NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

November 22, 2016

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Chief Medical Officer

A. ACCIDENT: CEN15FA291; Portland, TX

On July 4, 2015, about 1420 central daylight time, a Champion 7BCM, N10497, sustained substantial damage when it impacted the 16th-tee box of the Northshore Golf Course located in Portland, Texas, while maneuvering at a low altitude. The pilot and passenger received fatal injuries. The airplane was owned by a private individual and operated by the pilot under the provisions of the 14 Code of Federal Regulations Part 91 as a personal flight. Day visual meteorological conditions prevailed at the time of the accident and no flight plan was filed. The flight's origination and destination are unknown.

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

   FAA Medical Case Review

   According to the FAA medical case review, the 28 year old male pilot reported 700 total hours of flight experience as of his last medical exam, dated 07/18/2014. At that time, he was 72 inches tall and weighed 190 pounds. He had reported no medical conditions and no medications to the

FAA. He received a second class medical certificate limited by a requirement for corrective lenses.

Autopsy

According to the autopsy performed by the Medical Examiner, County of Neuces, the cause of death was blunt head trauma and the manner of death was accident. No significant natural disease was identified.

Toxicology

Toxicology testing performed by AIT labs at the request of the medical examiner identified alprazolam at 3.0 ng/ml, its metabolite, 7-aminoclonazepam at 12.2 ng/ml, benzoylecgonine at 116 ng/ml, hydrocodone at 18.7 ng/ml, and ethanol at 0.163 gm/dl in femoral blood.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory for volatiles identified ethanol at 0.153 gm/dl in femoral blood, 0.159 gm/dl in urine, and 0.160 gm/dl in vitreous. N-propanol was also found in urine.

In addition, ecgonine methyl ester and benzoylecgonine (0.133 ug/ml) were identified in heart blood and 0.021 ug/ml of hydrocodone was detected in femoral blood. In urine, anhydroecgonine methyl ester, benzoylecgonine (2.091 ug/ml), hydrocodone (0.085 ug/ml), and its metabolites dihydrocodeine (0.019 ug/mL) and hydromorphone (0.026 ug/mL) were detected.

Alprazolam is a benzodiazepine prescription medication available as a Schedule IV controlled substance. Benzodiazepines cause dose-related central nervous system depression varying from mild impairment to hypnosis.[1] The usual therapeutic window for alprazolam is between 6 ng/ml and 20 ng/ml and it carries the following warning: The side effects of alprazolam are typical of benzodiazepines and include sedation, impaired coordination and muscle relaxation. Warnings - may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery).[2]

Benzoylecgonine and ecgonine methyl ester are inactive metabolites of cocaine and anhydroecgonine methyl ester is a metabolite of cocaine that is only present after cocaine has been smoked. Cocaine is rapidly metabolized; its half-life is approximately 0.8 ± 0.2 hours, while the half-

[1] National Institutes of Health. US National Library of Medicine. DailyMed. Alprazolam. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2238e083-08f2-0aa8-59b7-16b6d68dbd48 Accessed 11/21/2016.
[2] Federal Aviation Administration. CAMI Toxicology Drug Information. Alprazolam. http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=5 Accessed 11/21/2016.

life of benzoylecgonine is 6 hours.[3] Smoking cocaine acutely results in euphoria, excitation, feelings of well-being, general arousal, and increased sexual excitement; higher doses may result in psychosis, delusions, hallucinations, irritability, fear, paranoia, antisocial behavior, and aggressiveness. After the brief "high" wears off, users may exhibit dysphoria, depression, agitation, nervousness, drug craving, fatigue, and inability to sleep.[3]

Hydrocodone is an opioid analgesic available as a prescription medication and listed as a Schedule II controlled substance, most commonly in combination with acetaminophen (also known as Tylenol). It is commonly sold with the names Vicodin, Lortab, and Norco.[4] Hydrocodone does not undergo significant post mortem redistribution and post mortem levels likely represent antemortem ones.[5, 6] Its usual therapeutic range is between 0.010 and 0.050 ug/ml and it carries this warning: Hydrocodone is more toxic than codeine, with a greater addiction liability. May impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery).[7] Hydromorphone and dihydrocodeine are metabolites of hydrocodone and are both also active opioid analgesics.

Ethanol is the type of alcohol present in beer, wine, and liquor. It is a social drug that acts as a central nervous system depressant. After ingestion, at low doses, it impairs judgment, psychomotor functioning, and vigilance; at higher doses ethanol can cause coma and death. Generally, the rapid distribution of ethanol throughout the body after ingestion leads to similar levels in different tissues. 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 alcohol in the blood.[8] The effects of alcohol on aviators are generally well understood; alcohol significantly impairs pilots' performance, even at very low levels.[9]

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[3] National Highway Traffic Safety Adminstration. Drugs and Human Performance Fact Sheets. Cocaine. http://www.nhtsa.gov/people/injury/research/job185drugs/cocain.htm Accessed 11/21/2016.
[4] National Institutes of Health. US National Library of Medicine. DailyMed. Hydrocodone and acetaminophen. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2238e083-08f2-0aa8-59b7-16b6d68dbd48 Accessed 11/22/2016.
[5] Han E, Kim E, Hong H, Jeong S, Kim J, In S, Chung H, Lee S. Evaluation of postmortem redistribution phenomena for commonly encountered drugs. Forensic Sci Int. 2012 Jun 10;219(1-3):265-71.
[6] Saitman A, Fitzgerald RL, McIntyre IM. Evaluation and comparison of postmortem hydrocodone concentrations in peripheral blood, central blood and liver specimens: a minimal potential for redistribution. Forensic Sci Int. 2015;247:36-40.
[7] Federal Aviation Administration. CAMI toxicology Drug Information. Hydrocodone. http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=73 Accessed 11/22/2016.
[8] 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 11/16/2016.
[9] Cook, C.C., Alcohol and aviation. Addiction (Abingdon, England), 1997. 92(5):539-555.

A small amount of ethanol can be produced in tissues by microbial action post mortem, often in conjunction with other alcohols such as N-propanol, acetone, and methanol.[10] This is much less likely to occur in urine and vitreous.

D. SUMMARY OF MEDICAL FINDINGS

The 28 year old male pilot in this accident had reported no medical conditions and no medications to the FAA. No natural disease was identified on autopsy. Toxicology testing in two laboratories identified ethanol at 0.153 gm/dl and 0.163 gm/dl in femoral blood, 0.159 gm/dl in urine, and 0.160 gm/dl in vitreous. N-propanol was also found in urine. In addition, alprazolam at 3.0 ng/ml, its metabolite, 7-aminoclonazepam at 12.2 ng/ml, benzoylecgonine at 116 ng/ml, and hydrocodone at 18.7 ng/ml in one lab and 0.021 ug/ml in the second lab were identified in femoral blood. Ecgonine methyl ester and benzoylecgonine (0.133 ug/ml) were identified in heart blood. In urine, anhydroecgonine methyl ester, benzoylecgonine (2.091 ug/ml), hydrocodone (0.085 ug/ml), and its metabolites dihydrocodeine (0.019 ug/ml) and hydromorphone (0.026 ug/ml) were detected.

[10] Federal Aviation Administration. CAMI toxicology Drug Information. Ethanol. http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60 Accessed 11/14/2016.