



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

July 6, 2016

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Chief Medical Officer

A. ACCIDENT: CEN15FA056; McDade, TX

On November 23, 2014, about 0950 central daylight time, an Aero Commander 500A airplane, N14AV, impacted terrain near McDade, Texas. The airline transport pilot, the sole occupant, was fatally injured. The airplane was substantially damaged. The airplane was registered to and operated by Aerial Viewpoint Aerial Photography under the provisions of 14 Code of Federal Regulations Part 91 as a positioning flight. Visual meteorological conditions prevailed for the flight, which operated without a flight plan. The flight departed the David Wayne Hooks Memorial Airport (KDWH), Houston, Texas, and was en route to the Austin Executive Airport (KEDC), Austin, Texas.

B. GROUP IDENTIFICATION

No group was formed for the medical evaluation in this accident.

C. DETAILS OF INVESTIGATION

1. Purpose

This investigation was performed to evaluate the pilot for any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins.

2. Methods

The FAA blue ribbon medical file, FAA medical case review, toxicology results, autopsy report, personal medical records, and the investigator's reports were reviewed.

FAA Medical File and Medical Case Review

According to the FAA files, the 63 year old male pilot received his first aviation medical certificate in 1988, without limitations. At that time, he reported a history of hay fever. In May, 1989 the pilot applied for a first class medical certificate. His electrocardiogram was abnormal and his

medical certificate was deferred until he underwent additional evaluation including a stress test with nuclear imaging as required by the FAA. The first cardiology evaluation was equivocal and the FAA required retesting. The pilot was eventually granted a first class medical certificate on November 27, 1990. At that time he reported using Sudafed and getting allergy shots. Sudafed is an over the counter medication for nasal congestion containing pseudoephedrine, a vasoconstrictive agent, as the active ingredient. He continued to receive first class medical certificates without limitations until 1997, when a requirement was added that glasses be available for near vision. In 1999 he began to routinely apply for and receive second class medical certificates. In August, 2001 he reported having had sinus surgery and received a second class certificate with a requirement for corrective lenses and available glasses for near vision.

However, records present in the FAA blue ribbon medical file indicate the pilot was first evaluated for a suspicious testicular mass in July 1999. No action was apparently taken at that time. In February 2001, the pilot developed a severe headache and then neurologic symptoms including difficulty with speech and intermittent confusion. An extensive evaluation including a biopsy of brain lesions visible on MRI eventually diagnosed him with primary angiitis of the central nervous system, a rare type of immune vasculitis affecting the brain. Treatment with high dose steroids and antiseizure medications was initiated to help with the headaches.

In addition, in October and November 2001, the pilot had repeated sonographic images of his testicle which suggested testicular cancer. On 12/27/2001, the left testicle was removed and found to contain a seminoma, a type of testicular cancer. Metastasis to a single inguinal lymph node was identified (Stage IIA). The cancer was treated with radiation in early 2002, and the findings all resolved.

In December 2001, while the steroids were being tapered down, the pilot had an episode lasting several hours of being unable to speak or swallow. This was initially thought to be a seizure but follow up MRI showed the presence of new lesions consistent with a relapse of his angiitis. The steroids were increased and treatment with cyclophosphamide (an antineoplastic agent that also inhibits inflammation, commonly called Cytosan¹) was begun.

In February 2002, the pilot was diagnosed with cataracts and elevated intraocular pressures, both thought to be related to his ongoing use of high dose steroids. The examination identified the cataracts (larger on the right than the left) and a best corrected visual acuity of 20/30 on the right and 20/20 on the left. In addition, he had an area of blindness in the upper right visual field as a result of an ongoing angiitis lesion. A repeat MRI in May,

2002 showed significant improvement in all the brain lesions. However, they had worsened again in August, 2002.

In December, 2002, the pilot reapplied for an aviation medical certificate. At that time, he reported his testicular seminoma and having headaches, as well as his use of prednisone (a prescription steroid medication) and cyclophosphamide. His certificate was deferred for further information and the FAA made several requests for supplemental medical records.

An MRI report in the FAA file from February 2003 notes ongoing areas of inflammation in the brain.

The FAA sent a letter to the pilot dated June 30, 2003 in which they denied his application for a medical certificate due to his metastatic testicular cancer and his primary angiitis of the central nervous system. The pilot requested a reconsideration and supplied additional information, including an MRI from August 2003 that demonstrated slight progression of the brain lesions compared with the previous scan. The FAA continued to request additional information in order to reconsider the denial of the pilot's medical certificate.

In March, 2004, the pilot's MRI was unchanged. Additional information was requested and an ophthalmology note from August 2004 notes the pilot had had bilateral cataract surgery in 2002. Multiple notes from the pilot's treating neurologist note a normal neurologic exam, beginning in 2002. In 2004, the FAA Consult Neurologist reviewed the file and imaging studies and recommended the pilot receive a second class pilot certificate. Finally, in October, 2004, the FAA awarded the pilot a second class special issuance medical certificate with requirements for the periodic submission of additional medical information from his treating physicians.

From 2004 through 2006, the pilot reported his medical history, ongoing use of the same medications, submitted the required additional information, and was awarded special issuance, second class medical certificates, limited by a requirement for corrective lenses and available glasses for near/intermediate vision. In 2006 and 2007, he applied for and received a first class medical certificate. Thereafter he applied for and received special issuance first or second class certificates. In 2009, he stopped using medications to prevent relapse of his cerebral angiitis and in 2011, the requirement for special issuance medical certificates was dropped by the FAA; he continued to apply for and receive second class medical certificates.

The pilot's last medical examination was dated May 7, 2014. At that time he reported 7075 total hours of flight experience and was documented as

69 inches tall and weighing 263 pounds. He received a second class medical certificate limited by a requirement for corrective lenses.

Autopsy

According to the autopsy performed by the Travis County Medical Examiner the cause of death was multiple blunt force injuries and the manner of death was accident.

In addition to identifying injuries, the autopsy evaluated the pilot for natural disease. The pilot was described as obese. In addition, the pathologist reported cardiomegaly. The heart weighed 475 grams; average for a 265 pound man is 429 grams with a range of 325-566 grams.² There was minimal coronary artery disease. The left ventricle measured 1.5 cm thick; average is 1.23 cm (SD 0.16 cm).² The remainder of the heart was unremarkable.

Examination of the brain was limited by a number of injuries. However, the uninjured portions of the brain were described as normal. Specifically, the report states, the brain “is not edematous. The gyri uninvolved by injury are of normal caliber and the sulci uninvolved by injury are unremarkable. . . The gray matter uninvolved by injury is free of contusion and is clearly delineated from the white matter. The ventricles are not dilated and have normal choroid plexuses. The deep nuclei, hippocampi, and mammillary bodies are symmetric and normally formed. The substantia nigra is normally pigmented. The cerebellum is normally formed and has normal folia and dentate nuclei. The vessels of the circle of Willis . . . are free of atherosclerosis or abnormality. . . The pituitary gland appears unremarkable within the sella turcica.” No histologic examination of the brain was performed.

Toxicology

Toxicology testing performed by the Travis County Medical Examiner identified naproxen and diphenhydramine in cavity blood.

Toxicology testing performed by the FAA’s Bioaeronautical Research Laboratory identified cetirizine, diphenhydramine (0.053 ug/ml), and fexofenadine in cavity blood. Acetaminophen, cetirizine, diphenhydramine, and naproxen, as well as fexofenadine and its metabolite azacyclonol were found in urine.

Naproxen is an analgesic anti-inflammatory medicine available over the counter and by prescription; it is commonly marketed with the names Alleve, Naprosyn, and Anaprox.³ Diphenhydramine is a sedating antihistamine available in many over the counter products intended to treat allergies, colds, and to induce sleep. It is available over the counter under the trade names Benadryl and Unisom. Diphenhydramine carries the

following FDA warning: may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery).⁴ Compared to other antihistamines, diphenhydramine causes marked sedation; it is also classed as a CNS depressant and this is the rationale for its use as a sleep aid.

Diphenhydramine's therapeutic range is between 0.0250 and 0.1120 ug/ml. However, diphenhydramine undergoes postmortem redistribution which means after death it can move back into pooled blood from storage sites. For diphenhydramine, postmortem central blood levels may increase by about three times.⁵

Cetirizine is another sedating antihistamine available over the counter, commonly sold with the name Zyrtec. It carries a warning that it may cause drowsiness.⁶ However, its level in the pilot's blood was too low for the lab to quantify.⁷ Fexofenadine is a non-sedating antihistamine available over the counter, commonly with the name Allegra.⁸ Its level in the specimen was also too low for the lab to quantify. Acetaminophen is an over the counter analgesic and fever suppressant commonly sold with the name Tylenol.

D. SUMMARY OF MEDICAL FINDINGS

The 63 year old male pilot in this accident had a history of allergies, sinus surgery, testicular cancer (treated in 2002 without evidence of recurrence), cataracts treated with surgical removal, and primary angiitis of the central nervous system associate with significant neurologic deficits which had been treated with steroids and cyclophosphamide from 2002 to 2009. However, his neurologic exam had returned to normal and he had been off medications for five years before the accident. The autopsy identified cardiomegaly with a heart weighing 475 grams and a left ventricle which measured 1.5 cm thick. Post accident toxicological testing identified cetirizine, diphenhydramine (0.053 ug/ml), and fexofenadine in cavity blood as well as acetaminophen, cetirizine, diphenhydramine, and naproxen, fexofenadine and its metabolite azacyclonol in urine.

References

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- ² Kitzman DW, Scholz DG, Hagen PT, Ilstrup DM, Edwards WD. Age-related changes in normal human hearts during the first 10 decades of life. Part II (Maturity): A quantitative anatomic study of 765 specimens from subjects 20 to 99 years old. Mayo Clinic Proc., 1988. 63(2): p. 137-46.
- ³ National Institutes of Health. US National Library of Medicine. DailyMed. Naproxen. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=68848217-03c9-4377-9be6-6f567e629129> Accessed 6/30/2016.
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- ⁵ Han E, et. al., Evaluation of postmortem redistribution phenomena for commonly encountered drugs, Forensic Science International 219 (2012) 265–271
- ⁶ Federal Aviation Administration. Civil Aerospace Medical Institute. Toxicology Drug Information: Cetirizine. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=131> Accessed 6/29/2016.
- ⁷ Email communication with CAMI toxicologist, Dr. Russell Lewis.
- ⁸ National Institutes of Health. US National Library of Medicine. DailyMed. Fexofenadine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ac0c0247-3b20-445a-84c0-cb7f3939c823> Accessed 6/30/2016.