

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



Medical Factual Memorandum for Record

October 15, 2024

A. CASE

NTSB ID: ERA24FA176
Location: Knoxville, Tennessee
Date: April 12, 2024

B. MEDICAL SPECIALIST

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

C. DETAILS

1.0 Description of Review

For purposes of evaluating the pilot for potentially impairing substances and potentially impairing medical conditions, the above Medical Specialist reviewed the following sources of medical information, along with selected relevant regulation, medical literature, and investigator reports.

- Final Federal Aviation Administration (FAA) medical case review
- Autopsy report
- FAA Forensic Sciences Laboratory toxicology report

2.0 Summary of Medical Facts

The 45-year-old male pilot's last aviation medical examination was April 19, 2023. At that time, he reported using the prescription cholesterol-control medications rosuvastatin and ezetimibe. He otherwise reported no active medical conditions. He was issued a third-class medical certificate without limitation.

The Knox County Regional Forensic Center performed the pilot's autopsy, as authorized by the Anderson County Medical Examiner. According to the pilot's autopsy report, his cause of death was multiple blunt force injuries, and his manner of death was accident. Autopsy evaluation for natural disease was limited by the extent of injury; structural evaluation of the brain was not possible. Within this limitation, the autopsy did not identify significant natural disease. Injuries included facial trauma.

At the request of the Knox County Medical Examiner's Office, NMS Labs performed postmortem toxicological testing of liver tissue from the pilot. No tested-for substances (including ethanol) were detected.

Postmortem toxicological testing by the FAA Forensic Sciences Laboratory detected ethanol at 0.02 g/dL in the pilot's vitreous fluid and at 0.019 g/dL in the pilot's urine. Ethanol was not detected in liver or brain tissue. Acetone was detected in urine, but not in vitreous fluid, liver tissue, or brain tissue. Ibuprofen was detected in liver tissue and urine.

Ethanol is the intoxicating alcohol in beer, wine, and liquor, and, if consumed, can impair judgment, psychomotor performance, cognition, and vigilance.¹ 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.² Alcohol consumption is not the only possible source of ethanol in postmortem specimens. Ethanol may sometimes be produced by microbes in a person's body after death, potentially elevating ethanol levels in some postmortem specimens but not others. Postmortem ethanol production is made more likely by extensive trauma, which can spread microbes. Vitreous fluid and, to a lesser extent, urine, are generally better protected against the spread of microbes and therefore are generally less susceptible to postmortem ethanol production than are other specimen types. However, postmortem ethanol production can occur in vitreous and urine.^{3,4,5}

¹ Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

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

³ Spitz WU. Forensic aspects of alcohol. In: Spitz WU, Spitz DJ, eds. *Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation*. 4th ed. Springfield, IL: Charles C Thomas; 2006:1218-1229.

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 Oshaug K, Kronstrand R, Kugelberg FC, Kristoffersen L, Mørland J, Høiseth G. Frequency of postmortem ethanol formation in blood, urine and vitreous humor - improving diagnostic accuracy with the use of ethylsulphate and putrefactive alcohols. *Forensic Sci Int*. 2022;331:111152. doi:10.1016/j.forsciint.2021.111152.

Acetone is an organic compound that is used industrially and occurs naturally. Its presence in postmortem specimens commonly is attributable to postmortem microbial activity.⁶

Ibuprofen is an anti-inflammatory medication that is available over the counter and is commonly used to treat pain and fever. Ibuprofen is not generally considered impairing.

Submitted by:

Turan Kayagil, MD, FACEP
Medical Officer

⁶ 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.