

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA22FA384

MEDICAL

Specialist's Factual Report

December 27, 2022

A. ACCIDENT

Location: Osteen, Florida
Date: 8/24/22
Time: 16:39 Local
Airplane: MXR Technologies MX2; N263MX

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 and pilot-rated passenger for medical conditions, the use of medications/illicit drugs, and the presence of toxins.

Methods

The Federal Aviation Administration (FAA) medical case review and the pilot's and the pilot-rated passenger's autopsy and FAA Forensic Sciences Laboratory toxicology reports¹ were reviewed. Other relevant medical and regulatory issues were reviewed.

D. FACTUAL INFORMATION

1.0 Pilot

1.1 FAA Medical Case Review

According to the FAA medical case review, at the time of the accident, the 61-year-old male pilot held a second class medical certificate with the limitation that it was not valid for night flying or by color signal control. At his most recent FAA medical certification examination on 6/2/21, he reported 1,342 total flight hours and was 74 inches tall and weighed 282 pounds. He reported taking no medications or having any medical conditions.

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/>

1.2 Autopsy

According to the autopsy report prepared by the Office of the Medical Examiner, District 7, Daytona Beach, Florida, the cause of death of the pilot was multiple blunt force injuries of the head, neck, torso, and extremities, and the manner of death was accident. The pilot was reported to have an enlarged heart (460 grams) with a dilated left ventricle. He was also described as obese with a body mass index of 37.23 kilograms per square meter (height 71 inches, weight 267 pounds). The pilot had evidence of prior surgery with an adjustable gastric band.

1.3 Toxicology

Toxicology testing performed for the medical examiner was negative for ethanol and tested-for drugs of abuse in the pilot's iliac blood. Toxicology testing performed by the FAA Forensic Sciences Laboratory detected chlorpheniramine in the pilot's blood at 17 nanograms per milliliter (ng/mL). Hydrocodone, hydromorphone, and dihydrocodeine were detected in the pilot's urine at 17 ng/mL, 37 ng/mL, and 16 ng/mL, respectively; these three substances were not detected in the pilot's blood.

Chlorpheniramine is a sedating antihistamine available over the counter to treat allergy or common cold symptoms. The therapeutic range is 10 to 40 ng/mL, and it has a half-life of 12 to 43 hours.² Chlorpheniramine undergoes postmortem redistribution and central blood levels may be two to three times higher than peripheral blood levels.³ 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.⁴

Hydrocodone is a semisynthetic opioid analgesic indicated for use often in combination with acetaminophen to treat moderate to severe pain; one commonly marketed combination is Vicodin. The therapeutic range is between 10 and 50 ng/mL. *Dihydrocodeine* is a commonly found active metabolite of hydrocodone, with an average concentration in blood about 29% of the hydrocodone value. *Hydromorphone* is also an active metabolite of hydrocodone. As an opioid, hydrocodone carries a warning for its high risk of addiction, abuse, and misuse. Adverse reactions on the central nervous system from hydrocodone include drowsiness, mental clouding, anxiety, and impairment of mental and physical

² FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Chlorpheniramine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=29>

³ 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.

⁴ FAA. Updated 10/26/22. [AllergyAntihistamineImmunotherapyMedication.pdf \(faa.gov\)](#)

performance. Dihydrocodeine and hydromorphone have similar warnings and adverse reactions as hydrocodone.^{5,6,7,8}

2.0 Pilot-rated Passenger

2.1 FAA Medical Case Review

According to the FAA medical case review, at the time of the accident, the 34-year-old male pilot-rated passenger was reportedly a member of the Peruvian Air Force. No FAA medical records related to this individual were available.

2.2 Autopsy

According to the autopsy report prepared for the Office of the Medical Examiner, District 7, Daytona Beach, Florida, the cause of death of the pilot-rated passenger was multiple blunt force injuries of the head, neck, torso, and extremities and the manner of death was accident. Early decomposition was reported. The body weighed 180 pounds and was 67 inches long. No significant natural disease was identified by the pathologist.

2.3 Toxicology

Toxicology testing performed for the medical examiner detected ethanol at 0.019 grams per deciliter (gm/dL) in the pilot-rated passenger's cavity blood. Toxicology testing performed by the FAA Forensic Sciences Laboratory detected ethanol in his cavity blood at 0.024 gm/dL and his urine at 0.012 gm/dL. N-propanol was also detected in his cavity blood and urine. Ethanol and n-propanol were not detected in the pilot-rated passenger's vitreous fluid. No other tested-for drugs were detected in his urine.

Ethanol is a social drug commonly consumed by drinking beer, wine, or liquor. It acts as a central nervous system depressant; it impairs judgment, psychomotor functioning, and vigilance. Ethanol is water soluble, and after absorption it quickly and uniformly distributes throughout the body's tissues and fluids. The distribution

⁵ NIH. NLM. Updated 3/31/21. [DailyMed - HYDROCODONE BITARTRATE capsule, extended release \(nih.gov\)](#)

⁶ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs.

Hydrocodone. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=73>

Dihydrocodeine. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=48>

Hydromorphone. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=74>

⁷ Saitman, A, RL Fitzgerald, IM McIntyre. 2015. Evaluation and comparison of postmortem hydrocodone concentrations in peripheral blood, central blood and liver specimens: A minimal potential for redistribution. *Forensic Science International* 247:36-40.

⁸ Cardia, L, G Calapai, D Quattrone, C Mondello, V Arcoraci, F Calapai, C Mannucci, E Mondello. 2018. Preclinical and clinical pharmacology of hydrocodone for chronic pain: A mini review. *Frontiers in Pharmacology* 9:1122. doi: [10.3389/fphar.2018.01122](https://doi.org/10.3389/fphar.2018.01122)

pattern parallels water content and blood supply of the tissue. A small amount of ethanol can be produced after death by microbial activity, sometimes in conjunction with other alcohols such as *propanol*. Vitreous humor, and to a lesser extent urine, does not suffer from postmortem production to any significant extent.^{9,10,11} Extensive trauma increases the spread of bacteria and raises the risk of ethanol production after death.¹²

E. SUMMARY OF MEDICAL FACTS

The 61-year-old male pilot held a second class medical certificate with the limitation that it was not valid for night flying or by color signal control. At his most recent FAA medical certification examination on 6/2/21, he reported taking no medications or having any medical conditions. According to the autopsy report, the cause of death of the pilot was multiple blunt force injuries of the head, neck, torso, and extremities, and the manner of death was accident. The pilot was reported to have an enlarged heart (460 grams) and to be obese and weigh 267 pounds. Toxicology testing detected chlorpheniramine in the pilot's blood at 17 nanograms per milliliter (ng/mL). Hydrocodone, hydromorphone, and dihydrocodeine were detected in the pilot's urine at 17 ng/mL, 37 ng/mL, and 16 ng/mL, respectively.

The 34-year-old male pilot-rated passenger was reportedly a member of the Peruvian Air Force. According to the autopsy report, the cause of death of the pilot-rated passenger was multiple blunt force injuries of the head, neck, torso, and extremities and the manner of death was accident. The body weighed 180 pounds. No significant natural disease was identified by the pathologist. Toxicology testing detected ethanol at 0.019 and 0.024 gm/dL in the pilot-rated passenger's cavity blood and at 0.012 gm/dL in his urine. N-propanol was detected in his cavity blood and urine. Ethanol and n-propanol were not detected in the pilot-rated passenger's vitreous fluid.

Submitted by:

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⁹ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Ethanol.
<http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60>

¹⁰ Canfield, DV, TC Kupiec, and EF Huffine. July 1992. Postmortem alcohol production in fatal aircraft accidents. U.S. Department of Transportation. FAA. Washington, D.C. Report # DOT/FANAM-92/24.

¹¹ Ioan, BG, V Jitaru, R Damian, and SI Damian. 2015. Study on the relationship between the concentration of ethanol in the blood, urine, and vitreous humor. *Rom J. Leg Med* 23:211-216.

¹² Kugelberg, FC and AW Jones. 2007. Interpreting results of ethanol analysis in postmortem specimens: a review of the literature. *Forensic Science International* 165(1):10-29.