

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22FA215

MEDICAL

Specialist's Factual Report

May 23, 2023

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A. ACCIDENT

Location: Buckeye, Arizona
Date: June 18, 2022
Time: About 06:55 local time

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 student pilot and the flight instructor (CFI) for potentially impairing medical conditions and potentially impairing substances.

2.0 Methods

The Federal Aviation Administration (FAA) medical case review and the autopsy and toxicology reports of the student pilot and CFI were reviewed. Records from the CFI's post-crash medical treatment, selected investigator reports, and relevant regulation and medical literature were also reviewed.

D. FACTUAL INFORMATION

1.0 Student Pilot

1.1 FAA Medical Case Review

According to the FAA medical case review, the 56-year-old male student pilot had his only aviation medical examination on January 31, 2022. At that time, he reported 0 total civilian flight hours. He was 72 inches tall and weighed 270 pounds. He reported no medication use or significant medical history. No significant issues were identified, and he was issued a third-class medical certificate without limitation.

1.2 Autopsy

The Maricopa County Office of the Medical Examiner performed the student pilot's autopsy. According to the student pilot's autopsy report, his cause of death

was blunt force injuries and his manner of death was accident. His heart was described as enlarged, with a slightly dilated shape. His heart weight was 625 grams (upper limit of normal is roughly 570 grams for a male of body weight 270 pounds), his left cardiac ventricular wall thickness was 1.5 cm (normal is roughly 0.9 cm to 1.6 cm), his right cardiac ventricular wall thickness was 0.3 cm (normal is roughly 0.2 cm to 0.6 cm), and his cardiac intraventricular septal thickness was 1.4 cm (normal is roughly 0.9 to 1.8 cm).¹ His right coronary artery had up to 25% narrowing by plaque. Visual examination of his heart was otherwise unremarkable for natural disease. The remainder of his autopsy did not identify other significant natural disease.

1.3 Toxicology

1.3.1 NMS Labs Toxicology Results

At the request of the Coroner's Office, NMS Labs performed toxicological testing of postmortem pleural cavity blood from the student pilot. No tested-for substances were detected.²

1.3.2 FAA Toxicology Results

The FAA Forensic Sciences laboratory also performed toxicological testing of postmortem specimens from the student pilot.³ Phentermine was detected in cavity blood and urine.

1.3.3 Description of Detected Substance

Phentermine is a prescription weight loss medication. It is the most frequently prescribed medication for weight loss in the United States. It is a Schedule IV controlled substance under federal law, with some potential for abuse. It may sometimes be associated with adverse cardiovascular effects including increased blood pressure, rapid or irregular heartbeat, or heart attack. Side effects of phentermine may include insomnia, nervousness, and dizziness. Uncommonly, more-extreme side effects such as psychosis may occur. The drug typically carries a warning that it may impair the ability to engage in potentially hazardous activities such as

¹ Kitzman DW, Scholz DG, Hagen PT, Ilstrup DM, Edwards WD. Age-related changes in normal human hearts during the first 10 decades of life. Part II (maturity): a quantitative anatomic study of 765 specimens from subjects 20 to 99 years old. *Mayo Clin Proc.* 1988;63(2):137-146. doi:10.1016/s0025-6196(12)64946-5.

² Tested-for substances are listed on the NMS Labs website at [Test Code 8041B](#). Additionally, carboxyhemoglobin testing was performed.

³ The FAA Forensic Sciences laboratory has the capability to test for around a thousand substances including illicit drugs, prescription and over-the-counter medications, and toxins. Some of these substances are listed at <https://jag.cami.jccbi.gov/toxicology>.

operating machinery or driving a motor vehicle.^{4,5} The FAA considers phentermine to be a “do not issue/do not fly” medication.⁶

2.0 Flight Instructor

2.1 FAA Medical Case Review

According to the FAA medical case review, the 32-year-old male CFI had his only aviation medical examination on December 13, 2019. At that time, he reported 0 total civilian flight hours. He was 72 inches tall and weighed 193 pounds. He reported a history of seasonal/environmental allergies treated with allergen immunotherapy (allergy desensitization shots). No significant issues were identified and the CFI was issued a first-class medical certificate limited by a requirement to wear corrective lenses.⁷

2.2 Post-Crash Treatment Records

According to reviewed hospital records from the CFI’s post-crash medical care, the CFI initially received care on-scene by ground emergency medical services. An air ambulance crew was dispatched at 07:23, assumed care at 07:51, and transported the CFI to a hospital trauma center, arriving at 08:31. The CFI was intubated prior to hospital arrival. Once inside the hospital emergency department, the CFI was evaluated and treated by the hospital trauma team. The CFI was critically ill from his injuries. Despite aggressive treatment, he experienced cardiac arrest at 09:19 and 09:57; he was resuscitated each time. He underwent emergency surgery and massive transfusion. However, attempts to stabilize his condition were unsuccessful, and further resuscitation was determined to be futile. The CFI passed away in the operating room at 12:36. According to the operative note, he had lost over 11.5 L of blood, had received 40 units of blood and 30 units of plasma as part of massive transfusion protocols, and had received 9 L of intravenous crystalloid fluids.

⁴ National Institutes of Health National Library of Medicine. Adipex-P. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f5b2f9d8-2226-476e-9caf-9d41e6891c46>. Updated September 1, 2020. Accessed May 17, 2023.

⁵ Perreault L. Obesity in adults: drug therapy. In: Post TW, ed. *UpToDate*. Waltham, MA: UpToDate Inc. <https://www.uptodate.com/contents/obesity-in-adults-drug-therapy>. Updated October 6, 2022. Accessed May 17, 2023.

⁶ 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 March 8, 2023. Accessed May 17, 2023.

⁷ As of the accident date, by [FAA regulation](#), the CFI’s medical certificate had expired for operations requiring first- or second-class medical certification, but had not expired for operations requiring third-class medical certification (including exercising privileges of a private pilot certificate, or of a flight instructor certificate when acting as pilot in command or a required pilot flight crewmember in operations other than glider or balloon).

2.3 Autopsy

The Maricopa County Office of the Medical Examiner performed the CFI's autopsy. According to the CFI's autopsy report, his cause of death was blunt force and thermal injuries and his manner of death was accident. His autopsy did not identify any significant natural disease.

2.4 Toxicology

Because the CFI received a large amount of donated blood products before his death, toxicological results in his postmortem specimens were not considered useful for this investigation.⁸ Donated blood may contain drugs. The screening routinely performed on donated blood does not test for drugs.⁹

According to the CFI's autopsy report, the Office of the Medical Examiner did not request toxicological testing of the CFI due to insufficient antemortem specimen.

The only antemortem specimen from the CFI that underwent toxicological testing was a hospital blood specimen collected at 09:10 on the accident date. This specimen underwent a hospital screening test for ethanol (the intoxicating alcohol in beer, wine, and liquor), which detected ethanol at the low level of 0.01 g/dL. The test result was marked in the hospital record with the disclaimer, "This test is to be used for medical purposes only." Because the ethanol test was performed for medical (not forensic) purposes, no secondary testing was performed to confirm the ethanol result. Additionally, hospital records indicate that the CFI was critically ill from his injuries at the time that the tested specimen was collected (minutes before cardiac arrest), with a high lactic acid (11.3 mmol/L, compared to a normal reference range of 0.7 to 1.9 mmol/L) and extensive tissue damage. Under such circumstances, hospital ethanol testing (performed using an enzymatic method that differs from typical forensic ethanol testing) might produce a false-positive ethanol result.¹⁰ As such, the CFI's ethanol result must be interpreted cautiously.

⁸ The FAA Forensic Sciences laboratory did perform toxicological testing on postmortem specimens from the CFI, and the report of that testing is contained in the docket for this investigation. Multiple medications/metabolites of unconfirmed origin were detected in liver tissue and cavity blood. Detected fentanyl (a pain medication) and ketamine (an anesthetic medication), and their respective metabolites norfentanyl and norketamine, were attributable to medications administered during post-crash medical care, as documented in hospital records. Glucose was elevated in vitreous; hospital records confirmed that high blood glucose was part of the CFI's post-crash metabolic disturbance associated with his critical injury.

⁹ Centers for Disease Control and Prevention. Blood safety basics. Centers for Disease Control and Prevention website. <https://www.cdc.gov/bloodsafety/basics.html>. Updated August 30, 2022. Accessed May 17, 2023.

¹⁰ Bishop-Freeman SC, Bertholf RL, Powers RH, Mayhew LC, Winecker RE. False-positive enzymatic alcohol results in perimortem specimens. *Lab Med*. 2020;51(4):394-401. doi:10.1093/labmed/lmz082.

E. SUMMARY OF MEDICAL FACTS

1.0 Student Pilot

The 56-year-old male student pilot had his only aviation medical examination on January 31, 2022. At that time, he reported no medication use or significant medical history. He was issued a third-class medical certificate without limitation. According to the student pilot's autopsy report, his cause of death was blunt force injuries and his manner of death was accident. His heart was enlarged and was described as having a slightly dilated shape. His right coronary artery had mild narrowing by plaque. The remainder of his autopsy did not identify other significant natural disease. Toxicological testing of postmortem specimens from the student pilot detected phentermine in cavity blood and urine.

2.0 Flight Instructor

The 32-year-old male flight instructor (CFI) had his only aviation medical examination on December 13, 2019. At that time, he reported a history of seasonal/environmental allergies treated with allergen immunotherapy. No significant issues were identified and he was issued a first-class medical certificate limited by a requirement to wear corrective lenses.

After the crash, the CFI was transported by air ambulance to a hospital trauma center. He was critically ill from his injuries and was resuscitated from cardiac arrest twice. He underwent emergency surgery and massive transfusion but did not stabilize. He passed away in the operating room.

According to the CFI's autopsy report, his cause of death was blunt force and thermal injuries and his manner of death was accident. His autopsy did not identify significant natural disease. Because the CFI received a large amount of donated blood products before his death, toxicological results in his postmortem specimens were not considered useful for this investigation. The CFI's only antemortem toxicological testing was a hospital blood ethanol screening test collected at 09:10 on the accident date. This screening test detected ethanol at 0.01 g/dL. No secondary testing was performed to confirm the ethanol result. Hospital records indicate that the CFI had a high lactic acid and extensive tissue damage. Under such circumstances, hospital ethanol testing might produce a false-positive ethanol result, and must be interpreted cautiously.

Submitted by:

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