



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

March 1, 2018

Mary Pat McKay, MD, MPH
Chief Medical Officer

A. ACCIDENT: CEN16FA370; Arcanum, OH

On September 14, 2016, about 0915 eastern daylight time, a Piper PA-11 airplane, N4910M, impacted terrain while maneuvering near Arcanum, Ohio. The student pilot and passenger were fatally injured and the airplane was substantially damaged. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Day visual meteorological conditions existed at the time of the accident. The local flight departed without a flight plan from a private grass strip about 0800.

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, autopsy report, toxicology results, police reports regarding the crash, and the investigator's reports were reviewed.

FAA Medical Case Review

According to the FAA files, the 20 year old male student pilot reported 2 total hours of flight experience as of his only FAA medical exam, dated 10/16/2012. At that time, he was 70 inches tall and weighed 184 pounds. He reported no medical conditions and no medications to the FAA. No abnormalities were identified, and he was issued a third class medical

certificate without limitations. At the time of the accident, he had not obtained a pilot's license.

Autopsy

According to the autopsy performed at the request of the Coroner, Montgomery County, Ohio, the cause of death was multiple trauma. No significant natural disease was identified.

Toxicology

Toxicology testing performed by the Montgomery County (OH) Coroner's Toxicology Laboratory on heart blood identified 57 ng/ml of alprazolam, along with 161 ± 33 ng/ml of cocaine, 917 ± 190 ng/ml of its primary inactive metabolite benzoylecgonine, 404 ng/ml of another metabolite, ecgonine methyl ester, and 106 ng/ml of cocaethylene, a metabolite only formed when cocaine and ethanol are ingested together. In addition, ethanol was found in heart blood at 0.139 ± 0.013 gm% and in vitreous at 0.095 ± 0.009 gm%.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified ethanol at 0.105 gm% in blood and 0.134 gm% in urine. In addition, alprazolam and its metabolite hydroxylalprazolam; cocaine and multiple metabolites including benzoylecgonine, cocaethylene, anhydroecgonine methyl ester, and ecgonine methyl ester; levamisole; hydroxyzine and its metabolite cetirizine; and naltrexone and its metabolite naltrexol were found in urine. Finally, benzoylecgonine, ecgonine methyl ester; hydroxyzine and its active metabolite cetirizine; and naltrexone and its metabolite naltrexol were confirmed in blood.

Alprazolam is a sedating benzodiazepine prescription medication used to treat anxiety available as a Schedule IV controlled substance and commonly marketed with the name Xanax. It carries this warning, "Because of its central nervous system depressant effects, patients receiving alprazolam tablets should be cautioned against engaging in hazardous occupations or activities requiring complete mental alertness such as operating machinery or driving a motor vehicle. For the same reason, patients should be cautioned about the simultaneous ingestion of alcohol and other central nervous system depressant drugs during treatment with alprazolam tablets."¹

Cocaine is a strong central nervous system stimulant. Initial effects include: euphoria, excitation, general arousal, dizziness, increased focus and alertness. At higher doses, effects may include psychosis, confusion,

¹ National Institutes of Health. US National Library of Medicine. DailyMed. Alprazolam tablets. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2238e083-08f2-0aa8-59b7-16b6d68dbd48> Accessed 2/27/2018.

delusions, hallucinations, fear, antisocial behavior, and aggressiveness. Late effects, beginning within 1 to 2 hours after use, include: dysphoria, depression, agitation, nervousness, drug craving, general central nervous system depression, fatigue, and insomnia. Additional performance effects are expected after higher doses, with chronic ingestion, and during drug withdrawal including agitation, anxiety, distress, inability to focus on divided attention tasks, inability to follow directions, confusion, hostility, time distortion, and poor balance and coordination.²

Ethanol is the intoxicant commonly found in beer, wine, and liquor. It acts as a central nervous system 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.³ 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% or more ethanol in the blood.⁴ Because ingested alcohol is distributed throughout the body, levels from different post mortem tissues are usually similar. Ethanol may also be produced in body tissues by microbial activity after death; however, when this occurs, levels in different tissues may vary considerably.⁵

Levamisole is a drug used to deworm animals; it is not available for use in humans. However, as another white powder, it is commonly used to cut illegally produced cocaine.⁶

Hydroxyzine is an anxiolytic often marketed with the names Atarax and Vistaril. It is known to be sedating and carries these warnings, "THE POTENTIATING ACTION OF HYDROXYZINE MUST BE CONSIDERED WHEN THE DRUG IS USED IN CONJUNCTION WITH CENTRAL NERVOUS SYSTEM DEPRESSANTS SUCH AS NARCOTICS, NON-NARCOTIC ANALGESICS AND BARBITURATES. Therefore, when central nervous system depressants are administered concomitantly with hydroxyzine their dosage should be reduced. Since drowsiness may occur with use of this drug, patients should be warned of this possibility and cautioned against driving a car or operating dangerous machinery while taking hydroxyzine. Patients should

² National Highway Traffic Safety Administration Drugs and Human Performance FACT SHEETS: Cocaine <http://www.nhtsa.gov/people/injury/research/job185drugs/cocain.htm> Accessed 07/31/2015

³ Cook, C.C., Alcohol and aviation. Addiction (Abingdon, England), 1997. 92(5): p. 539-555.

⁴ US Government Printing Office .eCFR- Code of Federal Regulations. 91.17. <http://www.ecfr.gov/cgi-bin/text-idx?rgn=div8&node=14:2.0.1.3.10.1.4.9>. Accessed 6/16/2016.

⁵ Federal Aviation Administration. Forensic Toxicology Drug Information. Ethanol. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60> Accessed 12/02/2016

⁶ National Institutes of Health. US National Library of Medicine. DailyMed. Levamisole powder. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=3fe6e9c0-e05b-4ecb-a437-46b359c39cb0> Accessed 2/27/2018.

also be advised against the simultaneous use of other central nervous system depressant drugs, and cautioned that the effects of alcohol may be increased.”⁷ (Capitals from the original.)

Cetirizine is the primary metabolite of hydroxyzine and is available over the counter as an antihistamine; it crosses the blood brain barrier. It is known to be sedating and is often marketed with the name Zyrtec. It carries this warning, “When using this product, drowsiness may occur, avoid alcoholic drinks, alcohol, sedatives, and tranquilizers may increase drowsiness, be careful when driving a motor vehicle or operating machinery.”⁸

Naltrexone is an opioid antagonist available by prescription and is commonly sold with the names Revia and Vivitrol. It may be used in the treatment of opioid and alcohol addiction.⁹

Other Medical Information

According to multiple people interviewed during the police investigation, the pilot had returned two weeks prior to the accident from a month long stay in a rehabilitation facility for heroin addiction.

D. SUMMARY OF MEDICAL FINDINGS

The 20 year old male student pilot had not reported any medical conditions or medications to the FAA.

According to the autopsy performed at the request of the Coroner, Montgomery County, Ohio, the cause of death was multiple trauma. No significant natural disease was identified.

Toxicology testing performed by the Montgomery County (OH) Coroner’s Toxicology Laboratory on heart blood identified 57 ng/ml of alprazolam, along with 161 ± 33 ng/ml of cocaine, 917 ± 190 ng/ml of its primary inactive metabolite benzoylecgonine, 404 ng/ml of another metabolite, ecgonine methyl ester, and 106 ng/ml of cocaethylene, a metabolite only formed when cocaine and ethanol are ingested together. In addition, ethanol was found in heart blood at 0.139 ± 0.013 gm% and in vitreous at 0.095 ± 0.009 gm%.

⁷ National Institutes of Health. US National Library of Medicine. DailyMed. Hydroxyzine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=81f9d88f-c50b-4c6a-a25b-46fa162a503e> Accessed 2/27/2018.

⁸ National Institutes of Health. US National Library of Medicine. DailyMed. Cetirizine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=9c56185f-5179-dd63-3c90-b96358228f9c> Accessed 2/27/2018.

⁹ National Institutes of Health. US National Library of Medicine. DailyMed. Naltrexone. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=49aa3d6d-2270-4615-aafa-b440859ab870> Accessed 2/27/2018.

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According to multiple witnesses, the student pilot had returned two weeks prior to the accident from a month long stay in a rehabilitation facility for heroin addiction.