

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22FA131

MEDICAL

Specialist's Factual Report

March 8, 2023

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A. ACCIDENT

Location: Fostoria, Ohio

Date: February 22, 2022

B. MEDICAL SPECIALIST

Specialist Turan Kayagil, MD, FACEP
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

1.0 Purpose

This investigation was performed to evaluate the pilot and copilot for medical conditions, the use of substances, and the presence of toxins.

2.0 Methods

The Federal Aviation Administration (FAA) medical case review and the autopsy and toxicology reports for the pilot and copilot were reviewed. Selected National Transportation Safety Board (NTSB) investigator reports and relevant regulation and medical literature were also reviewed.

D. FACTUAL INFORMATION

1.0 Pilot

1.1 FAA Medical Case Review

According to the FAA medical case review, the 59-year-old male pilot had his last aviation medical examination on May 10, 2021. At that time, he reported 1010 total civilian flight hours. He was 70 inches tall and weighed 225 pounds. He reported using the medications niacin (a vitamin that is available over the counter and that can be used as a dietary supplement or to help control cholesterol), fenofibrate (a prescription medication that can be used to help lower triglycerides and control cholesterol), and lisinopril (a prescription medication commonly used to treat high blood pressure). These medications are not generally considered impairing. The pilot reported a history of high blood pressure qualified under Conditions Aviation Medical Examiners Can Issue (CACI) criteria. No significant issues were identified, and the pilot was issued a second-class medical certificate limited by a requirement to wear corrective lenses.

1.2 Autopsy

The Lucas County Coroner's Office performed the pilot's autopsy, at the request of the Coroner of Seneca County. According to the autopsy report, the pilot's cause of death was multiple traumatic injuries and his manner of death was accident. The autopsy examination was somewhat limited by the extent of traumatic injury, with the brain unavailable for examination. Within this limitation, the autopsy did not identify significant natural disease.

1.3 Toxicology

1.3.1 Coroner Toxicology Results

The Lucas County Coroner's Office Forensic Toxicology Laboratory performed toxicological testing of postmortem liver fluid and urine from the pilot. Ethanol was detected at 0.21 g/dL in liver fluid. Ethanol was not detected in urine. Diphenhydramine was detected at 0.210 mg/L in liver fluid and 2.652 mg/L in urine.

1.3.2 FAA Toxicology Results

The FAA Forensic Sciences laboratory also performed toxicological testing of postmortem specimens from the pilot.¹ Diphenhydramine was detected in liver and muscle. Doxylamine was detected in muscle; the liver specimen was unsuitable for reporting a doxylamine result. Dextromethorphan was detected in liver and muscle, and the dextromethorphan metabolite dextrorphan was detected in liver (not in muscle). Ethanol was not detected in liver or muscle.² No blood was available for FAA testing.

1.3.3 Descriptions of Detected Substances

Ethanol is a type of alcohol. It is the intoxicating alcohol in beer, wine, and liquor, and, if consumed, can impair judgment, psychomotor performance, cognition, and vigilance.³ FAA regulation imposes strict limits on flying after consuming ethanol, including prohibiting pilots from flying with a blood ethanol level of 0.04 g/dL or greater.⁴ However, consumption is not the only possible source of ethanol in postmortem specimens. Ethanol can be produced by microbes in a person's body

¹ The FAA Forensic Sciences laboratory has the capability to test for around a thousand substances including toxins, prescription and over-the-counter medications, and illicit drugs. Some of these substances are listed at <https://jag.cami.jccbi.gov/toxicology>.

² According to an e-mail from an FAA Forensic Toxicologist, the FAA uses a 0.01 g/dL reporting cutoff for ethanol.

³ Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

⁴ [14 Code of Federal Regulations § 91.17](#).

after death. Postmortem ethanol production is made more likely by extensive traumatic injury and can cause an affected toxicological specimen to test positive for ethanol while another specimen from the same person tests negative.⁵

Diphenhydramine is a sedating antihistamine medication available over the counter in multiple cold and allergy products and sleep aids. Doxylamine is another sedating antihistamine medication that is available over the counter as a sleep aid and as an ingredient in various cold and allergy products. Sedating antihistamines can cause cognitive and psychomotor slowing and drowsiness, and products containing sedating antihistamines often carry warnings that they may impair performance of tasks like driving and operating heavy machinery.⁶⁻¹⁰ The FAA states that pilots should not fly within 60 hours of using diphenhydramine or doxylamine, to allow time for the drugs to be cleared from circulation.^{11,12}

Dextromethorphan is a cough suppressant medication that is available over the counter in a variety of cold and allergy products.^{13,14} Dextrophan is the main

⁵ Kugelberg FC, Jones AW. Interpreting results of ethanol analysis in postmortem specimens: a review of the literature. *Forensic Sci Int.* 2007;165(1):10-29. doi:10.1016/j.forsciint.2006.05.004.

⁶ National Institutes of Health National Library of Medicine. Benadryl Allergy Liqui-Gels. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=bfeae100-e2d1-4607-be3b-2d9b15cd4f7f>. Updated November 10, 2022. Accessed March 1, 2023.

⁷ National Institutes of Health National Library of Medicine. Unisom SleepTabs. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f591d52f-5610-4517-a96f-1ed63deb00bc>. Updated May 2, 2018. Accessed March 1, 2023.

⁸ Couper FJ, Logan BK. *Drugs and Human Performance Fact Sheets*. National Highway Traffic Safety Administration. DOT HS 809 725. April 2014 (Revised). <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>. Accessed March 1, 2023.

⁹ Moskowitz H, Wilkinson CJ. *Antihistamines and Driving-Related Behavior: A Review of the Evidence for Impairment*. National Highway Traffic Safety Administration. DOT HS 809 714. May 2004. <https://www.nhtsa.gov/sites/nhtsa.gov/files/antihistamines20text.pdf>. Accessed March 1, 2023.

¹⁰ Gildea KM, Hileman CR, Rogers P, Salazar GJ, Paskoff LN. *Antihistamines and Fatal Aircraft Mishaps in Instrument Meteorological Conditions*. Federal Aviation Administration. DOT/FAA/AM-18/09. <https://rosap.ntl.bts.gov/view/dot/57211>. July 2018. Accessed March 1, 2023.

¹¹ Federal Aviation Administration. Guide for aviation medical examiners: pharmaceuticals (therapeutic medications) do not issue - do not fly. Federal Aviation Administration website. <https://www.faa.gov/go/dni>. Updated February 21, 2019. Accessed March 1, 2023.

¹² Federal Aviation Administration. Allergy - antihistamine & immunotherapy medication. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/AllergyAntihistamineImmunotherapyMedication.pdf. Updated July 28, 2021. Accessed March 1, 2023.

¹³ National Institutes of Health National Library of Medicine. Robitussin 12 Hour Cough Relief. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5d12a1b8-f1fb-41ca-9a4f-0595a585cbb5>. Updated January 14, 2023. Accessed March 1, 2023.

¹⁴ National Institutes of Health National Library of Medicine. All Nite. DailyMed.

active metabolite of dextromethorphan. Dextromethorphan and dextrorphan are not typically impairing at levels associated with medicinal dextromethorphan use.⁸ The FAA states that pilots who use dextromethorphan should observe a waiting period for the drug to be cleared from circulation before flying.¹⁵

2.0 Copilot

2.1 FAA Medical Case Review

According to the FAA medical case review, the 51-year-old male copilot had his last aviation medical examination on January 10, 2022. At that time, he reported 6500 total civilian flight hours. He was 68 inches tall and weighed 179 pounds. He reported no medication use or active medical conditions. No significant issues were identified, and the copilot was issued a first-class medical certificate without limitation.

2.2 Autopsy

The Lucas County Coroner's Office performed the copilot's autopsy, at the request of the Coroner of Seneca County. According to the autopsy report, the copilot's cause of death was multiple traumatic injuries and his manner of death was accident. The autopsy examination was somewhat limited by the extent of traumatic injury, with the brain unavailable for examination. Within this limitation, the autopsy did not identify significant natural disease.

2.3 Toxicology

2.3.1 Coroner Toxicology Results

The Lucas County Coroner's Office Forensic Toxicology Laboratory performed toxicological testing of postmortem liver fluid from the copilot, detecting ethanol at 0.03 g/dL.

2.3.2 FAA Toxicology Results

The FAA Forensic Sciences laboratory also performed toxicological testing of postmortem specimens from the copilot. No tested-for drugs were detected in liver.¹

<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=945a4068-3630-4f1d-b794-d2f1603af285>. Updated December 19, 2018. Accessed March 1, 2023.

¹⁵ Federal Aviation Administration. Pilot information – Over-the-counter medications. Federal Aviation Administration website. https://www.faa.gov/pilots/medical_certification/medications. Updated November 9, 2022. Accessed March 1, 2023.

Ethanol was not detected in liver or muscle.² There was no blood available for FAA testing.

2.3.3 Description of Detected Substance

Ethanol is described in section D.1.3.3 above.

E. SUMMARY OF MEDICAL FACTS

1.0 Pilot

The 59-year-old male pilot had his last aviation medical examination on May 10, 2021. At that time, he reported using the medications niacin, fenofibrate, and lisinopril. He reported a history of high blood pressure qualified under Conditions Aviation Medical Examiners Can Issue (CACI) criteria. No significant issues were identified, and the pilot was issued a second-class medical certificate limited by a requirement to wear corrective lenses.

According to the pilot's autopsy report, his cause of death was multiple traumatic injuries and his manner of death was accident. His autopsy examination was somewhat limited by the extent of traumatic injury, with his brain unavailable for examination. Within this limitation, the pilot's autopsy did not identify significant natural disease.

The Lucas County Coroner's Office Forensic Toxicology Laboratory performed toxicological testing of postmortem liver fluid and urine from the pilot. Ethanol was detected at 0.21 g/dL in liver fluid. Ethanol was not detected in urine. Diphenhydramine was detected in liver fluid and urine.

The FAA Forensic Sciences laboratory also performed toxicological testing of postmortem specimens from the pilot. Diphenhydramine was detected in liver and muscle. Doxylamine was detected in muscle; the liver specimen was unsuitable for reporting a doxylamine result. Dextromethorphan was detected in liver and muscle, and the dextromethorphan metabolite dextrorphan was detected in liver. Ethanol was not detected in liver or muscle.

2.0 Copilot

The 51-year-old male copilot had his last aviation medical examination on January 10, 2022. At that time, he reported no medication use or active medical conditions. He was issued a first-class medical certificate without limitation.

According to the copilot's autopsy report, his cause of death was multiple traumatic injuries and his manner of death was accident. His autopsy examination was somewhat limited by the extent of traumatic injury, with his brain unavailable for examination. Within this limitation, the copilot's autopsy did not identify significant natural disease.

The Lucas County Coroner's Office Forensic Toxicology Laboratory performed toxicological testing of postmortem liver fluid from the copilot, detecting ethanol at 0.03 g/dL.

The FAA Forensic Sciences laboratory also performed toxicological testing of postmortem specimens from the copilot. No tested-for drugs were detected in liver. Ethanol was not detected in liver or muscle.

Submitted by:

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