

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN23FA038

MEDICAL

Specialist's Factual Report

March 13, 2023

A. ACCIDENT

Location: Decatur, Texas
Date: November 18, 2022
Time: 15:10 Local
Airplane: Cessna 421C; N6797L

B. MEDICAL SPECIALIST

Specialist Michelle Watters, MD, PhD, MPH
National Transportation Safety Board, RE-1
Washington, DC

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 certification file, FAA medical case review, and the pilot's autopsy and FAA Forensic Sciences Laboratory toxicology reports¹ were reviewed. Other relevant medical and regulatory issues were reviewed.

D. FACTUAL INFORMATION - PILOT

1.0 FAA Medical Certification File and FAA Medical Case Review

According to the FAA medical certification file and FAA medical case review, at the time of the accident, the 57-year-old male pilot held a first class medical certificate with the limitation that he must have available glasses for near vision. At his most recent FAA medical examination on 5/27/22, the pilot reported 6,891 total flight hours. He was 67 inches tall and weighed 232 pounds. He reported taking pantoprazole for gastric reflux, amlodipine and hydrochlorothiazide to treat high blood pressure, atorvastatin to treat high cholesterol, aspirin, zolpidem as a sleep aid, and fexofenadine to treat seasonal allergies. He was CACI (conditions aviation medical examiners can issue) qualified for hypertension.

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/>

2.0 Autopsy

According to the autopsy report from the Southwestern Institute of Forensic Sciences at Dallas, Office of the Medical Examiner, Dallas, Texas, the pilot's cause of death was blunt force injuries, and the manner of death was accident. The medical examiner reported the pilot had an enlarged heart (510 grams) with left ventricular thickening and was obese with a body mass index (BMI) of 39.43 kilograms per meter squared.²

3.0 Toxicology

Toxicology testing performed by the FAA Forensic Sciences Laboratory identified the muscle relaxant cyclobenzaprine at 8 nanograms per milliliter (ng/mL) in the pilot's femoral blood and in his urine at 41 ng/mL. Cyclobenzaprine's metabolite norcyclobenzaprine was detected at 15 ng/mL in his femoral blood and at 59 ng/mL in his urine. The sleep medicine zolpidem was detected in his femoral blood at 9 ng/mL and in his urine at 12 ng/mL. The high blood pressure medication amlodipine, the high cholesterol medication atorvastatin, the allergy medication fexofenadine and its metabolite azacyclonol, and the enlarged prostate medication tamsulosin were detected in the pilot's femoral blood and urine; the asthma medication albuterol was detected in his urine, but not in his blood. These six substances are generally considered non-impairing.³ Toxicology testing performed for the medical examiner's office detected norcyclobenzaprine,⁴ amlodipine, and atorvastatin in the pilot's femoral blood.

Cyclobenzaprine is a prescription medication commonly marketed as Flexeril. It is indicated for relief of muscle spasm associated with acute, painful musculoskeletal conditions. *Norcyclobenzaprine* is the major metabolite of cyclobenzaprine. Cyclobenzaprine carries the warning that its use may impair mental or physical ability for performing hazardous tasks. The therapeutic range for

² BMI is calculated from body weight and height. BMI of 18.5 to less than 25 is considered normal weight. BMI of 25 to less than 30 is considered overweight. BMI of 30 and above is considered obese. Obesity is sometimes further classified: class 1 = BMI of 30 to less than 35, class 2 = BMI of 35 to less than 40, class 3 = BMI of 40 or higher. [Centers for Disease Control and Prevention. Defining Adult Overweight and Obesity. Centers for Disease Control and Prevention website. <https://www.cdc.gov/obesity/adult/defining.html>. Last reviewed 6/3/22.]

³ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.
Amlodipine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=128>
Atorvastatin. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=312>
Fexofenadine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=210>
Azacyclonol. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=16>
Tamsulosin. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=285>
Albuterol. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=331>

⁴ The Office of The Medical Examiner reported the detection of desmethylycyclobenzaprine in the pilot's femoral blood. Desmethylycyclobenzaprine is a synonym for norcyclobenzaprine.

cyclobenzaprine is 5 to 40 ng/mL and its half-life averages around 18 hours.^{5,6} Cyclobenzaprine undergoes postmortem redistribution and central blood levels may be two and a half times higher than peripheral blood levels.⁷

Zolpidem is a sedative-hypnotic drug indicated for the short-term treatment of insomnia; it is commonly marketed as Ambien. The therapeutic range is between 80 and 160 ng/mL and it has a half-life between 1 and 5 hours. Zolpidem is a central nervous system depressant and carries the warning that adverse reactions may include drowsiness, prolonged reaction time, dizziness, blurred/double vision, reduced alertness, and impaired driving the morning after therapy.^{8,9} FAA requires a minimum waiting time of 24 to 36 hours after the last dose of zolpidem before resuming pilot duties.¹⁰

E. SUMMARY OF MEDICAL FACTS

The 57-year-old male pilot held a first class medical certificate with the limitation that he must have available glasses for near vision. At his most recent FAA medical examination on 5/27/22, he reported taking pantoprazole for gastric reflux, amlodipine and hydrochlorothiazide to treat high blood pressure, atorvastatin to treat high cholesterol, aspirin, zolpidem as a sleep aid, and fexofenadine to treat seasonal allergies. According to the autopsy report, the pilot's cause of death was blunt force injuries, and the manner of death was accident. The medical examiner reported the pilot had an enlarged heart (510 grams) with left ventricular thickening and was obese with a body mass index of 39.43 kilograms per meter squared.

Toxicology testing detected cyclobenzaprine at 8 ng/mL in the pilot's femoral blood and 41 ng/mL in his urine, norcyclobenzaprine at 15 ng/mL in his femoral blood and 59 ng/mL in his urine, and zolpidem at 9 ng/mL in his femoral blood and 12 ng/mL in his urine. The generally non-impairing substances amlodipine, atorvastatin, fexofenadine, azacyclonol, and tamsulosin were detected in the pilot's femoral blood and urine, and albuterol was detected only in his urine.

⁵ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.

Cyclobenzaprine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=133>

Norcyclobenzaprine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=372>

⁶ National Institutes of Health (NIH). U.S. National Library of Medicine (NLM). [DailyMed - CYCLOBENZAPRINE- cyclobenzaprine hydrochloride tablet, film coated \(nih.gov\)](#). Updated 12/30/19.

⁷ McIntyre, I. 2016. Analytical data supporting the "theoretical" postmortem redistribution fact (F_t): a new model to evaluate postmortem redistribution. *Forensic Sciences Research* 1(1):33-37. redistribution phenomena for commonly encountered drugs. *Forensic Sci Int.* 219(1-3):265-271.

⁸ NIH. NLM. Updated 4/14/22. [DailyMed - ZOLPIDEM TARTRATE tablet, film coated \(nih.gov\)](#)

⁹ 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.

¹⁰ FAA. 7/23/20. [Guide for Aviation Medical Examiners | Federal Aviation Administration \(faa.gov\)](#) Pharmaceuticals (Therapeutic Medications) Sleep Aids.

Submitted by:
Michelle Watters, MD, PhD, MPH
Medical Officer, RE-1