

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



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MEDICAL

Specialist's Factual Report

December 6, 2024

TABLE OF CONTENTS

A. ACCIDENT.....	3
B. MEDICAL SPECIALIST.....	3
C. DETAILS OF THE INVESTIGATION	3
1.0 PURPOSE	3
2.0 METHODS.....	3
D. FACTUAL INFORMATION.....	3
1.0 FAA MEDICAL CASE REVIEW.....	3
2.0 AUTOPSY	3
3.0 TOXICOLOGY	4
3.1 Autopsy Toxicology.....	4
3.2 FAA Toxicology	4
3.3 Descriptions of Detected Substances	4
E. SUMMARY OF MEDICAL FACTS.....	6

A. ACCIDENT

Location: Bainbridge, Georgia
Date: July 4, 2024

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 for potentially impairing or incapacitating medical conditions, substances, and exposures.

2.0 Methods

The final Federal Aviation Administration (FAA) medical case review and the pilot's autopsy and toxicology reports were reviewed. Selected investigator reports and relevant regulation and medical literature were also reviewed.

D. FACTUAL INFORMATION

1.0 FAA Medical Case Review

The 54-year-old male pilot, who did not hold a pilot certificate, had not applied for FAA medical certification.

2.0 Autopsy

The Georgia Bureau of Investigation Division of Forensic Sciences Office of the Medical Examiner performed the pilot's autopsy for the Decatur County Coroner. According to the pilot's autopsy report, his cause of death was fire trauma and his manner of death was accident. Severe coronary artery disease was present, including blockage of the midportion of the right coronary artery by an old blood clot (organizing thrombus), as well as 90% narrowing of the midportion of the left anterior descending coronary artery by plaque, and 90% narrowing of the proximal portion of the left circumflex coronary artery by plaque. The heart muscle had scarring, consistent with old damage from inadequate blood supply, extending along the mid posterior left ventricular wall to include the posterior intraventricular septum.

Coronary circulation was right-dominant. The heart was described as large, all four heart chambers were described as dilated, and the cardiac valve leaflets were slightly thickened by atherosclerotic disease. Diffuse moderate emphysematous changes of the lungs were present. The liver was described as fatty and large. No other significant natural disease was identified. No airway soot, no significant decomposition, and no major injuries apart from the fire trauma were identified.

3.0 Toxicology

3.1 Autopsy Toxicology

The pilot's autopsy report documented that a urine drug screen was performed at autopsy and that this screen was positive for ethyl glucuronide (EtG), methamphetamine, and amphetamine. The autopsy report also documented a negative blood test for carboxyhemoglobin.

The Georgia Bureau of Investigation Division of Forensic Sciences Toxicology Section performed postmortem toxicological testing of iliac blood from the pilot. Ethanol was detected at 0.117 g/dL. Methamphetamine was detected at 140 ng/mL and amphetamine was detected at 31 ng/mL.

3.2 FAA Toxicology

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the pilot. Ethanol was detected at 0.101 g/dL in blood, at 0.118 g/hg in brain tissue, and at 0.053 g/hg in liver tissue.¹ Methamphetamine was detected at 268 ng/mL in blood and at 1253 ng/g in liver tissue. Amphetamine was detected at 62 ng/mL in blood and at 305 ng/g in liver tissue. Desmethylsildenafil was detected in liver tissue and was not detected in blood.

3.3 Descriptions of Detected Substances

Ethanol is the intoxicating alcohol in beer, wine, and liquor, and, if consumed, can impair judgment, psychomotor performance, cognition, and vigilance, with detrimental effects on piloting tasks that worsen as ethanol levels increase.² FAA regulation imposes strict limits on flying after consuming ethanol, including a prohibition on piloting a civil aircraft while having a blood ethanol level of 0.04 g/dL or greater.³ When absorbed into circulation after alcohol consumption, ethanol

¹ In tissue, concentrations in g/hg are approximately equivalent to concentrations in g/dL. The collection site of the blood tested by the FAA was not specified. The autopsy report documented that blood collection from femoral and central venous sites occurred.

² Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

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

distributes relatively evenly throughout the body along with water. Various factors may affect ethanol levels measured in postmortem specimens. For example, there is some potential for ethanol in liver tissue to decrease after death due to residual enzymatic activity. Ethanol may also sometimes be produced by microbes in a person's body after death, potentially affecting some postmortem specimens but not others; this is made more likely by extensive traumatic injuries.⁴

EtG is a minor metabolite of ethanol. EtG is not produced to a significant degree by postmortem microbial activity, so EtG detected on postmortem toxicological testing is an indicator of antemortem ethanol consumption. In a living person, EtG can remain detectable in urine for many hours after consumed ethanol is eliminated. Detection of EtG on postmortem testing does not exclude a postmortem source of any detected ethanol.⁴

Methamphetamine is a central nervous system stimulant drug. Amphetamine is a metabolite of methamphetamine and is also a central nervous system stimulant. Both methamphetamine and amphetamine are available as federal Schedule II controlled substance prescription medications used to treat attention deficit hyperactivity disorder, narcolepsy, and occasionally obesity. As medicines, the drugs typically carry warnings that they may impair the ability to engage in potentially hazardous activities. Methamphetamine also carries a warning that misuse may cause serious cardiovascular adverse events.^{5,6} The FAA considers methamphetamine and amphetamine to be "Do Not Issue/Do Not Fly" medications.⁷

In addition to being used medicinally, methamphetamine and amphetamine are frequently produced illicitly and abused recreationally by ingestion, snorting, smoking, rectal insertion, or injection. Seeking an intense euphoric effect, people who abuse methamphetamine typically use higher doses than are used medicinally. In living people, methamphetamine blood concentrations of 20-50 ng/mL are typical with medicinal use, while methamphetamine blood concentrations over 200 ng/mL

⁴ 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.

⁵ National Institutes of Health National Library of Medicine. Methamphetamine hydrochloride. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f31f580f-1f08-4a0f-b078-0b9e3308f712>. Updated July 5, 2023. Accessed December 6, 2024.

⁶ National Institutes of Health National Library of Medicine. Amphetamine sulfate. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=79b9db39-7cdc-5607-f0ce-ac2a2cfd59d5>. Updated June 8, 2023. Accessed December 6, 2024.

⁷ 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/ame_guide/pharm/dni_dnf. Updated July 10, 2023. Accessed December 6, 2024.

generally represent abuse.⁸ Methamphetamine can undergo postmortem redistribution.⁹

At low doses used as part of appropriate medical treatment, methamphetamine and amphetamine may improve reaction time, cognitive function, and fatigue, but may cause people to make higher-risk choices. At higher doses, the drugs may have a variety of impairing effects on psychomotor function, cognition, and perception. Impairment related to methamphetamine or amphetamine use can result from drug or withdrawal effects, with features of central nervous system stimulation or central nervous system depression. A measured methamphetamine level does not indicate whether a person is experiencing early- or late-phase effects.⁸

Desmethylsildenafil is an active metabolite of sildenafil (which was not detected in this case). Sildenafil is a prescription medication commonly used to treat erectile dysfunction, as a sexual enhancement aid, or in the treatment of certain other conditions, including pulmonary hypertension. Sildenafil is not typically impairing, although the FAA states that pilots should wait 8 hours after using it before flying, to monitor for side effects.¹⁰

E. SUMMARY OF MEDICAL FACTS

The 54-year-old male non-certificated pilot had not applied for FAA medical certification. According to the pilot's autopsy report, his cause of death was fire trauma and his manner of death was accident. Severe coronary artery disease was present, including blockage of the right coronary artery by an old blood clot, as well as 90% narrowing of the left anterior descending and left circumflex coronary arteries by plaque. The heart muscle had scarring consistent with old damage from inadequate blood supply. The heart was described as large with dilated chambers and slight atherosclerotic valvular disease. Diffuse moderate emphysematous changes of the lungs were present. The liver was described as fatty and large. No other significant natural disease was identified. No airway soot, no significant decomposition, and no major injuries apart from the fire trauma were identified.

A urine drug screen performed at the pilot's autopsy was positive for ethyl glucuronide, methamphetamine, and amphetamine. Postmortem toxicological

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 December 6, 2024.

⁹ Baselt RC. *Disposition of Toxic Drugs and Chemicals in Man*. 11th ed. Biomedical Publications; 2017.

¹⁰ Federal Aviation Administration. Pharmaceuticals (therapeutic medications) erectile dysfunction and benign prostatic hyperplasia medications. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/pharm/ed/. Updated August 25, 2017. Accessed December 6, 2024.

testing of iliac blood performed by the Georgia Bureau of Investigation detected ethanol at 0.117 g/dL, methamphetamine at 140 ng/mL, and amphetamine at 31 ng/mL. Postmortem toxicological testing performed by the FAA Forensic Sciences Laboratory detected ethanol at 0.101 g/dL in blood, at 0.118 g/hg in brain tissue, and at 0.053 g/hg in liver tissue. Methamphetamine was detected at 268 ng/mL in blood and at 1253 ng/g in liver tissue. Amphetamine was detected at 62 ng/mL in blood and at 305 ng/g in liver tissue. Desmethyisildenafil was detected in liver tissue and was not detected in blood.

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