



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

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A. ACCIDENT: ERA20FA022; Ocala, Florida

On October 31, 2019, at 1130 eastern daylight time, a Beechcraft BE-58, N959CM, was destroyed after it impacted a vehicle and terrain shortly after takeoff from Ocala International Airport-Jim Taylor Field (OCF), Ocala, Florida. The private pilot and a passenger were fatally injured; one occupant in the vehicle was seriously injured. The airplane was owned and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 post-maintenance test flight. Visual meteorological conditions prevailed, and no flight plan was filed for the local flight that departed OCF at 1128.

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 private pilot for medical conditions, the use of medications/illicit drugs, and the presence of toxins.

Methods

The private pilot's Federal Aviation Administration (FAA) medical certification file, FAA initial medical case review, autopsy, and FAA Forensic Sciences laboratory toxicology¹ reports were reviewed. Because the passenger was the airplane's mechanic, had access to the controls, and appeared to have communicated with air traffic control, the passenger's autopsy and toxicology reports were also reviewed. Other pertinent scientific and regulatory issues were reviewed.

Private pilot

FAA Medical Certification Files and FAA Medical Case Review

According to the FAA medical certification files and initial medical case review, at the time of his most recent exam (2/19/2019), the 73-year-old male pilot reported 8,440 total hours of civil

¹ The FAA Forensic Sciences Laboratory tests for more than 1,300 substances including toxins, common prescription and over-the-counter medications as well as illicit drugs. See: <http://jag.cami.jccbi.gov/toxicology/>.

flight experience. The pilot was 68 inches tall and weighed 169 pounds. He reported taking no medications and no medical conditions. The pilot had a remote history of defective color vision but since 2009 had passed color vision testing. No significant issues were identified by the aviation medical examiner. The pilot held a third class medical certificate with the limitation that he must wear corrective lenses.

Autopsy

According to the autopsy report from the Medical Examiner Districts 5 & 24 (Citrus, Hernando, Lake, Marion, Seminole, and Sumter Counties), Leesburg, Florida, the cause of death for the pilot was multiple blunt force injuries due to aircraft crash and the manner of death was accident. Severe abdominal aortic atherosclerosis was identified. No other significant natural disease was identified.

Toxicology

FAA Forensic Sciences Laboratory toxicology testing detected diazepam (commonly marketed as Valium) and its psychoactive metabolites nordiazepam and oxazepam in the pilot's liver and muscle tissue. The non-sedating high blood pressure medication valsartan was also detected in liver and muscle.² Toxicology testing performed for the medical examiner's office detected diazepam at 96 nanograms per milliliter (ng/mL), nordiazepam at 94 ng/mL, and delta-9-tetrahydrocannabinol (THC) at 0.69 ng/mL in the pilot's chest blood.

Diazepam is a sedating benzodiazepine available by prescription as a controlled substance and used to treat anxiety and is also useful to help treat muscle spasms, alcohol withdrawal, and seizures. It is metabolized to the active metabolites nordiazepam or temazepam. These compounds are further metabolized to the active metabolite oxazepam. Diazepam and its metabolites carry the warning that they may impair the mental and physical ability to perform hazardous tasks. The therapeutic range of diazepam and nordiazepam is 100 to 2,000 ng/mL in the blood. Diazepam has a half-life of 21 to 82 hours; nordiazepam has a half-life of 25 to 200 hours.^{3,4,5,6}

The marijuana plant (*Cannabis*) contains chemicals called cannabinoids; THC is the primary psychoactive cannabinoid compound. THC's mood-altering effects include euphoria and relaxation. In addition, marijuana causes alterations in motor behavior, perception, and cognition. Significant performance impairments are usually observed for at least 1-2 hours following marijuana use, and residual effects have been reported up to 24 hours.⁷

² FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Valsartan.

<http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=286>

³ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Diazepam.

<http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=44>

⁴ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Nordiazepam.

<http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=85>

⁵ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Oxazepam.

<http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=93>

⁶ National Institutes of Health (NIH). U.S. National Library of Medicine (NLM). DailyMed. Diazepam. Updated 9/13/18. <https://www.dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=75c7d502-0178-5ba1-e053-2a91aa0a7d67>

⁷ National Highway Traffic Safety Administration. April 2014. Drugs and Human Performance Fact Sheets. Cannabis/Marijuana. <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>

THC is rapidly metabolized, but the rate of metabolism is not linear and depends on the means of ingestion (smoking, oil, and edibles), potency of the product, frequency of use, and user characteristics. THC is fat soluble, so is stored in fatty tissues and can be released back into the blood long after consumption. So, while the psychoactive effects may last a few hours, THC can be detected in the blood for days or weeks. Thus, low blood level test results do not necessarily reflect recent use and cannot be used to prove that the user was under the influence of the drug at the time of testing.⁸

Passenger (Airplane Mechanic)

FAA Medical Case Review

According to the FAA initial medical case review, at the time of the accident the 50-year-old male passenger held no FAA medical certificate, so his medications and medical conditions are unknown.

Autopsy

According to the autopsy report from the Medical Examiner Districts 5 & 24 (Citrus, Hernando, Lake, Marion, Seminole, and Sumter Counties), Leesburg, Florida, the cause of death for the passenger was multiple blunt force injuries due to aircraft crash and the manner of death was accident. No significant natural disease was identified.

Toxicology

FAA Forensic Sciences Laboratory toxicology testing detected the non-sedating antihistamine loratadine (commonly marketed as Claritin) in cavity blood and its active metabolite desloratadine in cavity blood and urine.^{9,10} The non-steroidal, non-sedating pain medication ibuprofen was also detected in cavity blood and urine. Toxicology testing performed for the medical examiner's office was negative for tested for drugs in the passenger's cavity blood.

D. SUMMARY OF MEDICAL FINDINGS

Pilot

The 73-year-old male pilot had reported taking no medications and no medical conditions to the FAA.

According to the autopsy report from the Medical Examiner Districts 5 & 24, Leesburg, Florida, the cause of death for the pilot was multiple blunt force injuries due to aircraft crash and manner of death was accident. Severe abdominal aortic atherosclerosis was identified.

⁸ 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>

⁹ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Loratadine.

<http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=150>

¹⁰ FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Desloratadine.

<http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=379>

Toxicology testing detected diazepam at 96 ng/mL and its psychoactive metabolite nordiazepam at 94 ng/mL in the pilot's chest blood. Diazepam, nordiazepam, and the psychoactive metabolite oxazepam were also detected in the pilot's liver and muscle tissue, along with the blood pressure medication valsartan. THC was detected at 0.69 ng/mL in the pilot's chest blood.

Passenger (Airplane Mechanic)

The 50-year-old male passenger held no FAA medical certificate; his medications and medical conditions are unknown. According to the autopsy report from the Medical Examiner Districts 5 & 24, Leesburg, Florida, the cause of death for the pilot was multiple blunt force injuries due to aircraft crash and manner of death was accident. No significant natural disease was identified. Toxicology testing detected loratadine, desloratadine, and ibuprofen in cavity blood.