



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

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Chief Medical Officer

A. ACCIDENT: CEN16FA188; Sheridan Lakes, CO

On May 18, 2016, about 0901 mountain daylight time, a Cessna P210N, N6609P, sustained substantial damage when it impacted a field in a flat spin about 4 miles northeast of Sheridan Lake, Colorado. The pilot, the sole occupant, received fatal injuries. The airplane was registered to and operated by the Stubblefield Construction Company under the provisions of the 14 Code of Federal Regulations as a Part 91 personal flight. Visual meteorological conditions prevailed at the time of the accident, and the airplane was receiving visual flight rules (VFR) flight following from the Federal Aviation Administration's (FAA) Air Route Traffic Control Center (ARTCC) in Denver, Colorado. The airplane departed the Rock Springs-Sweetwater County Airport (RKS), Rock Springs, Wyoming, about 0645 and was en route to the Wiley Post Airport (PWA), Oklahoma City, Oklahoma.

B. GROUP IDENTIFICATION

No group was formed for the medical evaluation in this accident.

C. DETAILS OF INVESTIGATION

1. Purpose

This investigation was performed to evaluate the pilot for any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins.

2. Methods

The FAA medical case review, FAA blue ribbon medical file, autopsy report, toxicology findings, personal medical records, and the investigator's reports were reviewed.

FAA Medical Case Review and Blue Ribbon Medical File

According to the FAA files, the 64 year old male pilot had been arrested in

2000 after a hard landing in which he collapsed the landing gear on his airplane; post accident evaluation by law enforcement led to a blood alcohol test that resulted in a BAC of 0.260 gm/dl. The pilot voluntarily handed over his Airman Certificate and medical certificate. Evaluation by the court system as well as a private alcohol counselor did not identify him as alcohol dependent at the time. The pilot reapplied for a medical certificate in 2005; after additional evaluation and information regarding the status of his alcohol use was provided, the FAA awarded him a medical certificate.

At the time of the pilot's last aviation medical exam, dated 11/02/2015, he reported 4,205 total hours of civilian flight experience. At that time, he was 70 inches tall and weighed 185 pounds. He reported his previous alcohol arrest as well as a recent hospitalization for a bronchial infection. However, he reported his alcohol abuse was resolved and denied the use of any medications. He was found to be at risk for sleep apnea and educational information was provided by the AME. The pilot was issued a third class medical certificate limited by a requirement to wear corrective lenses.

Autopsy

According to the autopsy requested by the El Paso County Coroner, the cause of death was multiple blunt force injuries and the manner of death was accident.

The heart was mildly enlarged at 500 grams; average for a 181 pound man is 354 grams with a range of 268- 467 grams.¹ There were focal areas of 20-40% coronary arteries but the remainder of the heart was unremarkable.

Toxicology

Toxicology testing performed by the El Paso County Coroner's office detected ethanol at 0.335 gm/dl in vitreous and 0.291 gm/dl in femoral blood as well as confirmed diphenhydramine at less than 0.050 ug/ml and zolpidem at 0.077 ug/ml in femoral blood.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified ethanol at 0.0332 gm/dl in vitreous and 0.247 in cavity blood. In addition, diphenhydramine was detected at levels too low to quantify, zolpidem was found at 0.049 ug/ml, and lorazepam was confirmed at 0.029 ug/ml in cavity blood. Clonidine was detected in liver but not in cavity blood.

¹ Kitzman 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 Clinic Proc., 1988. 63(2):137-46.

Ethanol is the intoxicant commonly found in beer, wine, and liquor. It acts as a central nervous system (CNS) depressant. After ingestion, at low doses, it impairs judgment, psychomotor functioning, and vigilance; at higher doses it can cause coma and death. The effects of ethanol on aviators are generally well understood; it significantly impairs pilots' performance, even at very low levels.² Federal Aviation Regulations, Section 91.17 (a) prohibits any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more ethanol in the blood.³

Diphenhydramine is a sedating antihistamine used to treat allergy symptoms and as a sleep aid. It is available over the counter under the names Benadryl and Unisom. Diphenhydramine carries the following FDA warning: may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery).⁴ Compared to other antihistamines, diphenhydramine causes marked sedation; it is also classed as a CNS depressant and this is the rationale for its use as a sleep aid. Altered mood and impaired cognitive and psychomotor performance may also be observed. In fact, in a driving simulator study, a single dose of diphenhydramine impaired driving ability more than a blood alcohol concentration of 0.10 gm/dl.⁵ The range of blood levels in which diphenhydramine is thought to have psychoactive effects is between 0.025 and 0.112 ug/ml.⁴

Zolpidem is a prescription CNS depressant used as short acting sleep aid, often sold with the name Ambien. It carries this warning, "Due to the rapid onset of action, zolpidem tartrate should only be taken immediately prior to going to bed. Patients should be cautioned against engaging in hazardous occupations requiring complete mental alertness or motor coordination such as operating machinery or driving a motor vehicle after ingesting the drug, including potential impairment of the performance of such activities that may occur the day following ingestion of zolpidem tartrate. Zolpidem tartrate showed additive effects when combined with alcohol and should not be taken with alcohol. Patients should also be cautioned about possible combined effects with other CNS-depressant

² Cook, C.C., Alcohol and aviation. *Addiction* (Abingdon, England), 1997. 92(5):539-555.

³ US Government Printing Office. eCFR- Code of Federal Regulations. 91.17. Accessed 6/16/2017. Available from: <http://www.ecfr.gov/cgi-bin/text-idx?rgn=div8&node=14:2.0.1.3.10.1.4.9>.

⁴ Federal Aviation Administration. Civil Aerospace Medical Institute. Toxicology Drug Information: Diphenhydramine. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=50> . Accessed 11/12/2017.

⁵ Weiler JM, B.J., Woodworth GG, Grant AR, Layton TA, Brown TL, McKenzie DR, Baker TW, Watson GS., Effects of fexofenadine, diphenhydramine, and alcohol on driving performance. A randomized, placebo-controlled trial in the Iowa Driving Simulator. *Ann Intern Med* 2000. 132(5): p. 354-63.

drugs.”⁶ Blood levels where the sedating effects are expected are between 0.025 and 0.30 ug/ml.⁷

Lorazepam is a sedating benzodiazepine that is a Schedule IV controlled substance available by prescription and commonly used to treat anxiety; it is often sold with the name Ativan. It carries this warning, “As with all patients on CNS-depressant drugs, patients receiving lorazepam should be warned not to operate dangerous machinery or motor vehicles and that their tolerance for alcohol and other CNS depressants will be diminished.”⁸ Blood levels where the sedating effects are expected in living subjects are between 0.1600 ug/ml and 0.2700 ug/ml.

Clonidine is a prescription blood pressure medication that is not generally considered impairing.⁹

Personal Medical Records

Records from the pilot’s primary care physician for care between 1/1/2013 and the accident date were acquired and reviewed. According to these records, the pilot had a long history of alcohol abuse with at least four admissions to inpatient rehabilitation for treatment. He relapsed in 2013 and was admitted; he relapsed again in 2014 but was treated as an outpatient. In addition, he had hypertension treated with clonidine, anxiety treated with lorazepam, chronic insomnia treated with zolpidem, low testosterone treated with topical testosterone, and prostate symptoms treated with tamsulosin.

Tamsulosin is a medication for the treatment of prostate symptoms in men, often sold with the name Flomax. It is not generally considered impairing.¹⁰ The other medications are described above.

D. SUMMARY OF MEDICAL FINDINGS

The 64 year old male pilot had a previous conviction for flying an aircraft under the influence of alcohol which followed an accident in 2000. At that time, his blood alcohol concentration was measured at 0.260 gm/dl. Evaluations by several professionals found

⁶ National Institutes of Health. US National Library of Medicine. DailyMed. Zolpidem. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=313ccc9f-7b3e-4e42-b5d8-0e27c3c72d8e> Accessed 12/5/2017.

⁷ Federal Aviation Administration. Civil Aerospace Medical Institute. Toxicology Drug Information: Zolpidem. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=225> Accessed 12/12/2017.

⁸ National Institutes of Health. US National Library of Medicine. DailyMed. Lorazepam tablet. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a0fbf748-b127-420b-8ad9-5e3e36f82568> Accessed 12/12/2017.

⁹ National Institutes of Health. US National Library of Medicine. DailyMed. Clonidine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=accb2879-7c0e-40d9-bc78-af78fc619609> Accessed 12/12/2017.

¹⁰ National Institutes of Health. US National Library of Medicine. DailyMed. Flomax. <https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=flomax&pagesize=20&page=1> Accessed 12/12/2017.

him to have alcohol abuse rather than alcohol dependence. After treatment and further evaluation, the FAA issued the pilot another medical certificate in 2005. He continued to fly and reported no new chronic medical problems, no medications, and reported that he continued to have recovered from his alcohol problem to the FAA. According to the autopsy requested by the El Paso County Coroner, the cause of death was multiple blunt force injuries and the manner of death was accident.

Toxicology testing performed by the El Paso County Coroner's office detected ethanol at 0.335 gm/dl in vitreous and 0.291 gm/dl in femoral blood as well as confirmed diphenhydramine at less than 0.050 ug/ml and zolpidem at 0.077 ug/ml in femoral blood. Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified ethanol at 0.0332 gm/dl in vitreous and 0.247 in cavity blood. In addition, diphenhydramine was detected at levels too low to quantify, zolpidem was found at 0.049 ug/ml, and lorazepam was confirmed at 0.029 ug/ml in cavity blood. Clonidine was detected in liver but not in cavity blood. Ethanol, diphenhydramine, lorazepam, and zolpidem are all considered central nervous system depressants and their use in combination may result in more extensive impairment than merely additive effects.

Personal medical records revealed a long history of multiple in- and out-patient attempts at alcohol rehabilitation as well as that the pilot had hypertension treated with clonidine, anxiety treated with lorazepam, chronic insomnia treated with zolpidem, low testosterone treated with topical testosterone, and prostate symptoms treated with tamsulosin.