

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



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MEDICAL

Specialist's Factual Report

January 4, 2023

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A. ACCIDENT

Location: Sausalito, California

Date: May 6, 2022

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 autopsy and toxicology reports were reviewed. Selected National Transportation Safety Board (NTSB) investigator reports and relevant regulation and medical literature were also reviewed.

D. FACTUAL INFORMATION

1.0 FAA Medical Case Review

According to the FAA medical case review, the 57-year-old male pilot had his only aviation medical examination on May 4, 2016. At that time, he reported 20 total civilian flight hours. He was 75 inches tall and weighed 221 pounds. He reported using sulfasalazine, which is a prescription medication that can be used to treat certain types of inflammatory arthritis and inflammatory bowel disease.¹ According to the FAA medical case review, the pilot had a history of psoriatic arthritis. He was issued a third-class medical certificate limited by a requirement to have available glasses for near vision, and in June 2016 the FAA issued a letter of eligibility for his arthritis, to be monitored per Conditions Aviation Medical Examiners Can Issue (CACI) criteria.

¹ National Institutes of Health National Library of Medicine. Azulfidine. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ddb69f3-bd55-45f3-a64f-f60226c744c4>. Updated October 26, 2022. Accessed December 30, 2022.

The pilot's medical certificate expired in 2018. He completed a BasicMed Comprehensive Medical Examination Checklist (CMEC) in November 2019 and a BasicMed training course in June 2020.²

2.0 Autopsy

The Marin County Sheriff's Office Coroner Division performed the pilot's autopsy. According to the autopsy report, the pilot's cause of death was multiple blunt impact injuries. The autopsy report described the pilot's heart as hypertrophic and markedly dilated. The heart weight was 490 grams (upper limit of normal is roughly 520 grams for a male of the pilot's 2016 body weight of 221 pounds; his body weight at the time of autopsy was not reported). The wall thickness of the left cardiac ventricle was 0.9 cm to 1 cm (borderline low-normal).³ No other abnormalities of the heart muscle, valves, or coronary arteries were identified on visual examination of the heart. The autopsy did not identify other significant natural disease.

3.0 Toxicology

3.1 NMS Labs Toxicology Results

At the request of the Marin County Sheriff's Office Coroner Division, NMS Labs performed toxicological testing of postmortem aortic blood from the pilot. This testing detected caffeine and theobromine.⁴

3.2 FAA Toxicology Results

The FAA Forensic Sciences Laboratory also performed toxicological testing of postmortem specimens from the pilot.⁵ The cannabis metabolite 11-hydroxy-delta-9-

² Effective May 1, 2017, BasicMed allows pilots who meet certain requirements to fly without current medical certification. Among those requirements, a pilot must have held valid medical certification anytime on or after July 15, 2006, must have had a medical examination with a state-licensed physician using the CMEC within 48 months of flight, and must have completed a BasicMed training course within 24 calendar months of flight. 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 Kitman 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.

⁴ Details of the NMS Labs testing procedure are available from the NMS Labs website at [Test Code 8092B](#). The procedure included screening for cannabinoids (10 ng/mL reporting limit). Additionally, confirmation testing was performed for cannabinoids (delta-9 THC with reporting limit 0.5 ng/mL, 11-hydroxy-delta-9 THC with reporting limit 1 ng/mL, and carboxy-delta-9 THC with reporting limit 5 ng/mL); no positive cannabinoid results were reported. Caffeine and theobromine were reported based on screening results without secondary confirmation.

⁵ The FAA Forensic Sciences laboratory has the capability to test for well over 1300 substances including toxins, prescription and over-the-counter medications, and illicit drugs. Some of these substances are listed at <https://jag.camijccbi.gov/toxicology>.

THC was detected at 13 ng/mL in urine but was not detected in aortic blood. The cannabis metabolite carboxy-delta-9 THC was detected at 3.8 ng/mL in aortic blood and at 18.1 ng/mL in urine. Cannabidiol (CBD) and its metabolite 7-carboxy-CBD were detected in aortic blood and urine. The CBD metabolite 7-hydroxy-CBD was detected in urine, with inconclusive results in aortic blood. Rosuvastatin and famotidine were detected in aortic blood and urine.

3.3 Descriptions of Detected Substances

11-hydroxy-delta-9-THC is a psychoactive metabolite of delta-9-THC, which is the primary psychoactive chemical in marijuana and hashish, derived from the cannabis plant.

Carboxy-delta-9-THC is a non-psychoactive metabolite of 11-hydroxy-delta-9-THC.

Delta-9-THC (not detected in this case) is the chemical commonly referred to as THC. It may be smoked or ingested recreationally by users seeking mind-altering effects. It may also be used medicinally to treat illness-associated nausea and appetite loss. 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. THC is a DEA controlled substance, and the FAA considers it unsuitable for pilots, regardless of state cannabis laws.^{6–11}

CBD is another chemical derived from the cannabis plant. CBD oils and extracts are marketed in a variety of commercial products for use by a variety of

⁶ 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 30, 2022.

⁷ Compton RP. Marijuana-Impaired Driving: A Report to Congress. National Highway Traffic Safety Administration. DOT HS 812 440. July 2017. <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/812440-marijuana-impaired-driving-report-to-congress.pdf>. Accessed December 30, 2022.

⁸ 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. December 30, 2022.

⁹ Federal Aviation Administration. Pilot's Handbook of Aeronautical Knowledge - Addendum A. FAA H 8083 25B (addendum). February 2021. https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/phak_addendum_a.pdf. Accessed December 30, 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 30, 2022.

¹¹ 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. Accessed December 30, 2022.

routes, with claims of having various beneficial effects without the mind-altering effects of THC. The only CBD product approved by the United States Food and Drug Administration (FDA) is a medication for the specialized treatment of certain types of seizure disorder. CBD generally is not considered impairing, although the FAA has cautioned pilots that commercial CBD products are not regulated for purity by the FDA, and sometimes contain undeclared THC that is unacceptable for flight. CBD use alone is not specifically disqualifying for pilot medical certification.^{10–14}

7-carboxy-CBD and 7-hydroxy-CBD are major metabolites of CBD.¹⁴

Rosuvastatin is a prescription medication used to control cholesterol and lower cardiovascular risk.¹⁵ Famotidine is an over-the-counter stomach acid suppression medication.¹⁶ 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.^{17,18} Theobromine, a naturally occurring substance in cocoa and other plants, is commonly ingested in chocolate and tea. Rosuvastatin, famotidine, caffeine, and theobromine generally are not considered impairing.

¹² Centers for Disease Control and Prevention. CBD: What You Need to Know. Marijuana and Public Health. <https://www.cdc.gov/marijuana/featured-topics/CBD.html>. Updated August 8, 2022. Accessed December 30, 2022.

¹³ United States Food and Drug Administration. FDA Regulation of Cannabis and Cannabis-Derived Products, Including Cannabidiol (CBD). Public Health Focus. <https://www.fda.gov/news-events/public-health-focus/fda-regulation-cannabis-and-cannabis-derived-products-including-cannabidiol-cbd>. Updated January 22, 2021. Accessed December 30, 2022.

¹⁴ Taylor L, Gidal B, Blakey G, Tayo B, Morrison G. A phase I, randomized, double-blind, placebo-controlled, single ascending dose, multiple dose, and food effect trial of the safety, tolerability and pharmacokinetics of highly purified cannabidiol in healthy subjects. *CNS Drugs*. 2018;32(11):1053-1067. doi:10.1007/s40263-018-0578-5.

¹⁵ National Institutes of Health National Library of Medicine. Crestor. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=325a5d0e-9a72-4015-9fcd-1655fb504cee>. Updated May 9, 2022. Accessed December 30, 2022.

¹⁶ National Institutes of Health National Library of Medicine. Pepcid AC Original Strength. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=54f4086f-e443-4e7e-8c7e-94e152e1c256>. Updated January 17, 2022. Accessed December 30, 2022.

¹⁷ 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 30, 2022.

¹⁸ 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 30, 2022.

E. SUMMARY OF MEDICAL FACTS

The 57-year-old male pilot had his only aviation medical examination on May 4, 2016. At that time, he was 75 inches tall and weighed 221 pounds. He had a history of psoriatic arthritis and reported using the medication sulfasalazine. He was issued a third-class medical certificate limited by a requirement to have available glasses for near vision, and in June 2016 he received an FAA letter of eligibility for his arthritis, to be monitored per Conditions Aviation Medical Examiners Can Issue (CACI) criteria. The pilot's medical certificate expired in 2018. He completed a BasicMed Comprehensive Medical Examination Checklist in November 2019 and a BasicMed training course in June 2020.

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Submitted by:

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