

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



Medical Factual Memorandum for Record

November 21, 2024

A. CASE

NTSB ID: CEN23FA084
Location: Yoakum, Texas
Date: January 17, 2023

B. MEDICAL SPECIALIST

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

C. DETAILS

1.0 Description of Review

For purposes of evaluating the 64-year-old male left-seat owner-pilot (pilot) and the 33-year-old male right-seat pilot (copilot) for potentially impairing substances and potentially impairing medical conditions, the above Medical Specialist reviewed the following sources of medical information, along with selected relevant regulation, medical literature, and investigator reports.

- Final Federal Aviation Administration (FAA) medical case review
- Autopsy report - pilot
- Toxicology report - pilot
- Autopsy report - copilot
- Toxicology report - copilot

2.0 Summary of Medical Facts

2.1 Pilot

The pilot's last aviation medical examination was March 21, 2022. At that time, he reported no medication use and no active medical conditions.¹ He was issued a second-class medical certificate limited by a requirement to wear corrective lenses.

The Fort Bend County Medical Examiner Office performed the pilot's autopsy. According to the pilot's autopsy report, his cause of death was multiple blunt force trauma. His autopsy did not identify significant natural disease.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the pilot. Pheniramine was detected at a trace level in femoral blood and was also detected in liver tissue. Naltrexone was detected in liver tissue; naltrexone was not detected in heart blood. The naltrexone metabolite 6-beta-naltrexol was detected at a trace level in heart blood and was also detected in liver tissue.² Cannabidiol (CBD) was detected in heart blood and liver tissue.

Pheniramine is a sedating antihistamine medication that is available over the counter in oral products for cold and allergy symptom relief, as well as in eye drops for allergy-related eye redness and itching. Oral pheniramine products typically carry a warning that users should use caution when driving a motor vehicle or operating machinery.³ The FAA states that, after a pilot uses any drug with that warning (including any sedating antihistamine), the pilot should observe a waiting period for the drug to be cleared from circulation before flying.⁴

Naltrexone is a prescription opioid-blocking medication that is available as an intramuscular injection and as an oral drug for treatment of opioid use disorder and alcohol use disorder.⁵ Naltrexone is also available in combination with another drug

¹ According to the FAA medical case review, the pilot had previously reported a history of seasonal allergies managed with over-the-counter non-sedating antihistamine medication.

² Pheniramine and 6-beta-naltrexol were reported as "detected" in blood. According to an e-mail from an FAA forensic toxicologist, the levels of pheniramine and 6-beta-naltrexol in blood were trace/very low.

³ National Institutes of Health National Library of Medicine. Theraflu Cold and Flu. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=e49a93a8-158a-4184-b4bc-cac3031ad8b6>. Updated April 24, 2024. Accessed November 21, 2024.

⁴ 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/ame_guide/pharm/dni_dnf. Updated July 10, 2023. Accessed November 21, 2024.

⁵ National Institutes of Health National Library of Medicine. Naltrexone Hydrochloride. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=49aa3d6d-2270-4615-aafa-b440859ab870>. Updated February 15, 2024. Accessed November 21, 2024.

(which was not detected in this case) as a prescription medication for weight control.⁶ Naltrexone may carry a warning that users should avoid driving or operating heavy machinery until they have determined how the drug affects them.⁵ According to the FAA medical case review for this accident, naltrexone may sometimes be acceptable for pilot medical certification, only after case-by-case FAA review of the dose and underlying condition. 6-beta-naltrexol is the primary active metabolite of naltrexone.⁷

CBD is a non-intoxicating chemical that can be derived from the cannabis plant.⁸ CBD is widely marketed in a variety of products for a variety of claims. The only CBD product approved by the US Food and Drug Administration is a prescription medication for the treatment of certain seizure disorders.⁹ The purity and safety of other CBD products is generally uncertain.¹⁰ The chemical CBD itself does not typically cause impairment on objective measures of performance.¹¹ CBD use is not specifically disqualifying for pilot medical certification, although the FAA's Guide for Aviation Medical Examiners notes that some conditions for which people use CBD products may be disqualifying, and instructs examiners to review a current detailed clinical progress note to verify any underlying condition.¹²

2.2 Copilot

The copilot's only aviation medical examination was March 28, 2018. At that time, he reported no medication use and no active medical conditions. He was issued a first-class medical certificate without limitation.

⁶ National Institutes of Health National Library of Medicine. Contrave Extended-Release. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=485ff360-32c8-11df-928b-0002a5d5c51b>. Updated May 21, 2024. Accessed November 21, 2024.

⁷ Baselt RC. *Disposition of Toxic Drugs and Chemicals in Man*. 11th ed. Biomedical Publications; 2017.

⁸ US Centers for Disease Control. About CBD. Cannabis and Public Health. <https://www.cdc.gov/cannabis/about/about-cbd.html>. Updated February 15, 2024. Accessed November 21, 2024.

⁹ National Institutes of Health National Library of Medicine. Epidolex. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=8bf27097-4870-43fb-94f0-f3d0871d1eec>. Updated March 13, 2024. Accessed November 21, 2024.

¹⁰ Substance Abuse and Mental Health Services Administration. Advisory: Cannabidiol (CBD) potential harm, side effects, and unknowns. Evidence-Based Practices Resource Center. <https://store.samhsa.gov/sites/default/files/pep22-06-04-003.pdf>. Published February 2023. Accessed November 21, 2024.

¹¹ Lo LA, Christiansen AL, Strickland JC, et al. Does acute cannabidiol (CBD) use impair performance? A meta-analysis and comparison with placebo and delta-9-tetrahydrocannabinol (THC). *Neuropsychopharmacology*. 2024;49(9):1425-1436. doi:10.1038/s41386-024-01847-w.

¹² Federal Aviation Administration. Controlled substances and CBD products. Guide for Aviation Medical Examiners. https://www.faa.gov/sites/faa.gov/files/2022-05/Controlled_Substances_and_CBD_Products.pdf. Updated May 25, 2022. Accessed November 21, 2024.

The Fort Bend County Medical Examiner Office performed the copilot's autopsy. According to the copilot's autopsy report, his cause of death was multiple blunt force trauma. His autopsy did not identify significant natural disease.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem specimens from the copilot. Meclizine was detected in heart blood at 36.5 ng/mL; meclizine was not detected in urine. Cetirizine was detected in urine; cetirizine was not detected in heart blood.

Meclizine, sometimes marketed as Dramamine Less Drowsy, is a sedating antihistamine medication available over the counter for prevention and treatment of dizziness, nausea, and vomiting associated with motion sickness. Meclizine can also be used to treat vertigo symptoms caused by inner ear problems. Meclizine typically carries a label warning that it can cause drowsiness and may adversely affect a user's ability to safely drive a motor vehicle or operate machinery.^{13,14} The FAA states that, after a pilot uses any drug with that warning (including any sedating antihistamine), the pilot should observe a waiting period for the drug to be cleared from circulation before flying.⁴ According to the FAA medical case review for this accident, meclizine should not be used by a pilot within 36 hours of flying, and the FAA considers regular use by a pilot (as opposed to occasional use) to be unacceptable. Therapeutic meclizine levels in the plasma of living users typically range from about 1 - 45 ng/mL, with a typical elimination half-life of about 5-7 hours.¹⁵

Cetirizine is a second-generation antihistamine medication that is available over the counter and is commonly used to treat allergy symptoms. Cetirizine often carries a warning that users may experience drowsiness and should be careful when driving a motor vehicle or operating machinery.¹⁶ Data on sedation and psychomotor impairment from cetirizine are mixed, with some studies finding some sedating and

¹³ National Institutes of Health National Library of Medicine. Dramamine Less Drowsy. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=fa6a0969-7427-4b87-bc04-a2792665c218>. Updated January 5, 2024. Accessed November 21, 2024.

¹⁴ National Institutes of Health National Library of Medicine. Antivert. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=4a5d81fc-ad25-4c3f-a91c-93fe334c02e5>. Updated October 18, 2022. Accessed November 21, 2024.

¹⁵ Schulz M, Schmoltdt A, Andresen-Streichert H, Iwersen-Bergmann S. Revisited: therapeutic and toxic blood concentrations of more than 1,100 drugs and other xenobiotics. *Crit Care*. 2020;24(1):195. doi:10.1186/s13054-020-02915-5.

¹⁶ National Institutes of Health National Library of Medicine. Zyrtec Allergy. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=b165db38-b302-4220-8627-77cb07bb078c>. Updated November 1, 2024. Accessed November 21, 2024.

impairing effects.^{17,18,19} The FAA states that pilots should wait 48 hours after using cetirizine before flying, to allow time for the drug to be cleared from circulation.²⁰

Submitted by:

Turan Kayagil, MD, FACEP
Medical Officer

¹⁷ Adelsberg BR. Sedation and performance issues in the treatment of allergic conditions. *Arch Intern Med.* 1997;157(5):494-500.

¹⁸ Moskowitz H, Wilkinson CJ. *Antihistamines and Driving-Related Behavior: A Review of the Evidence for Impairment.* National Highway Traffic Safety Administration. DOT HS 809 714. May 2004. <https://www.nhtsa.gov/sites/nhtsa.gov/files/antihistamines20text.pdf>. Accessed November 21, 2024.

¹⁹ Du Q, Zhou Y. Placebo-controlled assessment of somnolence effect of cetirizine: a meta-analysis. *Int Forum Allergy Rhinol.* 2016;6(8):871-879. doi:10.1002/alr.21746.

²⁰ Federal Aviation Administration. Allergy - antihistamine & immunotherapy medication. Guide for Aviation Medical Examiners. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/AllergyAntihistamineImmunotherapyMedication.pdf. Updated October 26, 2022. Accessed November 21, 2024.