

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22LA061

MEDICAL

Specialist's Factual Report

November 2, 2022

A. ACCIDENT

Location: Bermuda Dunes, California
Date: December 11, 2021
Time: 12:30 Local
Airplane: MOUL WILLIS RV-3; N9YY

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 and FAA Forensic Sciences Laboratory toxicology reports,¹ and post-accident 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, at the time of the accident, the 83-year-old male pilot had a medical certificate that expired for all classes in November 2021. He had completed his BasicMed requirements on 3/31/21. At the time of the most recent FAA medical certification exam (10/7/19), the pilot was 70 inches tall and weighed 180 pounds. He reported having 5,000 total flight hours. He reported taking no medications or medical conditions. No significant medical concerns were identified, and he was issued a third class medical certificate without limitation.

¹ The FAA Forensic Sciences Laboratory has the capability to test for more than 1,300 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 Riverside County Sheriff's Department, Coroner-Public Administrator office, Indio, California, the pilot's cause of death was multiple traumatic injuries and the manner of death was accident. The forensic pathologist reported that the pilot had cardiomegaly (460 grams), left ventricular hypertrophy (2.3 centimeters), and 75% atherosclerosis in his right coronary artery.

3.0 Toxicology

Toxicology testing performed for the Riverside coroner's office did not detect ethanol or tested for drugs in the pilot's hospital blood.

Toxicology testing performed by the FAA Forensic Sciences Laboratory identified ketamine in the pilot's heart blood at 39 nanograms per milliliter (ng/mL); ketamine and its metabolite norketamine were detected in his urine. Fentanyl and its inactive metabolite norfentanyl were detected in his blood at 15 ng/mL and 0.1 ng/mL, respectively; both were also detected in his urine. Atropine was detected in his blood and urine. The impairing medication ketamine is an anesthetic and used for pain management; its therapeutic range is 100 to 2,200 ng/mL. Fentanyl is a narcotic pain medicine. Atropine is used to treat a slow heart rhythm.²

FAA Forensic Sciences Laboratory detected the nerve pain medication gabapentin in the pilot's blood at 6,142 ng/mL and in his urine at 87,010 ng/mL. The antihistamine doxylamine was detected in his blood at 412 ng/mL and in his urine. The erectile dysfunction medication sildenafil, its metabolite desmethylsildenafil, and the antibiotic trimethoprim were detected in his blood and urine, these three substances are generally considered non-impairing.³

Gabapentin, commonly marketed as Neurontin, is an antiseizure medication that is also used to treat chronic nerve pain and postherpetic neuralgia (shingles). It carries a warning that it "may cause dizziness, somnolence and other symptoms and signs of central nervous system depression" and patients should be advised not to operate complex machinery "until they have gained sufficient experience on

² 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>

Fentanyl. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=64>

Norfentanyl. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=362>

Atropine. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=15>

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

Sildenafil. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=219>

Desmethylsildenafil. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=136>

Trimethoprim. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=203>

gabapentin to assess whether gabapentin impairs their ability to perform such tasks.” The therapeutic range of gabapentin is 2,000 to 10,000 ng/mL. Gabapentin has a long half-life that ranges from 6.5 to 52 hours.^{4,5}

Doxylamine is a sedating antihistamine available over the counter to treat allergy symptoms or as a sleep aid. Its therapeutic range is 50 to 150 ng/mL, and it has a half-life of 6 to 12 hours.⁶ Doxylamine undergoes postmortem distribution and central blood levels may be two to four times higher than peripheral blood levels.⁷ FAA provides guidance on wait times before flying after using this medication; post-dose observation time is 60 hours and the medication is not for daily use.^{8,9}

4.0 Post-accident Medical Records

Post-accident hospital records were obtained for the pilot. The pilot arrived at the emergency room awake and in pain but with a poor prognosis. Ketamine had been administered to him enroute by paramedics for pain control. In the emergency room, he received fentanyl and atropine. He received multiple blood transfusions and was intubated. His hospital admission urine drug screen was negative for drugs of abuse and his admission blood ethanol was below reporting levels. According to the admission notes, the pilot had a history of high blood pressure. The pilot died approximately nine hours after the crash.

E. SUMMARY OF MEDICAL FACTS

The 83-year-old male pilot was on BasicMed (3/31/21); his FAA third class medical certificate which was issued without limitation expired in November 2021. At his most recent FAA medical certification examination (10/7/19), he reported taking no medications or medical conditions. According to the autopsy report, the pilot’s cause of death was multiple traumatic injuries and the manner of death was accident. The forensic pathologist reported that the pilot had cardiomegaly (460 grams), left

⁴ National Institutes of Health (NIH). U.S. National Library of Medicine (NLM). Updated 12/30/21. [DailyMed - GABAPENTIN capsule \(nih.gov\)](https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?id=20222)

⁵ FAA. Updated 1/16/19. Forensic Toxicology’s WebDrugs. Gabapentin. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=254>

⁶ FAA. Updated 1/16/19. Forensic Toxicology’s WebDrugs. Doxylamine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=53>

⁷ Han, E, E Kim, H Hong, S Jeong, J Kim, S In, H Chung, and S Lee. 2012 Evaluation of postmortem redistribution phenomena for commonly encountered drugs. *Forensic Sci Int.* 219(1-3):265-271.

⁸ FAA. 11/13/19. What over-the-counter (OTC) medications can I take and still be safe to fly? OK-20-0302 https://www.faa.gov/licenses_certificates/medical_certification/media/OTCMedicationsforPilots.pdf

⁹ FAA. 7/2/21. [AllergyAntihistamineImmunotherapyMedication.pdf \(faa.gov\)](https://www.faa.gov/licenses_certificates/medical_certification/media/AllergyAntihistamineImmunotherapyMedication.pdf)

ventricular hypertrophy (2.3 centimeters), and 75% atherosclerosis in his right coronary artery.

Toxicology testing detected ketamine, fentanyl, and atropine in the pilot's blood and/or urine. Hospital medical records show that these impairing medications were administered post-accident. The generally non-impairing medications sildenafil and trimethoprim were detected in his blood and urine. Gabapentin was detected in the pilot's blood at 6,142 ng/mL and in his urine. Doxylamine was detected in his blood at 412 ng/mL and in his urine. Toxicology testing performed for the coroner's office did not detect ethanol or tested for drugs in the pilot's hospital blood; his hospital admission urine drug screen was negative for drugs of abuse and his admission blood ethanol was below reporting levels.

According to post accident medical records, the pilot arrived at the emergency room awake and in pain but with a poor prognosis. He received multiple blood transfusions and was intubated. The pilot's past medical history included high blood pressure. The pilot died approximately nine hours after the crash.

Submitted by:

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