National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

Medical Factual Memorandum for Record
December 31, 2024

A. CASE

NTSB ID: WPR23FA110
Location: Grass Valley, California
Date: February 19, 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 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.

- Federal Aviation Administration (FAA) final medical case review
- Autopsy report - pilot
- Toxicology report – pilot

2.0 Summary of Medical Facts

The 63-year-old male pilot's last aviation medical examination was December 14, 2021. At that time, he reported no medical conditions or medication use. He was issued a third-class medical certificate limited by a requirement to have available glasses for near vision.

The Office of the Sheriff – Coroner, Nevada County, performed the pilot's autopsy. According to the pilot's autopsy report, his cause of death was multiple blunt injuries, and his manner of death was accident. According to the autopsy report, a limited internal examination was performed for the purposes of obtaining toxicological specimens. The pathologist stated that brief examination of the heart showed mild to moderate coronary atherosclerosis without significant narrowing; no additional details of the coronary artery disease were documented. Within the limitations of the autopsy, no other significant natural disease was identified.

At the request of the Nevada County Office of the Sheriff – Coroner, NMS Labs performed toxicological testing of postmortem peripheral blood of the pilot.[1] Carboxy-delta-9-THC was detected at 10 ng/mL. Delta-9-THC and 11-hydroxy-THC were not detected, at a reporting threshold of 1 ng/mL.

The FAA Forensic Sciences Laboratory performed toxicology testing of postmortem specimens from the pilot.[2] Delta-9-THC was detected at a low level in femoral blood.[3] Delta-9-THC was also detected in lung tissue, at 2 ng/g. 11-hydroxy-THC was detected in femoral blood at 1.7 ng/ mL and in lung tissue at 2 ng/g. Carboxy-delta-9-THC was detected in femoral blood at 16.3 ng/mL and in lung tissue at 18.2 ng/g.

Delta-9-THC is the primary psychoactive chemical in cannabis, including marijuana and hashish. Delta-9-THC may be inhaled or ingested recreationally by users seeking mind-altering effects. It may also be used medicinally by users seeking to treat illness-associated nausea, chronic pain, and other symptoms of some chronic diseases.[4] Pharmacologically pure delta-9-THC is available as a prescription medication, often used to treat involuntary weight loss secondary to chronic disease

[1] NMS Labs. Test Code 8051B. Details can be found https://www.nmslabs.com/tests/8051B.

[2] 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.

[3] According to an email from the FAA forensic toxicologist, the lower limit of quantifiable delta-9-THC detection was 0.8 ng/mL. The level in this case, was below the detection level.

[4] 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.0000000000032111, 10.1097/MD.0000000000032111.

and nausea associated with chemotherapy.[5] The specific psychoactive effects of delta-9-THC vary depending on the user, user history of use, dose consumed, and route of consumption. Effects of delta-9-THC consumption may impair motor coordination, worsen reaction time, impair decision making and problem solving, distort perceptions of reality, and decrease vigilance.[6] 11-hydroxy-THC is the primary active metabolite of delta-9-THC. Carboxy-delta-9-THC is a non-psychoactive metabolite of delta-9-THC. Research shows inconsistent correlation between the presence and magnitude of impairment and THC concentrations in blood in living persons.[7] Delta-9-THC is a federally controlled substance, and the FAA considers it unsuitable for flying, regardless of individual state cannabis laws.[8,9,10]

Submitted by:

JE Tuttle MD MHA FACS
Medical Officer

[5] National Institute of Health Medical Library. Marinol-dronabinol capsule. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=628f9609-6583-49be-be77-b64cfbc46fd7. Updated April 8, 2019. Accessed March 22, 2024.

[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] Arkell TR, Spindle TR, Kevin RC, Vandrey R, McGregor IS. The failings of per se limits to detect cannabis-induced driving impairment: Results from a simulated driving study. Traffic Injury Prevention. 2021;22(2):102-107. doi: https://doi.org/10.1080/15389588.2020.1851685.

[8] 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.

[9] 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.

[10] 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.