



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

April 30, 2019

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A. ACCIDENT: CEN18FA336 Rhome, Texas

On August 16, 2018, about 1935 central daylight time, a Cessna 172 airplane, N2893Q, impacted trees and terrain shortly after departure from Rhome Meadows Airport (T76), Rhome, Texas. The commercial rated pilot was fatally injured and the 3 passengers sustained serious injuries. The airplane sustained substantial damage. The airplane was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident and no flight plan had been filed. The local flight had just departed T76 at the time of the accident.

One of the pilot's family members stated that the pilot retrieved this airplane out from under his open-air shelter for "family fun night" and pilot was giving rides to various family members. The family members stated that the pilot had flown the airplane about one week before the accident, then again two times immediately preceding the accident flight. The two preceding flights lasted about 20 minutes and 10 minutes, respectively, and the family members reported no anomalies with the airplane.

B. GROUP IDENTIFICATION

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

C. DETAILS OF INVESTIGATION

Purpose

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

Methods

The FAA medical case review, autopsy report, and toxicology data from FAA Forensic Sciences were reviewed. Other pertinent scientific and regulatory issues were examined.

FAA Medical Case Review

According to the FAA medical case review, the 63-year-old male pilot held a second

class medical certificate with the limitation that he must have available glasses for near vision. At the time of the most recent exam (10/13/2017), the pilot reported 8,000 total hours of civil flight experience. The pilot reported taking the blood pressure medication lisinopril and the cholesterol reducing medication simvastatin. These medications are not considered impairing. The pilot noted a history of herniated lumbar disc surgery in 2013 and skin graft surgery for second and third degree burns received from a fire accident in 2016. No other concerns were reported by the pilot and no significant issues were identified by previous Aviation Medical Examiners.

Autopsy

According to the Southwestern Institute of Forensic Sciences at Dallas Office of the Medical Examiner, the cause of death was blunt force injuries and the manner of death was accident. The pilot was 70 inches tall and weighed 175 pounds. There was some evidence of hypertensive and atherosclerotic cardiovascular disease, including cardiomegaly, left ventricular hypertrophy, a fusiform aneurysm in the right coronary artery, and moderate atherosclerosis of two other coronary arteries.

Toxicology

The toxicology testing performed by the Southwestern Institute of Forensic Sciences at Dallas laboratory at the request of the medical examiner, which was performed less than 12 hours after the accident, found both blood and vitreous fluid positive for ethanol (0.153 grams per deciliter (gm/dL) and 0.166 gm/dL, respectively). Postmortem blood was also positive for cannabinoids.

FAA toxicology testing detected ethanol in subclavian blood, vitreous fluid, and urine (0.154 gm/dL, 0.177 gm/dL, and 0.194 gm/dL, respectively). Delta-9-tetrahydrocannabinol (THC) was detected in blood (0.0033 micrograms per milliliter (µg/mL)); its active metabolite 11-hydroxy-delta-9-THC was not, but the inactive metabolite carboxy-delta-9-THC was detected at 0.0139 µg/mL. Both THC metabolites were detected in urine: 11-hydroxy-delta-9-THC at 0.0094 µg/mL and carboxy-delta-9-THC at 0.0346 µg/mL.

Description of Identified Psychoactive Substances

Ethanol is a social drug commonly consumed by drinking beer, wine, or liquor. Ethanol acts as a central nervous system depressant; it impairs judgment, psychomotor functioning, and vigilance. Effects of ethanol on aviators are generally well understood; it significantly impairs pilots' performance, even at very low levels.¹ Federal Aviation Regulations, Section 91.17 (a) prohibits any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dL or more ethanol in the blood.²

Ethanol is water soluble, and after absorption it quickly and uniformly distributes throughout the body's tissues and fluids. The distribution pattern parallels water content and blood supply of the tissue. A small amount of ethanol can be produced after death by

¹ Cook, C.C., Alcohol and aviation. *Addiction* (Abingdon, England), 1997. 92(5): p. 539-555.

² eCFR- Code of Federal Regulations. 91.17. Accessed 4/25/2019. Available from: <http://www.ecfr.gov/cgi-bin/text-idx?rgn=div8&node=14:2.0.1.3.10.1.4.9>.

microbial activity, usually in conjunction with other alcohols such as methanol; vitreous humor and urine do not suffer from such production. Post-absorption, vitreous humor has about 12% more ethanol than blood and urine about 25% more ethanol than blood.³

According to Title 21 USC 812, marijuana is listed as a Schedule I controlled substance.⁴ THC is the primary psychoactive substance in marijuana. THC's mood-altering effects include euphoria, relaxed inhibitions, disorientation, image distortion, and psychosis. THC is fat soluble, so is stored in fatty tissues and can be released back into the blood long after consumption. While the psychoactive effects may last for a few hours, THC may be detected in the blood for days or weeks. "Low THC levels of a few nanograms per milliliter (ng/ml) in blood can result from relatively recent use (e.g., smoking within 1 to 3 hours) when some slight or even moderate impairment is likely to be present, or it can result from chronic use where no recent ingestion has occurred and no impairment is present." Thus, the level of THC in the blood and level of impairment do not appear to be closely related.⁵

D. SUMMARY OF MEDICAL FINDINGS

The 63-year-old male pilot had reported being treated for hypertension and high cholesterol and having a history of herniated disc surgery and skin graft surgery for burns to the FAA. At the time of the accident, he held a current second class medical certificate.

According to the Southwestern Institute of Forensic Sciences at Dallas Office of the Medical Examiner, the cause of death was blunt force injuries and the manner of death was accident. There was some evidence of hypertensive and atherosclerotic cardiovascular disease including cardiomegaly, left ventricular hypertrophy, a fusiform aneurysm in the right coronary artery, and moderate atherosclerosis of two other coronary arteries. Toxicology performed postmortem at the Institute found ethanol and cannabinoids in blood.

FAA toxicology testing detected ethanol in subclavian blood, vitreous fluid, and urine (0.154 gm/dL, 0.177 gm/dL, and 0.194 gm/dL, respectively). Delta-9-THC was detected in blood (0.0033 µg/mL); its active metabolite 11-hydroxy-delta-9-THC was not, but the inactive metabolite carboxy-delta-9-THC was detected at 0.0139 µg/mL. Both THC metabolites were detected in urine: 11-hydroxy-delta-9-THC at 0.0094 µg/mL and carboxy-delta-9-THC at 0.0346 µg/mL.

³ Federal Aviation Administration. Forensic Toxicology Drug Information. Ethanol. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60> Accessed 04/25/2019.

⁴ U.S. Department of Justice, Drug Enforcement Administration, Office of Diversion Control, <http://www.deadiversion.usdoj.gov/21cfr/21usc/812.htm>

⁵ Compton, R. July 2017. Marijuana-Impaired Driving - A Report to Congress. (DOT HS 812 440). Washington, DC: National Highway Traffic Safety Administration. <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/812440-marijuana-impaired-driving-report-to-congress.pdf>