

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA22LA301

MEDICAL

Specialist's Factual Report

April 27, 2023

A. ACCIDENT

Location: Cleveland, Georgia
Date: 7/8/2022
Time: 13:05 Local
Airplane: Kolb Firestar II; N6136Y

B. MEDICAL SPECIALIST

Specialist Michelle Watters, MD, PhD, MPH
National Transportation Safety Board, RE-1
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C. DETAILS OF THE INVESTIGATION

Purpose

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

Methods

The Federal Aviation Administration (FAA) medical case review, the pilot's autopsy report, FAA Forensic Sciences Laboratory toxicology report,¹ and post-event medical records were reviewed. Other relevant medical and regulatory issues were reviewed.

D. FACTUAL INFORMATION–PILOT

1.0 FAA Medical Case Review

According to the FAA medical case review, the 79-year-old male pilot never held an FAA medical certificate.

2.0 Autopsy

According to the autopsy report from the Division of Forensic Sciences, Georgia Bureau of Investigation, Decatur, Georgia, the pilot's cause of death was multiple blunt force injuries, and the manner of death was accident. The body weighed 233 pounds and was 64 inches in length. There was evidence of medical intervention. The medical examiner reported that the pilot had an enlarged heart

¹ The FAA Forensic Sciences Laboratory has the capability to test for more than 1,000 substances including toxins, common prescription and over-the-counter medications, and illicit drugs. <https://jag.cami.jccbi.gov/toxicology/>

(530 grams) and areas of 60% focal stenosis in his left anterior descending artery; no other significant natural disease was identified.

3.0 Toxicology

Toxicology testing by the FAA Forensic Sciences Laboratory screened negative for drugs of abuse in the pilot's hospital admission serum sample. Ketamine was detected in the pilot's cavity blood at 27 nanograms per milliliter (ng/mL) and urine at 971 ng/mL; its metabolite norketamine was detected in his cavity blood at 44 ng/mL and his urine at 1,003 ng/mL. Cetirizine, amitriptyline, and its metabolite nortriptyline were detected in the pilot's urine, but not in his cavity blood. The high blood pressure medications diltiazem and propranolol, the gastric reflux medication famotidine, and the topical anesthetic pramoxine were detected in the pilot's cavity blood and urine; these four medications are generally considered non-impairing.²

Ketamine is an anesthetic and used for pain management; its therapeutic range is 100 to 2,200 ng/mL and it has a half-life of 2 to 4 hours. *Norketamine*, a major metabolite of ketamine, is an active metabolite.³

Cetirizine is a second-generation antihistamine used to relieve hay fever and allergy symptoms. It is available over the counter, commonly marketed as Zyrtec. Although designed to be less sedating, cetirizine does have some sedating properties. The elimination half-life is between 6.5 and 10 hours. FAA provides guidance on wait times before flying after using this medication, post-dose observation time is 48 hours and the medication is not for daily use.^{4,5}

Amitriptyline, commonly marketed as Elavil, is a prescription medication indicated for the treatment of depression, eating disorders, and chronic nerve pain; it is known to have sedative effects. Amitriptyline has an average half-life of 30 to 50

² FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.

Diltiazem. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=49>

Propranolol. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=116>

Famotidine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=293>

Pramoxine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=376>

³ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.

Ketamine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=82>

Norketamine. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=303>

⁴ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.

Cetirizine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=131>

⁵ FAA. Updated 10/26/22. [AllergyAntihistamineImmunotherapyMedication.pdf \(faa.gov\)](#)

hours; *nortriptyline*, its active metabolite, has a half-life of 18-44 hours.^{6,7} Amitriptyline is not approved by FAA for treatment of depression in pilots.⁸

4.0 Post-Event Medical Records

Post-accident hospital records were obtained for the pilot. The pilot had a traumatic subarachnoid hemorrhage with loss of consciousness, acute blood loss, and multiple other severe injuries. He was intubated and received blood products prior to arriving at the hospital. He received ketamine, diltiazem, propranolol, famotidine, and multiple units of whole blood and blood products. The pilot's wife reported that the pilot had no medical conditions and was taking no medications. A limited echocardiogram showed that the pilot had normal left and right ventricular function and normal ejection fraction. The pilot died two days after the crash.

E. SUMMARY OF MEDICAL FACTS

The 79-year-old male pilot never held an FAA medical certificate. According to the autopsy, the pilot's cause of death was multiple blunt force injuries, and the manner of death was accident. The pilot had an enlarged heart (530 grams) and areas of 60% focal stenosis in his left anterior descending artery. Post-accident medical records reported that the pilot had traumatic subarachnoid hemorrhages with loss of consciousness, acute blood loss, and multiple other severe injuries. A limited echocardiogram performed post-accident showed that he had normal left and right ventricular function and normal ejection fraction. The pilot died two days after the crash.

The pilot's toxicology screen was negative for drugs of abuse in his hospital admission serum sample. Ketamine and norketamine were detected in the pilot's cavity blood at 27 nanograms per milliliter (ng/mL) and 44 ng/mL, respectively; both were also detected in his urine. Cetirizine, amitriptyline, and nortriptyline were detected in the pilot's urine, but not in his cavity blood. The generally non-impairing medications diltiazem, propranolol, famotidine, and pramoxine were detected in the pilot's cavity blood and urine. Post-accident medical records show that he received ketamine, diltiazem, propranolol, famotidine, and multiple units of whole blood and blood products.

⁶ National Institutes of Health (NIH). U.S. National Library of Medicine (NLM). Updated 9/16/22. [DailyMed - AMITRIPTYLINE HYDROCHLORIDE tablet \(nih.gov\)](https://pubmed.ncbi.nlm.nih.gov/35888888/)

⁷ Schulz, M, A Schmoldt, H Andresen-Streichert, and S Iwersen-Bergmann. 2020. Revisited: Therapeutic and toxic blood concentrations of more than 1100 drugs and xenobiotics. Additional File 1. *Critical Care* 24(1):195 doi: 10.1186/s13054-020-02915-5.

⁸ FAA. Last modified 7/23/18. Guide for Aviation Medical Examiners, Item 47. Psychiatric Conditions - Use of Antidepressant Medications. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item47/amd/antidepressants/

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