National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

Medical Factual Memorandum for Record
August 28, 2024

A. CASE

NTSB ID: WPR22FA345
Location: Seligman, Arizona
Date: September 13, 2022

B. MEDICAL SPECIALIST

Specialist JE Tuttle MD MHA FACS
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
- FAA medical certification file
- Autopsy report – pilot
- Toxicology report – pilot

2.0 Summary of Medical Facts

According to FAA medical records, the 42-year-old male pilot's only aviation medical examination was December 30, 2020. At that time, the pilot reported using the medication esomeprazole to treat acid reflux and reported no other active

medical conditions. The pilot reported having had four driving under the influence (DUI) arrests, and a history of an illegal gun charge. The Aviation Medical Examiner (AME) deferred the medical certification decision to the FAA.

The pilot underwent an evaluation by a Human Intervention Motivational Study (HIMS) AME on March 1, 2022.[1] According to the HIMS AME evaluation report, the pilot reported a long history of alcohol use with multiple failed interventions over a 25-year period, as well as a history of cocaine and "speed" use in his early twenties.[2] After the last DUI in 2014, the pilot attended court mandated outpatient rehabilitation and cognitive behavioral therapy. His sobriety date was reported as August 3, 2014. The pilot also reported that he was taking fluoxetine (a prescription medication commonly used to treat depression) for anger and irritability prescribed by his primary care physician. The HIMS AME noted that the pilot was also taking phentermine as a weight loss adjunct since 2021, as documented in the pilot's personal medical records; however, there is no evidence that the HIMS AME noted the use of trazodone or the pilot disclosed using trazodone which was also referenced in his personal medical records.[3] The HIMS AME recommended that the pilot be considered for an Authorization for Special Issuance as long as the pilot continued his recovery programs including Alcoholics Anonymous (AA).

The pilot also underwent a formal neuropsychological evaluation on March 11, 2022, to facilitate the FAA's consideration for medical certification. The pilot did not report using phentermine or trazodone to the neuropsychologist; he did report using fluoxetine. The evaluating neuropsychologist concluded that the results of the evaluation revealed some degree of anterior brain dysfunction that impacted processing speed, retrieval of information, and sustained attention. The examiner concluded that there was mild evidence of aeromedical significant cognitive defects and recommended cognitive rehabilitation and re-testing. The pilot underwent cognitive rehabilitation and underwent re-testing on June 2, 2022. At that time, the evaluating neuropsychologist concluded that the previously documented anterior brain dysfunction was no longer present and there were no aeromedically significant deficits that would preclude an Authorization for Special Issuance.

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[1] A HIMS AME is an AME who has successfully completed and passed additional training in evaluating pilots for substance- or alcohol-related conditions or other conditions (such as the SSRI program).

Federal Aviation Association. AME Guide: Drug and Alcohol Monitoring. https://www.faa.gov/ame_guide/media/DA_Monitoring_Programs_and_HIMS_FAQs.pdf. Updated October 25, 2023. Accessed August 2, 2024.

[2] "Speed" is a street name commonly referring to stimulant amphetamines that can be used by individuals seeking euphoria, increased alertness, or weight loss.

[3] In the personal medical records contained in the FAA medical certification file, there is one reference in a primary care visit note from October 5, 2021, where the pilot was asking for a refill for trazodone. There is no explanation as to the indication for prescribing trazodone to the pilot or if the prescription was refilled.

According to records contained with the pilot's FAA medical certification file, the pilot's primary care physician wrote a letter to the FAA on July 12, 2022 stating that the pilot was no longer taking trazodone or phentermine as of December 12, 2021. The physician stated that she had verified these findings with the State of Texas prescription monitoring program at that time. The pilot was then seen again by the HIMS AME on July 30, 2022. The report from the HIMS AME documents multiple negative random drug and alcohol tests from December 2021 to June 2022, AA attendance records, and a review of both sets of neurocognitive testing results. The pilot continued to report taking fluoxetine. The HIMS AME recommended the pilot be considered for an Authorization for Special Issuance.

According to the medical certification file, a random drug and alcohol test from July 26, 2022, detected ethyl glucuronide in urine.[4] No other tested-for substances were detected.[5] These results were not available to the HIMS AME at the time of the July 30, 2022, visit. A letter from the HIMS AME dated August 3, 2022, to the FAA, reported the positive toxicology result and states that the pilot self-discontinued monitoring when contacted. According to the letter, when the HIMS AME requested the pilot return to provide another specimen for follow-up testing, the pilot refused.[6] The HIMS AME rescinded his support for the pilot's Authorization for Special Issuance. The FAA issued the pilot a general denial on September 1, 2022, for substance dependence and unspecified depressive disorder with unreported fluoxetine use and phentermine use.

The Coconino County Health and Human Services Medical Examiner's Office performed the pilot's autopsy. According to the pilot's autopsy report, his cause of death was multiple blunt force injuries, and his manner of death was accident. The autopsy examination was limited by the extent of the pilot's injuries. The brain was absent, and the heart and lungs had extensive structural injuries. Within these limitations, the autopsy did not identify significant natural disease.

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[4] Ethyl glucuronide is a metabolite of ethanol, and it is used as a biomarker to assess ethanol abstinence. It can be detected in urine 2-5 days from last ethanol consumption.

[5] Quest urine drug screens includes a urine validity test, urine substance abuse panel (including amphetamines, barbiturates, benzodiazepines, cocaine metabolites, marijuana metabolites, methadone, methaqualone, opiates, oxycodone, phencyclidine, propoxyphene) and ethyl glucuronide and ethyl sulfate. Test 22898N in 2022. https://testdirectory.questdiagnostics.com/test/results?q=urine%20drug%20monitoring%20panel%20%2B%20etg. Accessed August 2, 2024.

[6] PEths are a group of phospholipids formed only in the presence of ethanol. It is a sensitive biomarker for ethanol consumption and may be detected for 3-12 days after consumption.

Schröck A, Thierauf-Emberger A, Schürch S, Weinmann W. Phosphatidylethanol (PEth) detected in blood for 3 to 12 days after single consumption of alcohol-a drinking study with 16 volunteers. Int J Legal Med. 2017 Jan;131(1):153-160. doi: 10.1007/s00414-016-1445-x. Epub 2016 Sep 5. PMID: 27596747.

The FAA Forensic Sciences Laboratory performed toxicological testing of postmortem vitreous fluid, and liver, lung, and muscle tissue of the pilot.[7] Ethanol was detected in lung tissue at 0.034 g/hg and in muscle tissue at 0.026 g/hg.[8] Ethanol was not detected in vitreous fluid or liver tissue. Fluoxetine and norfluoxetine were detected in liver and muscle tissue. Trazodone was detected in liver tissue at 993 ng/g and muscle at 118 ng/g. Phentermine was detected in liver tissue at 2503 ng/g and muscle at 273 ng/g. Dextromethorphan, loratadine, and desloratadine were detected in liver and muscle tissue. No blood was available for testing.

Ethanol is a type of alcohol. It is the intoxicating alcohol in beer, wine, and liquor, and, if consumed, can impair judgment, psychomotor performance, cognition, and vigilance.[9] FAA regulation imposes strict limits on flying after consuming ethanol, including prohibiting pilots from flying with a blood ethanol level of 0.04 g/dL or greater.[10] Alcohol consumption is not the only possible source of ethanol in postmortem specimens. Ethanol can sometimes be produced by microbes in a person's body after death. Postmortem ethanol production is made more likely by extensive traumatic injury and can cause an affected toxicological specimen to test positive for ethanol while another specimen from the same person tests negative.[11] Vitreous fluid generally is better protected from microbial spread, and thus generally is less susceptible to postmortem ethanol production, than are other specimen types.[12,13]

Fluoxetine is a prescription medication commonly used to treat major depressive disorders, obsessive compulsive disorders, and bulimia. Fluoxetine is the only antidepressant medication with an indication to treat bipolar disorder as a single medication. Fluoxetine generally carries a warning that it may impair judgement,

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[7] 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.

[8] In tissue, concentrations in g/hg are approximately equivalent to concentrations in g/dL.

Lewis RJ, Johnson RD, Angier MK, Vu NT. Ethanol formation in unadulterated postmortem tissues. *Forensic Sci Int*. 2004;146(1):17-24. doi:10.1016/j.forsciint.2004.03.015.

[9] Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

[10] 14 Code of Federal Regulations §91.17. General operating and flight rules. https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-91. Updated May 7, 2024. Accessed May 16, 2024.

[11] Kugelberg FC, Jones AW. Interpreting results of ethanol analysis in postmortem specimens: a review of the literature. *Forensic Sci Int*. 2007;165(1):10-29. doi:10.1016/j.forsciint.2006.05.004.

[12] Federal Aviation Administration. Forensic Toxicology Drug Information. Ethanol. http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60. Accessed February 29, 2024.

[13] Savini F, Tartaglia A, Coccia L, et al. Ethanol Determination in Post-Mortem Samples: Correlation between Blood and Vitreous Humor Concentration. *Molecules*. 2020;25(12):2724. Published 2020 Jun 12. doi:10.3390/molecules25122724.

thinking, and motor skills, and that caution should be used when operating heavy machinery until the person using the medication is certain the drug does not adversely affect them.[14] A pilot on fluoxetine (not in combination with other psychiatric drugs) may be considered for FAA medical certification via an Authorization for Special Issuance, depending on evaluation of the individual pilot's condition and response to treatment.[15] Norfluoxetine is a metabolite of fluoxetine.

Trazodone is a prescription antidepressant medication that may be used to treat major depression and is also commonly used to treat insomnia. It typically carries a warning that it can slow thinking and motor skills, and that users should not drive, operate heavy machinery, or do other dangerous activities until they know how the drug affects them. The FAA considers trazodone a "do not issue/do not fly medication."[16]

Phentermine is an amphetamine derivative used as a short-term adjunct with diet modification and exercise to increase weight loss. Phentermine generally carries a warning that use may impair the ability to operate a motor vehicle or operate heavy machinery. Phentermine also carries a warning regarding the risk of abuse as it is a stimulant, and its use may also contribute to insomnia due to its stimulant effects.[17] The FAA considers phentermine a "do not issue/do not fly" medication.

Dextromethorphan is a cough suppressant found in numerous over-the-counter cough syrups and cold medications.[18] Dextromethorphan is not typically impairing at levels associated with medicinal use.[19] The FAA states that pilots should

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[14] National Institutes of Health National Library of Medicine. Fluoxetine hydrochloride. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=45454555-7402-41cb-a452-e6a76e04f387. Updated February 12, 2024. Accessed August 2, 2024.

[15] Federal Aviation Administration. Guide for Medical Examiners: Decisions considerations – aerospace medical dispositions. Item 47. Psychiatric Conditions- use of antidepressants. https://www.faa.gov/ame_guide/app_process/exam_tech/item47/amd/antidepressants. Updated April 24, 2024. Accessed August 2, 2024.

[16] National Institutes of Health National Library of Medicine. Trazodone hydrochloride. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a699724b-7412-479e-9894-4cf6ec454d8b. Updated October 25, 2007. Accessed August 2, 2024.

[17] National Institutes of Health National Library of Medicine. Phentermine hydrochloride. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=02b8f684-b1ca-4ab7-9567-bcacc6a92779. Updated February 27, 2020. Accessed August 2, 2024.

[18] National Institutes of Health National Library of Medicine. Acetaminophen, dextromethorphan, phenylephrine. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=563452d1-0c19-4094-895a-805c859bc49b. Updated January 15, 2015. Accessed May 13, 2024.

[19] National Highway Traffic Safety Administration. Drugs and Human Performance. (2014). "Drugs and Human Performance" (2014). https://doi.org/10.21949/1525821.

not fly after using dextromethorphan until at least five dosage intervals have elapsed, to allow time for the drug to be cleared from circulation.[20]

Loratadine is a second-generation antihistamine available over the counter. It is commonly available in combination medications to treat allergy and cold symptoms.[21] Loratadine is not generally considered impairing. Desloratadine is a metabolite of loratadine.

Submitted by:

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Medical Officer

[20] Federal Aviation Administration. What over-the-counter medications can I take and still be safe to fly? https://www.faa.gov/sites/faa.gov/files/licenses_certificates/medical_certification/medications/OTCMedicationsfoPilots.pdf. Updated November 13, 2019. Accessed May 13, 2024.

[21] National Institute of Health National Library of Medicine. Loratadine tablet. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a54cdbe9-32ec-45ca-948f-9cefbb8e3cbf. Updated January