

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN22FA375

MEDICAL

Specialist's Factual Report

July 11, 2023

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A. ACCIDENT

Location: Maxwell, California
Date: August 9, 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 potentially impairing substances and potentially impairing medical conditions.

2.0 Methods

The Federal Aviation Administration (FAA) medical case review and the pilot's autopsy and toxicology reports were reviewed, as were selected personal medical records. Selected 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 73-year-old male pilot's last aviation medical examination was on June 2, 2008. At that time, he reported 1200 total civilian flight hours. He reported a history of Barrett's esophagus.¹ He reported using the medications rabeprazole (a prescription stomach-acid-suppression medication) and atorvastatin (a prescription medication commonly used to help control cholesterol and reduce cardiovascular risk), neither of which is generally considered impairing. No significant issues were identified, and he was issued a third-class medical certificate limited by a requirement to wear corrective lenses for near and distant vision. That medical certificate expired in 2010.

¹ Barrett's esophagus is a condition in which the tissue lining the esophagus becomes damaged by reflux of stomach acid. This condition sometimes may progress to esophageal cancer.

In June 2021, the pilot completed a BasicMed Course and Comprehensive Medical Examination Checklist (CMEC).²

2.0 Personal Medical Records

Records for 3 years prior to the accident date were reviewed from the health system where the pilot obtained his primary medical care. The pilot's most recent healthcare visit documented in those records was a physical medicine and rehabilitation visit on August 3, 2022.³ At that visit his height was 71 inches and his weight was 156 pounds.

According to reviewed medical records, the pilot had a history of esophageal cancer managed with surgery (esophagectomy) in 2013, with no recurrence. Since that time, the pilot required occasional esophageal stricture dilation procedures. The most recent such procedure documented in reviewed records was in October 2021. There was no finding concerning for recurrent cancer on the endoscopic examination performed during that procedure.

Reviewed records also indicated that the pilot's medical history included high cholesterol and iron deficiency anemia (both being treated), anxiety (no documented indication that this was a significant active issue or was being actively treated), and cataracts (not significantly affecting his vision or requiring treatment as of a June 2021 comprehensive eye examination by an optometrist). The pilot's documented home medications as of his most recent visit to his primary care provider in February 2022 were omeprazole (an over-the-counter stomach-acid-suppression medication of the same class as rabeprazole), atorvastatin, and an iron supplement.⁴

The pilot visited his primary care provider in June 2021 for follow-up and to complete an FAA form (presumably his BasicMed CMEC, although this is not explicitly stated in the record). The visit note documented the pilot's medical history and medications and an unremarkable physical examination. The provider noted that the pilot wore hearing aids and had no problems with vision or mobility. According to

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 This visit was for follow up of a knee injury sustained several months earlier while dismounting a motorcycle. The visit provider noted good strength and range of motion and an unremarkable gait, and documented that the pilot enjoyed physical activities including bicycling and hiking.

⁴ The pilot was also prescribed azelastine nasal spray and inhaled budesonide/formoterol for a cough at that visit. None of these medications is generally considered impairing.

the visit note, the provider completed the FAA form; reviewed records did not include a copy of that form.

3.0 Autopsy

Bennet Omalu Pathology performed the pilot's autopsy. According to the pilot's autopsy report, his cause of death was high-velocity acceleration-deceleration polytrauma and his manner of death was accident. The extent of injuries severely limited evaluation for natural disease, preventing structural evaluation of the brain, heart, and lungs. Examined trachea and bronchi showed no evidence of smoke inhalation.

4.0 Toxicology

4.1 Central Valley Toxicology Results

At the request of Bennet Omalu Pathology, Central Valley Toxicology (CVT) performed toxicological testing of postmortem liver tissue from the pilot. This testing detected ethanol at 0.16 g/hg.⁵

4.2 FAA Toxicology Results

The FAA Forensic Sciences laboratory also performed toxicological testing of postmortem specimens from the pilot.⁶ Ethanol was detected at 0.078 g/hg in liver tissue, 0.038 g/hg in lung tissue, 0.064 g/hg in kidney tissue, and 0.033 g/hg in heart tissue. N-propanol was detected in lung tissue, kidney tissue, and heart tissue, and was not detected in liver tissue. Ondansetron was detected in liver tissue and was not detected in kidney tissue. No urine, vitreous fluid, or suitable blood was available for FAA testing.

4.3 Descriptions of Detected Substances

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.⁷ 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.⁸ However, consumption is not the only possible source of ethanol in

⁵ In tissue, concentrations in g/hg are approximately equivalent to concentrations in g/dL.

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.

⁷ Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

⁸ [14 Code of Federal Regulations § 91.17](#).

postmortem specimens. Ethanol can sometimes be produced by microbes in a person's body after death. Postmortem ethanol production is made more likely by severe trauma and delayed recovery of remains, and can affect different specimens from the same individual to different extents, causing significant variations in measured ethanol levels across the specimens. N-propanol is another alcohol that can be produced by microbes in a person's body after death.⁹

Ondansetron is a prescription medication commonly used to treat nausea and vomiting.¹⁰ Multiple studies have found no significant impairing effect of ondansetron on cognitive and psychomotor performance.^{11 - 15} Ondansetron may be used to treat nausea associated with cancer chemotherapy or radiation therapy, and, according to the FAA medical case review for this crash, the FAA considers ondansetron unacceptable for pilot medical certification.

Notably, the pilot's personal medical records reviewed for this case indicated that he had never received chemotherapy or radiation therapy for his esophageal cancer. Although the records did not document ondansetron among the pilot's prescribed medications, a family member of the pilot stated in an e-mail that the pilot had used ondansetron as needed for occasional nausea that had persisted since his 2013 esophagectomy.

⁹ 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.

¹⁰ National Institutes of Health National Library of Medicine. Ondansetron. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=eb74425c-c635-4d99-8e98-e63e7359fb89>. Updated March 24, 2022. Accessed July 11, 2023.

¹¹ Hall ST, Cueppens PR. A study to evaluate the effect of ondansetron on psychomotor performance after repeated oral dosing in healthy subjects. *Psychopharmacology (Berl)*. 1991;104(1):86-90. doi:10.1007/BF02244559.

¹² O'Hanlon JF, Vermeeren A, Uiterwijk MM, van Veggel LM, Swijgman HF. Anxiolytics' effects on the actual driving performance of patients and healthy volunteers in a standardized test. An integration of three studies. *Neuropsychobiology*. 1995;31(2):81-88. doi:10.1159/000119177.

¹³ Benline TA, French J. Anti-emetic drug effects on cognitive and psychomotor performance: granisetron vs. ondansetron. *Aviat Space Environ Med*. 1997;68(6):504-511.

¹⁴ Benline TA, French J, Poole E. Anti-emetic drug effects on pilot performance: granisetron vs. ondansetron. *Aviat Space Environ Med*. 1997;68(11):998-1005.

¹⁵ Tsitsipa E, Rogers J, Casalotti S, Belessiotis-Richards C, Zubko O, Weil RS, Howard R, Bisby JA, Reeves S. Selective 5HT3 antagonists and sensory processing: a systematic review. *Neuropsychopharmacology*. 2022;47(4):880-890. doi:10.1038/s41386-021-01255-4.

E. SUMMARY OF MEDICAL FACTS

The 73-year-old male pilot's last aviation medical examination was on June 2, 2008. At that time, he reported a history of Barrett's esophagus, a condition which sometimes may progress to esophageal cancer. He reported using the medications rabeprazole and atorvastatin. No significant issues were identified, and he was issued a third-class medical certificate limited by a requirement to wear corrective lenses for near and distant vision. That medical certificate expired in 2010.

In June 2021, the pilot completed a BasicMed Course and Comprehensive Medical Examination Checklist. At that time, his primary care provider documented an unremarkable physical examination and noted that the pilot wore hearing aids and had no problems with vision or mobility. Reviewed medical records from 3 years prior to the crash date, including records from the pilot's primary care provider, documented that the pilot had a history of esophageal cancer managed with esophagectomy in 2013. After that surgery, the pilot had no recurrence of esophageal cancer. He required occasional esophageal stricture dilation procedures and used the over-the-counter stomach-acid-suppression medication omeprazole. His medical conditions also included high cholesterol treated with atorvastatin and iron deficiency anemia treated with an iron supplement.

According to the pilot's autopsy report, his cause of death was high-velocity acceleration-deceleration polytrauma and his manner of death was accident. The extent of injuries severely limited evaluation for natural disease, preventing structural evaluation of the brain, heart, and lungs.

Toxicological testing of postmortem specimens from the pilot identified ethanol at 0.16 g/hg in one liver tissue specimen, 0.078 g/hg in another liver tissue specimen, 0.038 g/hg in lung tissue, 0.064 g/hg in kidney tissue, and 0.033 g/hg in heart tissue. N-propanol was detected in lung tissue, kidney tissue, and heart tissue. Ondansetron was detected in liver tissue.

Submitted by:

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