

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22FA021

MEDICAL

Specialist's Factual Report

February 21, 2023

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A. ACCIDENT

Location: Lena, Wisconsin
Date: October 27, 2021

B. MEDICAL SPECIALIST

Specialist Turan Kayagil, MD, FACEP
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

1.0 Purpose

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

2.0 Methods

The Federal Aviation Administration (FAA) medical case review and the pilot's FAA medical certification file were reviewed. The pilot's autopsy and toxicology reports were also reviewed, as were selected investigator reports and relevant regulation and medical literature.

D. FACTUAL INFORMATION

1.0 FAA Medical Records

According to FAA medical records, the 67-year-old male pilot had his last aviation medical examination on October 5, 2017. At that time, he reported 2465 civilian flight hours. He was 73 inches tall and weighed 208 pounds. He reported having occasional asthma symptoms associated with seasonal allergies. He reported using fluticasone/salmeterol, which is an inhaled prescription combination of two medications commonly used to treat symptoms of asthma and chronic obstructive pulmonary disease. Fluticasone/salmeterol generally is not considered impairing, and was a previously reported medication for the pilot. The aviation medical examiner (AME) noted that the pilot had undergone pulmonary function testing within the prior 3 months (results not documented in reviewed FAA records) and met the Conditions AMEs Can Issue (CACI) criteria for his asthma.¹ No significant issues

¹ Medical certification decision considerations for asthma, including CACI criteria, can be found in the FAA Guide for Aviation Medical Examiners at: https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item35/amd/asthma/.

were identified, and the pilot was issued a third-class medical certificate limited by a requirement to have available glasses for near vision. This certificate expired in 2019. On July 13, 2020, the pilot completed a BasicMed Comprehensive Medical Examination Checklist (CMEC). On July 15, 2020, the pilot completed a BasicMed Course.²

2.0 Autopsy

The Office of the Dane County Medical Examiner performed the pilot's autopsy. According to the autopsy report, the cause of death was blunt force injuries (with a contributory cause of death of hypertensive heart disease), and the manner of death was accident. A summary comment from the Medical Examiner who performed the autopsy stated: "It is my medical opinion that [the pilot] died as a result of blunt force injuries of the head, torso and extremities complicating hypertensive and atherosclerotic heart disease. The minimal injuries and hemorrhage present at autopsy suggest that the decedent died of natural causes before the crash. However, the contribution of these injuries to an unconscious state, and immediate death, cannot be excluded. As such, the manner of death in this case is ruled accident."

The autopsy identified an enlarged heart. Heart weight was 530 grams (the upper limit of normal heart weight is about 510 grams for a male of the pilot's body weight, which was 210 pounds at autopsy). The left ventricular wall of the heart was 1.6 cm thick (the upper limit of normal is about 1.6 cm). The right ventricular wall was 0.4 cm thick (the upper limit of normal is about 0.6 cm). The interventricular septum was 1.6 cm thick (the upper limit of normal is about 1.8 cm).³ The remainder of the heart examination was unremarkable, and cross sections of the coronary arteries were described as revealing no atherosclerosis. The kidneys showed chronic changes typical of high blood pressure. The lungs were moderately edematous and there were plexiform lesions of the bifurcation to the pulmonary arteries (evidence of pulmonary hypertension, or elevated blood pressure in the lungs). The autopsy examination did not identify other significant natural disease.

² BasicMed provisions allow pilots who meet certain requirements to fly without current medical certification. Among those requirements, a pilot must have completed a BasicMed training course within 24 calendar months, and must have had a medical examination with a state-licensed physician using the CMEC within 48 months. Aircraft and operating restrictions also apply. For details, see [14 Code of Federal Regulations \(CFR\) Part 68, 14 CFR 61.113\(i\), 14 CFR 61.23\(c\)\(3\)](#), and https://www.faa.gov/licenses_certificates/airmen_certification/basic_med/.

³ Kitzman DW, Scholz DG, Hagen PT, Ilstrup DM, Edwards WD. Age-related changes in normal human hearts during the first 10 decades of life. Part II (maturity): a quantitative anatomic study of 765 specimens from subjects 20 to 99 years old. *Mayo Clin Proc.* 1988;63(2):137-146. doi:10.1016/s0025-6196(12)64946-5.

3.0 Toxicology

3.1 NMS Labs Toxicology

At the request of the Dane County Medical Examiner, NMS Labs performed toxicological testing of postmortem subclavian blood from the pilot.⁴ Delta-9-THC (commonly known as THC) was detected at 0.63 ng/mL; no THC metabolites were detected.⁵ Caffeine was also detected.

3.2 FAA Toxicology

The FAA Forensic Sciences Laboratory also performed toxicological testing of postmortem specimens from the pilot.⁶ This testing detected loratadine and its metabolite desloratadine in subclavian blood and urine. No THC or THC metabolites were detected in urine.⁷

3.3 Descriptions of Detected Substances

THC is the primary psychoactive chemical in marijuana and hashish, derived from the cannabis plant. THC is commonly smoked or ingested recreationally by users seeking mind-altering effects. It may also be used medicinally to treat illness-associated nausea and appetite loss. It is present as an undeclared contaminant in some commercial cannabidiol (CBD) extracts and oils that may be used by a variety of routes for a variety of reasons. Psychoactive effects of THC vary depending on the user, dose, and route of administration, and may impair motor coordination, reaction time, decision making, problem solving, and vigilance.⁸ THC is a federally controlled

⁴ Details of the NMS Labs testing procedure are available from the NMS Labs website at [Test Code 8042B](#). Confirmation testing was performed for cannabinoids. Confirmation testing was not performed for caffeine.

⁵ According to the NMS Labs report, subclavian blood was screened for cannabinoids with a reporting limit of 10 ng/mL, and cannabinoid confirmation testing was performed with reporting limits of 0.5 ng/mL for delta-9-THC, 1 ng/mL for the THC metabolite 11-hydroxy-delta-9-THC, and 5 ng/mL for the THC metabolite carboxy-delta-9-THC.

⁶ 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. Some of these substances are listed at <https://jag.cami.jccbi.gov/toxicology>.

⁷ FAA testing for THC and its metabolites comprised urine screening (with a reporting cutoff of 25 ng/mL, according to the [FAA website](#)). The general drug screen (which was used to test blood) does not test for THC or its metabolites.

⁸ Couper FJ, Logan BK. Drugs and Human Performance Fact Sheets. National Highway Traffic Safety Administration. DOT HS 809 725. April 2014 (Revised). <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>. Accessed December 27, 2022.

substance, and the FAA considers it unsuitable for flying, regardless of state cannabis laws.^{9,10,11,12}

A person's blood THC level depends on multiple variables, including route and pattern of use, and does not have a simple predictive relationship with impairment. A person who is smoking THC typically has a peak THC level during smoking, whereas a person who consumes THC orally typically has a peak level 1 to 3 hours after use. A single puff of a marijuana cigarette can produce a significant THC level. Plasma THC levels (about twice blood THC levels) of 100 to 200 ng/mL routinely occur with smoking, with levels typically falling below 5 ng/mL less than 3 hours after smoking, as THC is rapidly metabolized and excreted in feces and urine. In occasional users, THC typically becomes undetectable in plasma within 8 to 12 hours of last use. However, storage and slow release of THC from body fat may significantly increase the time of its low-level detection.⁸

Caffeine is a central nervous system stimulant that is commonly ingested, including in coffee, tea, soft drinks, and chocolate; it is also an ingredient in certain anti-drowsiness medications and headache medications.^{13,14} Loratadine is a non-sedating antihistamine medication that is available over the counter and can be used to treat allergy symptoms and hives.¹⁵ Desloratadine is an active metabolite of loratadine, and is available as a prescription medication with similar uses as

⁹ 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/go/dni>. Updated November 23, 2022. Accessed December 27, 2022.

¹⁰ Berry M. Marijuana and derivatives: what are the aeromedical implications? *FAA Safety Briefing*. May/June 2019. https://www.faa.gov/news/safety_briefing/2019/media/mayjun2019.pdf. Accessed December 27, 2022.

¹¹ Federal Aviation Administration. Pilot's Handbook of Aeronautical Knowledge - Addendum A. FAA H 8083 25B (addendum). February 2021. https://www.faa.gov/sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/phak_addendum_a.pdf. Accessed December 27, 2022.

¹² 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. December 27, 2022.

¹³ National Institutes of Health National Library of Medicine. NoDoz Alertness Aid. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=e700e809-29b5-799e-e053-2a95a90a235c>. Updated October 11, 2022. Accessed December 27, 2022.

¹⁴ National Institutes of Health National Library of Medicine. Fioricet. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c018be7d-f7b8-45e2-97b8-8e7a71740657>. Updated January 1, 2021. Accessed December 27, 2022.

¹⁵ National Institutes of Health National Library of Medicine. Claritin. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=acf2d393-53d7-062f-e053-2995a90a0d60>. Updated May 2, 2022. Accessed December 27, 2022.

loratadine.¹⁶ Caffeine, loratadine, and desloratadine generally are not considered impairing.

E. SUMMARY OF MEDICAL FACTS

The 67-year-old male pilot had his last aviation medical examination on October 5, 2017. At that time, he was 73 inches tall and weighed 208 pounds. He reported having occasional asthma symptoms associated with seasonal allergies. He reported using fluticasone/salmeterol, a combination of two asthma medications which generally are not considered impairing. The aviation medical examiner (AME) noted that the pilot met the Conditions AMEs Can Issue (CACI) criteria for his asthma. No significant issues were identified, and the pilot was issued a third-class medical certificate limited by a requirement to have available glasses for near vision. This certificate expired in 2019. In July 2020, the pilot completed a BasicMed Comprehensive Medical Examination Checklist (CMEC) and a BasicMed Course.

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Postmortem toxicological testing by NMS Labs detected delta-9-THC (commonly known as THC) at 0.63 ng/mL in subclavian blood, and also detected caffeine in subclavian blood; no THC metabolites were detected. Postmortem

¹⁶ National Institutes of Health National Library of Medicine. Clarinex. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c671342e-69a2-4ca5-abc2-8166ed4240d4>. Updated November 14, 2022. Accessed December 27, 2022.

toxicological testing by the FAA Forensic Sciences Laboratory detected loratadine and its metabolite desloratadine in subclavian blood and urine; no THC or THC metabolites were detected in urine.

Submitted by:

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