



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

January 5, 2022

Mary Pat McKay, MD, MPH
Chief Medical Officer

A. ACCIDENT: CEN21LA084; Colorado City, TX

Date and time: December 10, 2020, 09:30 local time

Injuries: 2 fatal

B. GROUP IDENTIFICATION

No group was formed for the medical evaluation in this accident.

C. DETAILS OF INVESTIGATION

1. Purpose

This investigation was performed to evaluate the pilot for medical conditions, the use of medications/illicit drugs, and the presence of toxins.

2. Methods

The FAA medical case review, autopsy report, toxicology findings, and the investigator's reports were reviewed. Relevant regulation and medical literature were reviewed as appropriate.

FAA Medical Case Review

According to the FAA medical case review, the 31 year old male pilot had reported 2400 total flight hours as of his last medical exam, dated 6/24/2020. At that time, he was 75 inches tall and weighed 225 pounds. He had reported no significant medical conditions or use of medications to the FAA but had reported his airman certificate had been revoked in 2011 for flying while intoxicated and carrying a firearm. It was reinstated in 2014. He also reported an arrest for public intoxication in 2010. On his last exam, no significant abnormalities were identified on the physical exam and he was issued a second class medical certificate without limitations.

Autopsy

According to the autopsy performed by the Southwestern Institute of Forensic Sciences at Dallas, the cause of death was blunt force injuries and the manner of death was accident. No significant natural disease was identified.

Toxicology

Toxicology testing performed by the Laboratory at the Southwestern Institute of Forensic Sciences at Dallas identified delta-9-tetrahydrocannabinol (THC, the psychoactive compound in cannabis) at 132 ng/ml and its inactive metabolite, carboxy-delta-9-THC at 329.5 ng/ml in chest cavity blood.

Toxicology testing performed by the FAA's Forensic Sciences Laboratory identified delta-9-THC at 81.7 ng/ml in cavity blood as well as at 2664.5 ng/ml in gastric contents, 29.5 ng/g in liver tissue, 914.4 ng/g in lung, and 94.8 ng/g in brain. In addition, its psychoactive metabolite, 11-hydroxy-delta-9-THC, was identified at 96 ng/ml in cavity blood, 171.1 ng/g in liver tissue, 46.7 ng/g in lung, and 44.1 in brain. Finally, the inactive metabolite, carboxy-delta-9-THC was found at 356.6 ng/ml in cavity blood, 3749.5 ng/g in liver, 190.9 ng/g in lung, and 94 ng/g in brain.

Substance Descriptions

Cannabis has mood altering effects including inducing euphoria and relaxation generally caused by the effects of delta-9-THC and 11-hydroxy-delta-9-THC. In addition, cannabis causes alterations in motor behavior, perception, cognition, memory, learning, endocrine function, food intake, and regulation of body temperature. Specific performance effects include decreased ability to concentrate and maintain attention, impairment of hand-eye coordination is dose-related over a wide range of dosages. Impairment in retention time and tracking, subjective sleepiness, distortion of time and distance, vigilance, and loss of coordination in divided attention tasks have been reported.¹

THC is lipophilic and gets stored in fatty tissues; it may leech back into blood from liver, lung, and brain after death. This effect, postmortem redistribution, may double or triple peripheral levels.²

¹ National Highway Traffic Safety Administration. April 2014. Drugs and Human Performance Fact Sheets. Cannabis/Cannabis. <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>

² Lemos NP and Ingle EA. Cannabinoids in Postmortem Toxicology Journal of Analytical Toxicology, 2011;35: 394-401.

Cannabis has been demonstrated to have clinical effects at levels as low as 1 ng/ml.³ While significant performance impairments are usually observed for at least 1-2 hours following cannabis use, and residual effects have been reported up to 24 hours, even when the blood level is undetectable.¹ Finally, the pattern and frequency of use effect levels in blood and various tissues.

Delta-9-THC concentrations typically peak during the act of smoking, while peak carboxy-delta-9-THC concentrations occur approximately 9-23 minutes after the start of smoking. Concentrations of both analytes decline rapidly and are often < 5 ng/mL at 3 hours.

D. SUMMARY OF MEDICAL FINDINGS

The 31 year old male pilot had reported no significant medical conditions or use of medications to the FAA but had reported his airman certificate had been revoked in 2011 for flying while intoxicated and carrying a firearm. It was reinstated in 2014. He also reported an arrest for public intoxication in 2010.

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³ Federal Aviation Administration. Civil Aerospace Medical Institute Toxicology Drug Information: Cannabis <http://jag.cami.jcabi.gov/toxicology/DrugDetail.asp?did=154> Accessed 1/28/2021.