

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22FA354

MEDICAL

Specialist's Factual Report

September 27, 2023

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A. ACCIDENT

Location: Sisters, Oregon
Date: September 22, 2022

B. MEDICAL SPECIALIST

Specialist Turan Kayagil, MD, FACEP
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Washington, DC

C. DETAILS OF THE INVESTIGATION

1.0 Purpose

This investigation was performed to evaluate the pilot for potentially impairing substances and potentially impairing medical conditions.

2.0 Methods

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

D. FACTUAL INFORMATION

1.0 FAA Medical Case Review

According to the FAA medical case review, the 66-year-old male pilot's last aviation medical examination was on July 1, 2013. At that time, he reported 979 total civilian flight hours. He was 73 inches tall and weighed 265 pounds. He reported a history of borderline high blood pressure controlled with exercise and diet, as well as a history of bilateral partial knee replacements in 2012. He reported no medication use. No significant issues were identified, and he was issued a third-class medical certificate limited by a requirement to wear corrective lenses. This medical certificate subsequently expired. The pilot completed a BasicMed Comprehensive Medical Examination Checklist (CMEC) on April 5, 2018, and a BasicMed Course on April 19, 2018; these were not current on the date of the crash.¹

¹ BasicMed provisions allow pilots who meet certain requirements to fly without current medical certification. Among those requirements, a pilot must have completed a BasicMed training course within 24 calendar months and must have had a medical examination with a state-licensed physician using the CMEC within 48 months. Aircraft and operating restrictions also apply. For details, see [14 Code of Federal Regulations \(CFR\) Part 68](#),

2.0 Postmortem Medical Examiner Report

The pilot did not undergo an autopsy due to limited recovery of fragmented remains. The Linn County Medical Examiner's Office, Albany, Oregon, produced a medical examiner report that included information about the death investigation and the visual examination of the recovered remains. According to this report, the pilot's cause of death was massive blunt and sharp force trauma, and his manner of death was accident. His recovered remains were recovered from the remote crash site on the day after the crash. Due to the condition of the pilot's remains, effective examination for natural disease was not possible.

The medical examiner report documented information provided by a family member of the pilot about the pilot's medical history and medication use. According to this information, the pilot was being treated for high blood pressure and diabetes, and had gait disability that had persisted since his 2012 bilateral partial knee replacements. His medications were the prescription blood pressure medications chlorthalidone and irbesartan, the prescription oral diabetes medication metformin, a potassium supplement, and vitamins; these medications are not generally considered impairing.

3.0 Toxicology

3.1 FAA Toxicology Results

The FAA Forensic Sciences laboratory performed toxicological testing of a postmortem muscle tissue specimen from the pilot. This testing detected ethanol at 0.057 g/hg, n-butanol at 0.016 g/hg, isopropanol at 0.093 g/hg, and acetone at 0.01 g/hg.² The toxicology report noted that the specimen was unsuitable for general drug screening. The specimen was screened for drugs of abuse with negative results.³ No other specimen was available for FAA toxicological testing.

3.2 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.⁴ FAA

[14 CFR 61.113\(i\)](#), [14 CFR 61.23\(c\)\(3\)](#), and https://www.faa.gov/licenses_certificates/airmen_certification/basic_med/.

² For tissue specimens, concentrations in g/hg are approximately equivalent to concentrations in g/dL.

³ According to the [FAA Forensic Sciences Laboratory methodology webpage](#), the FAA tissue drugs of abuse screen tests for methamphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, opiates, phencyclidine (PCP), acetaminophen, and salicylate.

⁴ Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

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.⁵ Alcohol consumption is not the only possible source of ethanol in postmortem specimens. Ethanol can sometimes be produced by microbes in a person's body after death. Postmortem ethanol production is made more likely by extensive trauma and delayed recovery of remains.⁶

N-butanol is another alcohol that can be produced by microbes in a person's body after death. Its presence in a postmortem specimen indicates likely postmortem microbial activity in the specimen (although such activity does not necessarily produce ethanol).⁶

Isopropanol, which is another alcohol, and acetone, which is an organic compound, are both used industrially, occur naturally, and are interrelated metabolites in the human body. Although the presence of isopropanol and acetone in a postmortem specimen sometimes may be related to a serious medical issue (such as isopropanol poisoning or metabolic disturbance from diabetes or alcoholism), both substances are also commonly attributable to postmortem microbial production.^{7,8}

E. SUMMARY OF MEDICAL FACTS

The 66-year-old male pilot's last aviation medical examination was on July 1, 2013. At that time, he reported a history of borderline high blood pressure controlled with exercise and diet, as well as a history of bilateral partial knee replacements in 2012. He reported no medication use. He was issued a third-class medical certificate limited by a requirement to wear corrective lenses. This medical certificate subsequently expired. The pilot completed a BasicMed Comprehensive Medical Examination Checklist and Course in April 2018. These were not current on the date of the crash.

The pilot did not undergo an autopsy due to limited recovery of fragmented remains, which occurred the day after the crash. The Linn County Medical Examiner's

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

⁶ 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.

⁷ Boumba VA, Exadactylou P, Velivasi G, Ziavrou KS, Fragkouli K, Kovatsi L. The frequency of ethanol, higher alcohols and other low molecular weight volatiles in postmortem blood samples from unnatural deaths. *Forensic Sci Int*. 2022;341:111503. doi:10.1016/j.forsciint.2022.111503.

⁸ Dumollard C, Wiart JF, Hakim F, et al. Putatively lethal ingestion of isopropyl alcohol-related case: interpretation of post mortem isopropyl alcohol and acetone concentrations remains challenging. *Int J Legal Med*. 2021;135(1):175-182. doi:10.1007/s00414-020-02444-4.

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Toxicological testing of a postmortem muscle specimen from the pilot detected ethanol at 0.057 g/hg, n-butanol at 0.016 g/hg, isopropanol at 0.093 g/hg, and acetone at 0.01 g/hg. The specimen was unsuitable for general drug screening, but was screened for a selection of drugs of abuse with negative results.

Submitted by:

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