



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

August 2, 2018

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Chief Medical Officer

A. ACCIDENT: ANC18FA007; Clearwater, FL

On November 7, 2017, about 1204 eastern standard time, an amphibious, light sport Icon Aircraft, Inc., A5 airplane, N922BA, impacted open water in the Gulf of Mexico while maneuvering at low level near New Port Richey, Florida. The private pilot sustained fatal injuries, and the airplane was substantially damaged. The airplane was registered to N529PG LLC, and operated by the pilot as a 14 Code of Federal Regulations Part 91 visual flight rules personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The local area flight departed from a lake near the pilot's home in Odessa, Florida, about 1147.

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 medical conditions, the use of medications/illicit drugs, and the presence of toxins.

2. Methods

The FAA medical case review, FAA blue ribbon medical file, autopsy reports, 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 records, the 40 year old male pilot was initially medically certified in 2012. His second and last application was dated 5/25/2017. At that time, he reported 624 total hours of flight experience and was 78 inches tall and weighed 265 pounds. He had reported no

medical conditions and no use of medications to the FAA. He was issued a first class medical certificate without limitations.

Autopsy

According to the autopsy performed by Medical Examiner of District Sic, Pasco and Pinellas Counties, the cause of death was blunt trauma and drowning was a contributory factor. The manner of death was accident.

The heart weighed 600 grams and the coronary arteries were described as having mild to minimal atherosclerosis. No other abnormalities were described. Chamber size and wall thicknesses were not reported. The average heart weight for a 260 pound man is 425 grams with a range of 322 to 561 grams.¹

Toxicology

Toxicology testing performed by NMS labs at the request of the medical examiner identified zolpidem at 0.072 ug/ml, amphetamine at 1.80 ug/ml, and morphine at 0.150 ug/ml in cardiac blood.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified amphetamine at 2.2 ug/ml, morphine at 0.192 ug/ml, zolpidem at 0.088 ug/ml, fluoxetine and its metabolite norfluoxetine, and baclofen at 0.72 ug/ml in cardiac blood. All of these substances as well as hydromorphone and ibuprofen were found in the pilot's urine. The lab found the heart blood unsuitable for testing for hydrocodone, the more common precursor for hydromorphone than morphine.

Description of Identified Substances

Zolpidem is a sleep aid available by prescription as a Schedule IV controlled substance, often sold with the name Ambien.² The drug information states, "Complex behaviors such as "sleep-driving" (i.e., driving while not fully awake after ingestion of a sedative-hypnotic, with amnesia for the event) have been reported with sedative-hypnotics, including zolpidem. These events can occur in sedative-hypnotic-naive as well as in sedative-hypnotic-experienced persons. Although behaviors such as "sleep-driving" may occur with zolpidem tartrate alone at

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.

² Controlled substances are those that have been identified by the Drug Enforcement Administration as having the potential for abuse and dependence. Substances are placed in their respective schedules (I-V) based on whether they have a currently accepted medical use in treatment in the United States, their relative abuse potential, and likelihood of causing dependence when abused. Schedule I substances are not legally available because of limited medical use and high risk of abuse and dependence; Schedule II substances have a high potential for abuse which may lead to severe psychological or physical dependence. As the number of the Schedule goes up, the abuse and dependence potential decreases.

therapeutic doses, the use of alcohol and other CNS (central nervous system) depressants with zolpidem tartrate appears to increase the risk of such behaviors...”³

Amphetamine is a Schedule II controlled substance that stimulates the central nervous system available by prescription for the treatment of attention deficit disorder and narcolepsy. It carries a boxed warning about its potential for abuse and has warnings about an increased risk of sudden death and the potential for mental health and behavioral changes.⁴ In some preparations, the prescription drug is metabolized to amphetamine; commonly marketed names in this category include Adderall, Dexedrine, and Vyvanse. After a single 30 mg oral dose, early blood levels averaged 0.111 ug/ml and average blood levels in adults using the long acting prescription orally for a week were about 0.065 ug/ml.⁵ Amphetamine is also prepared and used as a street drug, often by snorting, inhaling, or injecting. Generally, levels above 0.2 ug/ml are the result of mis-using amphetamine to maximize its psychoactive effects.

Morphine is a powerful opioid pain medication available as an injection, tablet, or capsule, identified as a Schedule II controlled substance. Ranges for therapeutic levels are typically determined by giving novice users one or two doses and measuring their blood levels. For morphine, such ranges are 0.010 to 0.100 ug/ml.⁶ Toxic levels of opioids are typically associated with symptoms such as coma and respiratory depression; the information may come from cases of acute intentional or unintentional overdose. With regular opioid use, brain physiology changes, leading to tolerance for both the desired analgesic effects and the sedative effects and increasing dosing as a result; chronic users may need the drug to feel and act “normally.”⁷ This means a chronic user may appear to function normally at levels that would be toxic or even fatal to a first-time user.

Fluoxetine is an antidepressant available by prescription. It carries this warning, “As with any CNS-active drug, fluoxetine has the potential to impair judgment, thinking, or motor skills. Patients should be cautioned about operating hazardous machinery, including automobiles, until they

³ 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 8/2/2018.

⁴ National Institutes of Health. US National Library of Medicine. DailyMed. Amphetamine salts. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=72ddd1c9-ddbd-4c95-acd9-003189a353a3> Accessed 8/2/2018.

⁵ Amphetamine. In: Disposition of Toxic Drugs and Chemicals in Man. Ed: Randall C. Baselt. 9th edition. (2011) Biomedical Publications, Seal Beach, CA.

⁶ Federal Aviation Administration. CAMI Toxicology Drug Information. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=176> Accessed 8/2/2018.

⁷ Kosten TR, George TP. The Neurobiology of Opioid Dependence: Implications for Treatment. Science & Practice Perspectives. 2002;1(1):13-20.

are reasonably certain that the drug treatment does not affect them adversely.”⁸ However, Major depression itself is associated with significant cognitive degradation, particularly in executive functioning.⁹ The cognitive degradation may not improve even with remission of the depressed episode, and patients with severe disease are more significantly affected than those with fewer symptoms or episodes.^{10,11}

Baclofen is a muscle relaxant available by prescription. It carries this warning, “Because of the possibility of sedation, patients should be cautioned regarding the operation of automobiles or other dangerous machinery, and activities made hazardous by decreased alertness. Patients should also be cautioned that the central nervous system effects of baclofen may be additive to those of alcohol and other CNS depressants.”¹²

Hydromorphone is an opioid pain medication available by prescription as a Schedule II controlled substance. Other common names are Dilaudid and Exalgo. It is also a relatively uncommon active metabolite of morphine and a common metabolite of hydrocodone, which is not a metabolite of morphine. It carries this warning, Hydromorphone and other “Schedule II opioid agonists, including morphine, oxycodone, oxycodone, fentanyl, and methadone, have the highest potential for abuse and risk of producing respiratory depression. Alcohol, other opioids and central nervous system depressants (sedative-hypnotics) potentiate the respiratory depressant effects of hydromorphone, increasing the risk of respiratory depression that might result in death.”¹³

Ibuprofen is an over the counter pain medication commonly sold with names like Motrin and Advil. It is not considered impairing.

Personal Medical Records

Records were obtained and reviewed from the pilot’s primary care physician, his back specialist, and his psychiatrist. Although records were

⁸ National Institutes of Health. US National Library of Medicine. DailyMed. Fluoxetine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=59de2889-c3d3-4ebf-8826-13f30a3fa439> Accessed 8/2/2018.

⁹ 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.

¹⁰ Nakano Y, Baba H, Maeshima H, Kitajima A, Sakai Y, Baba K, Suzuki T, Mimura M, Arai H. Executive dysfunction in medicated, remitted state of major depression. *J Affect Disord.* 2008;111(1):46-51.

¹¹ Paelecke-Habermann Y, Pohl J, Leplow B. Attention and executive functions in remitted major depression patients. *J Affect Disord.* 2005;89(1-3):125-35

¹² National Institutes of Health. US National Library of Medicine. DailyMed. Baclofen. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=346af8fe-3816-49de-bfd3-5a7425e728f9> Accessed 8/2/2018.

¹³ National Institutes of Health. US National Library of Medicine. DailyMed. Hydromorphone. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=78353952-324c-4a8d-818c-6537fca21d4e> Accessed 8/2/2018.

requested for any visits in the 3 years preceding the accident, all of the recorded visits occurred in 2015.

During a visit in September 2015, the pilot's primary care physician noted a history of substance abuse with inpatient rehab treatment in 2013 and another from January-March in 2015. At the time, the pilot had been abusing opioids and benzodiazepines. He was noted to have chronic back pain. He told the physician he was being treated for depression and the records document he was taking Adderall and Prozac. No significant abnormalities were noted. The records do not include any other visits.

Another physician saw the pilot for a single visit in 2012 with a complaint of insomnia and provided him with a prescription for 30 tablets of zolpidem. The records provided do not include any other visits.

Records from the pilot's back physician document Grade II spondylolisthesis with nerve compression and treatment in April 2015 with a back injection. There is mention of an earlier prescription (dated 1/22/2013) for hydrocodone-acetaminophen (7.5/325 mg) to be taken every 6 hours as needed (#90). The records do not include any more recent visits.

Finally, records were obtained from visits the pilot made to a psychiatrist in September and October 2015. These include prescriptions for Vyvanse and Prozac. The records provided do not include any other visits.

D. SUMMARY OF MEDICAL FINDINGS

The 40 year old male pilot in this accident had reported no medical conditions and no use of medications to the FAA. Review of personal records indicated a history of substance abuse requiring inpatient rehabilitation at least twice, chronic back pain, insomnia, and a diagnosis of depression. He had been treated with a variety of prescribed medications at times in the years prior to the accident. No recent personal medical records were identified by the investigation.

According to the autopsy performed by Medical Examiner of District Sic, Pasco and Pinellas Counties, the cause of death was blunt trauma and drowning was a contributory factor. The manner of death was accident. The heart was heavier than average but no more descriptive information was provided.

Post accident toxicology testing indicated the pilot had used multiple psychoactive substances simultaneously including amphetamine, zolpidem, morphine, fluoxetine, and baclofen. Levels of these in two labs included amphetamine at 1.80 ug/ml and 2.2 ug/ml, zolpidem at 0.072 ug/ml and 0.088 ug/ml, morphine at 0.150 ug/ml and 0.192 ug/ml, fluoxetine, and baclofen at 0.72 ug/ml in cardiac blood.