.[1,2] Diagnosis is typically made by using computed tomography or Ventilation-perfusion scans. Treatment usually involves a form of anti-coagulation and ensuring continued pulmonary function.[11] The common causes of a thrombotic emboli event are like that of the causes of a venous thrombosis. Those risk factors for venous thrombosis or emboli

include, alterations in blood flow (ie, stasis, bedridden), vascular endothelial injury (i.e. trauma, surgery), or alterations in the constituents of the blood (ie, inherited or acquired hypercoagulable states).[12] ♦

Arpan Kothari D.O., Capt, MC, FS, OHANG, was a resident in aerospace medicine at Wright State University, when he wrote this case report at the Civil Aerospace Medical Institute. Currently he is the 162nd IRS squadron SME in the Ohio Air National Guard and practices as an emergency physician in the civilian sector.

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CASE REPORT: HYDRONEPHROSIS

by Elizabeth A. Casstevens, MD, MPH

Hydronephrosis is dilatation of the urinary collecting system from urinary tract obstruction. It can be asymptomatic, or manifest with abdominal pain, renal stones, hematuria, dysuria, infection, fever, malaise or subtle declines in overall health or cognition. This article presents a case report of a first-class pilot who was incidentally found to have severe hydronephrosis resulting in a solitary kidney but with overall normal renal function.

History

A pilot underwent a computed tomography (CT) study during an episode of acute right lower quadrant (RLQ) pain. Lab work including blood and urine showed no abnormalities. The CT scan revealed a normal appendix, pancreas and hepato-biliary system; however, it also showed complete, chronic Left-sided ureteropelvic junction (UPJ) obstruction with cystic replacement of the Left kidney, and partial UPJ obstruction on the Right (see Images 1-4). A few weeks later, after recovery from his abdominal pain, he completed a 3-phase CT scan to assess the incidental finding of bilateral UPJ obstruction. The CT confirmed a Left UPJ obstruction with severe hydronephrosis and nearly absent Left renal tissue, and Right UPJ stenosis with hydronephrosis.

The pilot continued urology follow-up for six weeks, during which he underwent nuclear medicine renography, a dimercaptosuccinic acid scan (DMSA), and a diethylenetriamine pentaacetic acid (DPTA) Lasix renogram to assess renal function. His Right kidney had mild UPJ obstruction with no functional impairment, and his Left kidney had severe hydronephrosis and was non-functioning. The urologist recommended the pilot have a non-urgent prophylactic nephrectomy in the future to prevent a renal abscess. To further assess the need for nephrectomy, he underwent a Captopril renal function study, which verified normal Right renal function without obstruction, and a nonfunctioning Left kidney. Urology estimated that since the hydronephrosis had never caused symptoms nor interfered with his duties, there was a < 1% risk that his condition would cause an acute incapacitating event; hence, he did not require surgical intervention at that time. He requires annual labs including urinalysis and renal function testing to confirm normal, stable renal function, and needs to remain asymptomatic. If he becomes symptomatic or develops uncontrolled hypertension, then he should be re-evaluated for a Left nephrectomy.

Aeromedical Issues

This pilot's case was forwarded to CAMI for review due to the unique nature of his condition and the concern for the resulting large abdominal mass. The primary concerns regarding congenital UPJ obstruction with hydronephrosis are the associated symptoms which could manifest and impair flying performance or cause sudden incapacitation. Potential symptoms include abdominal pain, renal stone pain, hematuria, dysuria, infection, or fever. Pyelonephritis could lead to cortical scarring and potentially compromise renal function. Less acute symptoms which could occur include malaise and subtle declines in overall health or cognition.

This pilot's clinically quiescent bilateral uretero-pelvic junction (UPJ) obstruction with associated bilateral hydronephrosis was an incidental finding during a workup for unrelated pathology. UPJ obstruction occurs in approximately 1 of 500 live births, affects males more than females, and is more common on the left side, with bilateral obstruction occurring in approximately 10% of cases.[4] His condition is most likely congenital; the cortical thinning and paper-thin parenchyma indicate a chronic obstruction. With a normal functioning contralateral kidney, his urine output and serum creatinine were within normal limits. His left kidney is non-functioning due to the severe hydronephrosis. His right kidney has well-preserved function. The Lasix renogram showed a non-

persistent obstruction of the right kidney. This condition likely occurred during fetal or infant life and then spontaneously resolved; although it resulted in dilatation of the right collecting system, it is not clinically significant at this time.
Because he was asymptomatic and did not have any residual Left renal function to salvage, the benefits of a prophylactic left nephrectomy are likely minimal. Since surgical intervention was not needed, continued observation was recommended, with immediate re-evaluation of his condition if he becomes symptomatic or experiences any metabolic or hemodynamic sequellae.

Although there is some concern that force on the Left renal pedicle could result in bleeding, the pilot has never had symptoms, and has maintained an active lifestyle, with proven physical performance under a variety of flight conditions and with no complications. As a result, his individual risk of this occurrence was determined to be low. Given his proven performance, it was not necessary to recommend any activity or recreational limitations.

Since this pilot's condition likely existed for many years, it was unlikely to progress or cause an acute incapacitating event. He was expected to remain stable under the stresses of the aviation environment, and would likely not pose an increased risk to his health or safety, the safety of those around him, or flight safety.

Because he has only one functioning kidney, the pilot was counseled on renal precautions, and must be otherwise healthy to compensate for his solidary kidney condition. Specifically, essential management includes preventing dehydration, and avoid medications which may decrease his remaining renal function; if NSAIDs are needed, they should be taken at the lowest effective dose for the shortest duration possible. Because obstruction in a solitary kidney is a medical emergency and can very quickly deteriorate renal function, he should monitor for signs or symptoms of obstruction or nephrolithiasis, including flank pain, gross hematuria, or decreased urine output. He should continue to engage in healthy lifestyle choices, including a low-sodium diet to prevent hypertension; one option is the Dietary Approaches to Stop Hypertension (DASH) diet, which limits sodium intake to 2,300 mg/day.[5] Additionally, he should engage in regular exercise and maintain a healthy weight to reduce his risk of developing Type II diabetes or hypertension, since these conditions jeopardize renal function.

Case Outcome

The *FAA Guide for Aviation Medical Examiners* addresses hydronephrosis, but only in the context of impaired renal function, which requires FAA decision.[6] Nevertheless, the AME out of caution called his Regional Medical Office. They went over the history and gave the AME verbal permission to issue the airman a medical certificate. The AME provided the medical office with copies of the test results and they subsequently issued the airman an "Eligibility letter." The local AME issued the pilot's Class I medical certificate, and counseled him of the pilot's personal responsibility for self-grounding and immediate re-assessment of his flying class eligibility if he experiences any of the signs or symptoms discussed above, or if there is a change in his renal function status.

Etiology of Hydronephrosis

Hydronephrosis, or "water inside the kidney" is caused by obstruction of the urinary system across the ureteropelvic junction (UPJ), resulting in impaired urinary transport from the renal pelvis to the ureter. The obstruction is usually from an intrinsic abnormality such as a narrowing, kinking, or an aperistaltic segment of the proximal ureter (vice an external compression from, for example, an accessory artery). UPJ obstruction can also be acquired; vesicoureteral reflux in childhood can lead to upper tract dilatation with ureter elongation, tortuosity, and kinking.[1] Hydronephrosis can be either acute, such as that caused by ureterocalculus, or chronic, as caused by a congenital or functional anomaly such as infection or urogenic bladder. Additionally, it can be symptomatic if it is acute or bilateral, or asymptomatic in the case of chronic or unilateral hydronephrosis with retained

contralateral renal function. One of the most common causes of hydronephrosis is UPJ obstruction, which occurs in approximately 1 of 500 live births, affects males more than females, and is more common on the left side, with bilateral obstruction occurring in approximately 10% of cases.[2] Other causes include vesicoureteral reflux (VUR), transient or functional hydronephrosis, posterior urethral valves, congenital megaureter, ureterocele, and multicystic dysplastic kidney (MCDK). Newborns can present with urinary tract infection (UTI), hematuria, or failure to thrive; they may also have a palpable abdominal mass from the enlarged kidney. Older children may present with Dietl's crisis (intermittent flank or abdominal pain), nausea, vomiting, or hypertension. Adult hydronephrosis may be discovered incidentally, as in this pilot's case, and may have existed since birth or early childhood yet remained clinically quiescent. Typical imaging studies include renal ultrasound followed by a diuretic renogram to determine the degree of renal function and obstruction. Because it is difficult to determine how hydronephrosis will progress, management can include either surgical intervention or observation with serial renal function labs. Indications for intervention include obstructive symptoms, progressive overall or ipsilateral renal function impairment, infection or development of stones, or causal hypertension.[3] The primary goals are symptomatic relief, to preserve renal function, and additionally for an aviator, to prevent sudden incapacitation or inability to perform flight duties. ♦

Dr. Elizabeth Casstevens was a resident in aerospace medicine when she wrote this case report while on rotation at the FAA Civil Aerospace Medical Institute (CAMI).

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AME SEMINARS

August 2–4	Washington, DC	Refresher (1)
September 20–22	Denver, CO	Refresher (1)
September 26–28	Cleveland, OH	CAMA (4)
October 28–November 1	Oklahoma City, OK	Basic (2)
November 15–17	San Antonio, TX	Refresher (1)

NOTES

(1) A 2 ½ day AME refresher seminar consisting of 14 hours of AME specific subjects. You must use the Designee Registration System (DRS) to register for a seminar.

(2) A 4 ½ day AME seminar focused on preparing physicians to be designated as Aviation Medical Examiners. Contact your Regional Flight Surgeon.

(3) A 3 ½ day AME seminar held in conjunction with the Aerospace Medical Association (AsMA). Registration must be made through AsMA. Call (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) Sanctioned by the FAA, this seminar is sponsored by the Civil Aviation Medical Association (CAMA) and does fulfill the FAA recertification training requirements. Registration may be completed through the website, www.civilavmed.org, or by calling CAMA at (770) 487-0100.

For more information, visit
https://www.faa.gov/other_visit/aviation_industry/designees_delegations/designee_types/ame/seminar_schedule/

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AWARDS IN AEROSPACE MEDICINE

AAM top doctors were recently honored during Aerospace Medical Association 90th Annual Scientific Meeting in Las Vegas: (left to right) Charles Delohn, MD, PhD, accepting on behalf of former AAM Research Medical Officer, Eduard M. Ricaurte, MD; AAM Medical Officer David Schell, MD; Deputy Federal Air Surgeon, Stephen Goodman, MD; Federal Air Surgeon, Michael A. Berry, MD; Aerospace Medical Certification Division Director, David O'Brien, MD; Retired Southern Region Deputy Regional flight Surgeon, John Berson, DO; and Medical Appeals Branch Manager, James DeVoll, MD.

Dr. Charles DeJohn was recently awarded the 2019 Ashton Graybiel Award by the U.S. Naval Flight Surgeons for outstanding contributions to medical literature in support of operational issues in Aerospace Medicine.

Amanda Taylor received the "A. Howard Hasbrook Award" granted by the Life Sciences and Biomedical Engineering Branch (LSBEB) for providing noteworthy data or design with respect to safety, survivability, or crashworthiness relevant to aircraft or space vehicles.

Dr. Warren Silberman received the "Order of Aeromedical Merit" granted by the by the Society of US Army Flight Surgeons.

Racquel Crisp received the "Employee of the Year, Technical, Professional, & Administrative (GS-9 and above)" award granted by the Oklahoma Federal Executive Board.

Dr. Dennis Beringer was inducted as "Honorary Fellow" of the International Symposium on Aviation Psychology.

Christy Hileman received the "Outstanding Employee Overcoming Significant Challenges" award granted by the Oklahoma Federal Executive Board.

Gregory Day, Ph.D., was recently awarded for Advancing a Safety Culture at the Designated Agency Safety and Health Official Safety Awards. Dr. Day is the Environmental Occupational Safety and Health Officer at CAMI.

Debra Yarbrough received the "Golden Wings Award for Secretarial/Clerical/Administrative Service" granted by the FAA. The awards ceremony is scheduled on July 11th.

CAMI's Daniela T. Kratchounova, PhD, Outstanding Innovator; Kevin Carrel, Outstanding Manager; Melchor Antuñano, MD, CAMI Director; Kathrine L. Davis, Administrative Excellence Award (Pay Bands H-M); Paige E. Smiley, Outstanding Leadership Award; and David M. O'Brien, M.D., AAM Mission Support Award. Award recipients not pictured are Outstanding Team Award - Team Med: Shawna J. Adkins & Vinh N. Kieu; Administrative Excellence Award (Pay Bands A-G) Kendra D. McIntyre; The William E. Collins Publication Award (Pay Bands A-G) - Julia L. Buck; The William E. Collins Publication Award (Pay Bands H-M) - Dana M. Broach, PhD; Outstanding Customer Service Award - Frances A. Hamilton, Friend of AAM - Joe Mooney, AVP-210, Flight Surgeon of the Year Award - Stephen W. Griswold, MD; Inspector of the Year Award - Shalayia N. Jones; Investigator of the Year Award - James F. Mong; Outstanding Legal Instruments Examiner Award - A. Irene Strole; and Regional Employee of the Year Award - Dwight Coleman, Jr.

AAM Program Management Division team members accepting the AAM Office of the Year Award. Left to right: Natalie Gibbs, Lise BienAime, Joanne Bernado, Tawawn Harrison-Lowe, Jan Aucker, Joseph Baden, Kevin Iacobacci, Joshua Willett, Melissa Laughlin, Aileen Blakely, Tiffany Vanzego and Nancy Rodriguez- Brown.

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