

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



Medical Factual Memorandum for Record

December 31, 2024

A. CASE

NTSB ID: ERA23FA138
Location: West Palm Beach, Florida
Date: March 5, 2023

B. MEDICAL SPECIALIST

Specialist JE Tuttle MD MHA FACS
National Transportation Safety Board
Washington, DC

C. DETAILS

1.0 Description of Review

For purposes of evaluating the pilot, and certificated flight instructor (CFI) for potentially impairing medical conditions and substances, 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
- Postmortem examination report - pilot
- Toxicology report - pilot
- Postmortem examination report - CFI
- Toxicology report - CFI

2.0 Summary of Medical Fact

2.1 Pilot¹

According to the FAA medical case review, the 34-year-old male pilot's last aviation medical examination was January 17, 2023. At that time, the pilot reported having high blood pressure and taking losartan, a prescription medication commonly used to treat high blood pressure. The pilot's high blood pressure was noted to be qualified under Conditions Aviation Medical Examiners Can Issue (CACI) criteria. The pilot was issued a first-class medical certificate without limitation.

The Office of the District Medical Examiner performed the pilot's autopsy. According to the pilot's autopsy report, his cause of death was blunt force trauma, and his manner of death was accident. The autopsy did not identify significant natural disease.

At the request of the Office of the District Medical Examiner, Axis Forensic Toxicology performed toxicological testing of postmortem heart blood and urine from the pilot. Caffeine was presumptively detected in heart blood.² Carboxy-THC were detected in urine.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the pilot.³ Carboxy-delta-9-THC was detected in urine at 3.6 ng/mL. Carboxy-delta-9-THC was not detected in cavity blood. Delta-8-THC was detected in cavity blood and urine at low levels.⁴ Carboxy-delta-8-THC was detected in cavity blood at 1 ng/mL and in urine at 48 ng/mL. Losartan was detected in urine and was not detected in cavity blood.

Carboxy-delta-9-THC is a non-psychoactive metabolite of delta-9-THC, which was not detected in this case. Delta-9-THC is the primary psychoactive chemical in cannabis, including marijuana, hashish, and other cannabis products.⁵ The specific psychoactive effects of delta-9-THC vary depending on the user, user history of use,

¹ The pilot was seated in the left front seat.

² A presumptive positive indicates a positive result on a preliminary screening test, without a second test to confirm the result.

³ 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.

⁴ According to an email from an FAA Forensic Sciences Laboratory toxicologist, the levels detected of delta-8-THC in blood and urine were below the threshold for quantifiable results.

⁵ Shah J, Fermo O. Review of systemic and syndromic complications of cannabis use: A review. *Medicine* (Baltimore). 2022;101(49): e32111. doi:10.1097/MD.00000000000032111, 10.1097/MD.00000000000032111.

dose consumed, and route of consumption. Effects of delta-9-THC consumption may impair motor coordination, decrease reaction time, impair decision making and problem solving, distort perceptions of reality, and decrease vigilance.⁶ Delta-9-THC is a federally controlled substance, and the FAA considers it unsuitable for flying, regardless of state cannabis laws.^{7,8,9}

Delta-8-THC is a psychoactive compound typically chemically manufactured from cannabidiol (CBD), a chemical in the cannabis plant. It has similar psychoactive effects as delta-9-THC such as cognitive impairment including decreased processing speed of information, distorted perception, visual disturbances and decreased attention and response time.^{10,11,12} Delta-8-THC containing products are often marketed simply as "hemp" or "CBD" products, which consumers may not associate with potential psychoactive effects. Delta-8-THC is available in a variety of over-the-counter products for oral consumption, smoking, and inhalation and vary widely in

⁶ Testai FD, Gorelick PB, Aparicio HJ, et al. Use of Marijuana: Effect on Brain Health: A Scientific Statement from the American Heart Association. *Stroke*. 2022;53(4): e176-e187. doi:10.1161/STR.0000000000000396, 10.1161/STR.0000000000000396.

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 22, 2023.

⁸ Federal Aviation Administration. Aeromedical factors. In: *Pilot's Handbook of Aeronautical Knowledge*. FAA-H-8083-25C. Oklahoma City: United States Department of Transportation, Federal Aviation Administration, Airman Testing Standards Branch, AFS-630; 2023. https://www.faa.gov/sites/faa.gov/files/19_phak_ch17.pdf. Accessed December 22, 2023.

⁹ Federal Aviation Administration. Controlled substances and CBD products. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/Controlled_Substances_and_CBD_Products.pdf. Updated May 25, 2022. Accessed December 22, 2023.

¹⁰ Wurz GT, Montoya E, DeGregorio MW. Examining impairment and kinetic patterns associated with recent use of hemp-derived Δ 8-tetrahydrocannabinol: case studies. *J Cannabis Res*. 2022;4(1):36. doi:10.1186/s42238-022-00146-9.

¹¹ Tagen M, Klumpers LE. Review of delta-8-tetrahydrocannabinol (Δ 8-THC): Comparative pharmacology with Δ 9-THC. *Br J Pharmacol*. 2022;179(15):3915-3933. doi:10.1111/bph.15865. Erratum in: *Br J Pharmacol*. 2023;180(1):130.

¹² United States Centers for Disease Control and Prevention (CDC). Increases in availability of cannabis products containing Delta-8 THC and reported cases of adverse events. CDC Health alert Network. <https://stacks.cdc.gov/view/cdc/109759>. Updated September 14, 2021. Accessed February 9, 2024.

potency of delta-8-THC and content of delta-9-THC.^{13,14, 15} Delta-8 THC products have not been evaluated or approved by the US Food and Drug Administration for safe use in any context.^{16,17}

Caffeine is a central nervous system stimulant that is commonly ingested, including in coffee, tea, soft drinks, and chocolate, and is also an ingredient in certain anti-drowsiness medications and headache medications.¹⁸ Losartan is a prescription medication commonly used to treat high blood pressure.¹⁹ Caffeine and losartan are not generally considered impairing.

2.2 CFI²⁰

According to the FAA medical case review, the 43-year-old male CFI's last aviation medical examination was on February 15, 2022. At that time, he reported having lumbosacral strain with intervertebral disc syndrome, lower extremity radiculopathy, and obstructive sleep apnea (OSA) with use of a continuous positive airway pressure (CPAP) machine. He reported no medication use. The pilot was issued a first-class medical certificate with a time limitation (not valid for any class after February 28, 2023). The CFI did not hold an active FAA medical certification at the time of the crash. However, the CFI was not required to have a current medical certification as a non-required flight crew member.

¹³ LoParco C, Rossheim ME, Walters ST, Zhou Z, Olsson S, Sussman SY. Delta-8 tetrahydrocannabinol: a scoping review and commentary. *Addiction*. 2023; 118(6):1011-28. doi: <https://doi.org/10.1111/add.16142>.

¹⁴ Oleinik G. New Leafreport research reveals more than 50% of delta-8 THC hemp-derived products tested had illegal levels of delta-9 THC. In: *Leafreport*. 2021. <https://www.leafreport.com/education/delta-8-thc-products-market-report-11339>. Accessed March 1, 2024.

¹⁵ Johnson L. CBD Oracle Lab Study Shows Some Delta-8 Products Are 7700% Over the Legal Delta-9 THC Limit. CBD Oracle. Published October 21, 2021. Accessed January 23, 2025. <https://cbdoracle.com/news/delta-8-thc-products-market-study-consumer-safety-and-legality/#Executive-summary>.

¹⁶ 5 Things to Know about Delta-8 Tetrahydrocannabinol - Delta-8 THC. FDA. Published online September 16, 2021. <https://www.fda.gov/consumers/consumer-updates/5-things-know-about-delta-8-tetrahydrocannabinol-delta-8-thc>. Accessed January 14, 2025.

¹⁷ Leas EC. The Hemp Loophole: A Need to Clarify the Legality of Delta-8-THC and Other Hemp-Derived Tetrahydrocannabinol Compounds. *Am J of Pub Health*. 2021;111(11):1927-1931. doi: <https://doi.org/10.2105/ajph.2021.306499>.

¹⁸ National Institutes of Health National Library of Medicine. Caffeine. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=6d9b3926-7198-5e00-e053-2a91aa0a9580>. Updated September 23, 2020. Accessed November 19, 2024.

¹⁹ National Institutes of Health National Library of Medicine. Losartan potassium tablet. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=d5571a70-fe83-4277-ac42-ffaff2e051b2>. Updated March 14, 2019. Accessed November 19, 2024.

²⁰ The CFI was seated in the right front seat.

On August 6, 2020, the CFI received an Authorization for Special Issuance from the FAA for an Aviation Medical Examiner Assisted Special Issuance (AASI) for OSA and CPAP use.²¹ The authorization of the AASI required an annual review of the CFI's OSA management. According to medical records from the Veteran's Affairs Medical Center (VAMC), the CFI was evaluated by his VAMC sleep physician on February 14, 2023. According to the sleep physician's documentation, the CFI's CPAP record from February 14, 2022- February 13, 2023 was reviewed and the CFI had been adherent to his prescribed CPAP therapy. The reviewed CPAP records show the CFI used the machine an average time on the days used of 7 hours 57 minutes, and usage 99% of the days during the time period reviewed.²²

The Office of the District Medical Examiner performed the CFI's autopsy. According to the CFI's autopsy report, his cause of death was blunt force trauma, and his manner of death was accident. The autopsy did not identify significant natural disease.

At the request of the Office of the District Medical Examiner, Axis Forensic Toxicology performed toxicological testing of postmortem cavity blood and urine from the CFI. Caffeine was presumptively detected in cavity blood.²³ No other tested-for substances were detected.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the CFI.²⁴ Ibuprofen was detected in urine and was not detected in cavity blood. No other tested-for substances were detected.

²¹ AASI is a process by which an AME may issue a medical certificate under the provisions of an applicant's FAA Authorization for Special Issuance if the applicant provides specific required medical information from treating physician(s). AASI determinations are subject to review by the FAA. Additional information about the AASI process is available on the [FAA AME Guide website](#).

²² The FAA generally considers the target goal for effective CPAP treatment to be use on at least 75% of nights, for an average of at least 6 hours/night on nights used.

Federal Aviation Administration. Decision considerations: disease protocols - obstructive sleep apnea (OSA). Guide for Aviation Medical Examiners. https://www.faa.gov/ame_guide/dec_cons/disease_prot/osa. Updated March 22, 2023. Accessed January 14, 2025.

²³ A presumptive positive indicates a positive result on a preliminary screening test, without a second test to confirm the result.

²⁴ 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.

Caffeine is described above. Ibuprofen is a non-prescription medication commonly used to treat mild to moderate pain and fever.²⁵ Caffeine and ibuprofen are not generally considered impairing.

Submitted by:
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Medical Officer

²⁵ National Institutes of Health National Library of Medicine. Ibuprofen tablet. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=e914472b-c785-4c73-b37c-4d459166cf41>. Updated July 27, 2023. Accessed November 20, 2024.