



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report **May 5, 2021**

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Medical Officer

A. ACCIDENT: ERA20LA330; Floral City, Florida

Date/Time: September 23, 2020; 7:50 a.m. (EDT)
Aircraft: Piper PA-25, N6106Z
Injuries: 1 Fatal
Flight Conducted under Part 137 aerial application flight

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 Federal Aviation Administration (FAA) medical case review and the pilot's autopsy, interview records,¹ and FAA Forensic Sciences Laboratory toxicology report² were reviewed. Other pertinent scientific and regulatory issues were reviewed.

FAA Medical Case Review

According to the FAA medical case review, the 67-year-old male pilot held a second class medical certificate with the limitation that he must wear corrective lenses for near and distant vision. His most recent FAA medical certification exam was on 4/13/20 and at that time he reported he had accrued 31,000 total flight hours. He was 72 inches tall and weighed 237 pounds. He reported taking no medications and a history of diabetes and high blood pressure resolved by diet and exercise; a letter of eligibility and a letter advising that a special issuance for these conditions was no longer needed were sent by FAA in 2015. No other significant medical concerns or issues were identified.

¹ See the docket for this accident to view the written interview.

² See <https://jag.camii.jccbi.gov/toxicology/> for a complete list of tested-for substances.

Autopsy

According to the Florida Medical Examiner's Office District 5 & 24 (Citrus, Hernando, Lake, Marion, Seminole, and Sumter Counties), Leesburg, Florida autopsy report, the cause of death was multiple blunt force injuries due to an airplane collision and the manner of death was accident. The medical examiner reported that the pilot had 60% atherosclerosis in his left anterior descending coronary artery and moderate atherosclerosis of his aorta.

Interview Records

In a written interview with the pilot's wife, she reported the pilot had no current health concerns and used metformin (a diabetes medication), lisinopril (a high blood pressure medication), and omeprazole (a medication for gastric reflux, commonly marketed as Prilosec). Lisinopril and omeprazole are not considered impairing.^{3,4}

Toxicology

The FAA laboratory detected the diabetes medication glipizide in the pilot's iliac blood and urine.⁵ Glipizide is considered non-impairing and glipizide taken alone or in combination with metformin is considered acceptable to the FAA since these diabetes medications are not likely to cause low blood sugar.⁶ Clinical findings from the FAA laboratory included vitreous fluid and urine glucose concentrations of 130 milligrams per deciliter (mg/dL) and 1,264 mg/dL, respectively. The FAA laboratory considers postmortem vitreous glucose levels above 125 mg/dL and urine glucose levels greater than 100 mg/dL as abnormal. The pilot's hemoglobin A1C was 6.3%; a hemoglobin A1C greater than 6% is considered abnormal by the FAA laboratory.⁷

Toxicology testing performed for the medical examiner's office on the pilot's iliac blood detected marijuana's primary psychoactive compound delta-9-tetrahydrocannabinol (THC) at 6.5 nanograms per milliliter (ng/mL), its primary psychoactive metabolite 11-hydroxy-delta-9-THC at 1.2 ng/mL, and THC's inactive metabolite carboxy-delta-9-tetrahydrocannabinol (THC-COOH) at 31 ng/mL; caffeine was also detected. FAA Forensic Sciences Laboratory toxicology testing results were inconclusive for THC in the pilot's iliac blood and detected THC in his urine at 6.7 ng/mL. The FAA laboratory detected 11-hydroxy-delta-9-THC and THC-COOH in his urine at 77.9 ng/mL and 671.3 ng/mL, respectively; THC-COOH was also detected in the pilot's iliac blood at 29.4 ng/mL.

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

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=290>

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

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=241>

⁵ National Institutes of Health. U.S. National Library of Medicine. DailyMed. Glipizide. Updated 11/8/19.

<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5565ccec-8000-48ab-a6af-37eca2d8c993>

⁶ FAA. Updated 1/27/21. Acceptable combinations of diabetes medications.

https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/diabetesmeds_acceptablecomb.pdf

⁷ Hemoglobin A1C is a measure of the percentage of hemoglobin molecules that have a glucose molecule attached to them. The test measures the average blood glucose over the past three months. A normal A1C level is below 5.7%, prediabetes is between 5.7 to 6.4%, and diabetes is 6.5% or above. [National Institutes of Health. U.S. National Library of Medicine. MedlinePlus. A1C. <https://medlineplus.gov/a1c.html> Page last updated 4/22/20.]

Marijuana

The marijuana plant (*Cannabis species*) contains chemicals called cannabinoids; tetrahydrocannabinol (THC) is the primary psychoactive cannabinoid compound. THC's mood-altering effects include euphoria and relaxation. In addition, marijuana causes alterations in motor behavior, time and space 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.⁸

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. The primary metabolite, 11-hydroxy-delta-9-THC, is equally psychoactive, but is rapidly metabolized to the non-psychoactive metabolite THC-COOH. 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 body for days or weeks. Very little THC is excreted in urine. Instead, THC-COOH can be found in urine days to weeks after the last use of the drug. Thus, both blood and urine test results do not necessarily reflect recent use and cannot be used to prove that the user was experiencing effects of the drug at the time of testing.⁹

D. SUMMARY OF MEDICAL FINDINGS

The 67-year-old male pilot held a second class medical certificate with the limitation that he must wear corrective lenses for near and distant vision. At his most recent exam (4/13/20), he reported taking no medications and having resolved his previous diagnoses of diabetes and high blood pressure by diet and exercise. From a written interview with the pilot's wife, at the time of the accident, the pilot was taking medications for diabetes, high blood pressure, and gastric reflux.

According to the autopsy report, the cause of his death was multiple blunt force injuries due to an airplane collision and the manner of death was accident. The medical examiner reported that the pilot had 60% atherosclerosis in his left anterior descending coronary artery and moderate atherosclerosis of his aorta.

Toxicological testing detected the diabetes medication glipizide in the pilot's blood and urine. Post-mortem clinical laboratory findings showed the pilot had vitreous fluid and urine glucose concentrations of 130 mg/dL and 1,264 mg/dL, respectively and a hemoglobin A1C of 6.3%. Toxicological testing also detected THC in the pilot's blood and urine (6.5 and 6.7 ng/mL, respectively) and THC's psychoactive metabolite 11-hydroxy-delta-9-THC in his blood and urine (1.2 and 77.9 ng/mL, respectively). THC's inactive metabolite THC-COOH was detected in his blood (31 and 29.4 ng/mL) and urine (671.3 ng/mL).

⁸ National Highway Traffic Safety Administration. April 2014 (revised). Drugs and Human Performance Fact Sheets. Cannabis/Marijuana. <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>

⁹ 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>