

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



Medical Factual Memorandum for Record

June 28, 2024

A. CASE

NTSB ID: WPR22FA298
Location: Blyn, Washington
Date: August 10, 2022

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 pilot 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 reports – pilot

2.0 Summary of Medical Facts

The 66-year-old male pilot's last aviation medical examination was August 12, 2019. At that time, he reported a history of high blood pressure. He reported taking the prescription blood pressure medications losartan and amlodipine. The Aviation Medical Examiner (AME) noted that the pilot had a history of taking the prescription

diabetes/prediabetes medication metformin for elevated blood sugar, and that his most recent hemoglobin A1c (HbA1c) without medication was 7.3%.¹ The AME consulted with a physician in the FAA Aerospace Medical Certification Division and was advised that he could issue the medical certificate and should counsel the pilot about diabetes control. The AME issued the pilot a third-class medical certificate without limitation. This certificate expired in 2021. In August 2021, the pilot completed a BasicMed education course, and reported completing a BasicMed Comprehensive Medical Examination Checklist (CMEC) in July 2021.²

Pacific Northwest Forensic Pathologists performed the pilot's autopsy, as authorized by the Jefferson County Prosecuting Attorney / Coroner. According to the pilot's autopsy report, his cause of death was multiple blunt force trauma and his manner of death was accident. Evidence of dilated cardiomyopathy was identified; his heart was described as enlarged with prominent dilatation of all chambers. The autopsy did not identify other significant natural disease.

At the Request of the Jefferson County Prosecuting Attorney's Office, NMS Labs performed toxicological testing of postmortem heart blood from the pilot. No tested-for substances were detected.³

The FAA Forensic Sciences Laboratory also tested postmortem specimens from the pilot. This testing detected doxepin at 9 ng/mL in heart blood and 23 ng/mL in urine, as well as the doxepin metabolite nordoxepin at 11 ng/mL in heart blood and 9 ng/mL in urine. Sildenafil and its metabolite desmethylsildenafil were also detected in heart blood and urine, as were losartan and amlodipine. Glucose was measured at 771 mg/dL in urine; glucose was not detected in vitreous fluid.⁴ HbA1c was measured at 6.4%.

¹ HbA1c is an indirect measure of a person's average blood sugar over approximately the preceding 3 months. Generally, normal HbA1c is below 5.7%, HbA1c of 5.7% to 6.4% is considered prediabetes, and HbA1c of 6.5% or higher indicates diabetes. For treated diabetes, HbA1c of less than 7% generally indicates control.

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 education 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 The toxicology report listed tested-for substances as: amphetamines, barbiturates, benzodiazepines, buprenorphine/metabolite, cannabinoids, cocaine/metabolites, fentanyl/acetyl fentanyl, methadone/metabolite, methamphetamine / MDMA, opiates, oxycodone/oxymorphone, and phencyclidine, as well as the volatiles acetone, ethanol, isopropanol, and methanol.

⁴ According to [the FAA Forensic Sciences Laboratory's website](#), the laboratory considers glucose (sugar) levels in urine and vitreous fluid to be abnormal if above 100 mg/dL and 125 mg/dL, respectively. The choice of these values is discussed in FAA Aerospace Medicine Technical Report [DOT/FAA/AM-00/22](#).

Doxepin is a prescription tricyclic antidepressant medication that may be used at low doses to treat insomnia or at higher doses to treat depression. A topical form of doxepin is also available for treatment of itching and nerve-related pain. Doxepin is highly sedating and generally carries a warning against driving or operating machinery after use, even in topical form. The plasma elimination half-life of doxepin is about 8-25 hours and impairing effects from bedtime doxepin use can persist into the next day.⁵⁻⁹ The FAA states that pilots should not fly while using any sedative or medication that carries a driving or drowsiness warning.¹⁰ Additionally, some conditions treated by doxepin can be impairing; for example, major depression can cause cognitive impairment, particularly of executive function.¹¹ According to the FAA medical case review for this crash, a pilot's use of doxepin for any reason is disqualifying. Nordoxepin is an active metabolite of doxepin. Both doxepin and nordoxepin may undergo postmortem redistribution, affecting levels measured in heart blood.⁹

Sildenafil is a prescription medication commonly used to treat erectile dysfunction, as a sexual enhancement aid, or in the treatment of certain other conditions.¹² Sildenafil is not generally considered impairing, although the FAA states that pilots should wait 8 hours after using it before flying, to monitor for side effects.¹³ Desmethylsildenafil is a metabolite of sildenafil.

⁵ Hirsch M, Birnbaum RJ. Tricyclic and tetracyclic drugs: pharmacology, administration, and side effects. In: Post TW, ed. *UpToDate*. Waltham, MA: UpToDate Inc. <https://www.uptodate.com/contents/tricyclic-and-tetracyclic-drugs-pharmacology-administration-and-side-effects>. Updated December 11, 2023. Accessed June 28, 2024.

⁶ National Institutes of Health National Library of Medicine. Silenor. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=1bec1223-5239-4eb6-a9e8-62444106d2c0>. Updated May 8, 2023. Accessed June 28, 2024.

⁷ National Institutes of Health National Library of Medicine. Zonalon. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=1bec1223-5239-4eb6-a9e8-62444106d2c0>. Updated June 14, 2017. Accessed June 28, 2024.

⁸ National Institutes of Health National Library of Medicine. Doxepin hydrochloride. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=33a15c3f-bec0-4703-a4e9-f8f78f8b5fd3>. Updated December 5, 2022. Accessed June 28, 2024.

⁹ Baselt RC. *Disposition of Toxic Drugs and Chemicals in Man*. 11th ed. Biomedical Publications; 2017.

¹⁰ 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 April 23, 2024.

¹¹ Snyder HR. Major depressive disorder is associated with broad impairments on neuropsychological measures of executive function: a meta-analysis and review. *Psychol Bull*. 2013;139(1):81-132. doi:10.1037/a0028727.

¹² National Institutes of Health National Library of Medicine. Viagra. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=0b0be196-0c62-461c-94f4-9a35339b4501>. Updated December 15, 2017. Accessed January 8, 2024.

¹³ Federal Aviation Administration. Guide for aviation medical examiners: pharmaceuticals (therapeutic medications) erectile dysfunction and benign prostatic hyperplasia medications. Federal Aviation Administration

Losartan and amlodipine are prescription medications commonly used to treat high blood pressure; they are not generally considered impairing.

Submitted by:

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Medical Officer

website. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/pharm/ed/.
Updated August 25, 2017. Accessed January 8, 2024.