



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

August 9, 2022

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Medical Officer

A. ACCIDENT INFORMATION

Identification: WPR20FA018

Location: Brawley, California

Date: October 31, 2019

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 Federal Aviation Administration (FAA) medical case review and the pilot's autopsy, coroner, and toxicology reports were reviewed, as were selected investigator reports and relevant regulation and medical literature.

3. Findings

a. FAA Medical Case Review

According to the FAA medical case review, the 25-year-old male pilot's last aviation medical examination was on November 16, 2015. At that time, he reported 0 civilian flight hours. He was 74 inches tall and weighed 147 pounds. He reported no medical conditions or medication use. No significant issues were identified, and he was issued a third-class medical certificate limited by a requirement to wear corrective lenses.¹

¹ According to [FAA regulation](#), this certificate would have expired at the end of November 2020.

b. Autopsy

The Imperial County Coroner's Office performed the pilot's autopsy. According to the autopsy report, the cause of death was acute cocaine and ethanol intoxication. The accompanying coroner investigative report stated the manner of death as accidental. The forensic pathologist who performed the autopsy characterized the pilot's injuries as "nonfatal blunt force traumatic injuries." The autopsy did not identify significant natural disease. The autopsy report noted that the pilot weighed about 190 pounds and had 375 mL of urine in his bladder.

c. Toxicology

At the request of the Imperial County Coroner's Office, Bio-Tox Laboratories performed toxicological testing of postmortem blood from the pilot.² Ethanol was detected at 0.233 g/dL. Cocaine was detected at 0.006 mg/L. The cocaine metabolite benzoylecgonine was detected at 0.022 mg/L. Cocaethylene, a substance that forms when cocaine is metabolized in the presence of ethanol, was detected at a level reported as less than 0.005 mg/L.

The FAA Forensic Sciences Laboratory also performed toxicological testing of postmortem specimens from the pilot.³ Ethanol was detected at 0.219 g/dL in blood, 0.259 g/dL in vitreous, and 0.320 g/dL in urine. Cocaine was detected at a level too low to quantify in blood, and at 0.505 mg/L in urine. Benzoylecgonine was detected at 0.029 mg/L in blood, and 0.179 mg/L in urine. Cocaethylene was not detected in blood, but was found at 0.074 mg/L in urine. The cocaine metabolite ecgonine methyl ester was detected in blood and urine.

d. Descriptions of Detected Substances

Ethanol is the intoxicating alcohol in beer, wine, and liquor. It can impair judgment, psychomotor performance, cognition, and vigilance. At high enough levels, ethanol can cause unconsciousness, respiratory depression, and death.^{4,5,6} FAA regulation imposes strict limits on flying after consuming ethanol. This includes a prohibition on acting as a crewmember of a civil aircraft while having a blood ethanol level of 0.04 g/dL or greater.⁷ The number and

² According to the autopsy report, the blood specimen was taken from a jugular vein. According to the toxicology report, the specimen was screened for a minimum of 150 common acidic, basic, and neutral drugs.

³ The FAA Forensic Sciences Laboratory tests specimens for over 1,300 substances including toxins, prescription and over-the-counter medications, and illicit drugs.

⁴ Cohen JP, Quan D. Alcohols. In: Tintinalli JE, Ma OJ, Yealy DM, et al., eds. *Tintinalli's emergency medicine: a comprehensive study guide*. 9th ed. New York, NY: McGraw-Hill Education; 2020:1222-1232.

⁵ Dolinak D. Toxicology. In: Dolinak D, Matshes EW, Lew EO, eds. *Forensic pathology: principles and practice*. Burlington, MA: Elsevier Academic Press; 2005:487-502.

⁶ Spitz WU. Forensic aspects of alcohol. In: Spitz WU, Spitz DJ, eds. *Spitz and Fisher's medicolegal investigation of death: guidelines for the application of pathology to crime investigation*. 4th ed. Springfield, IL: Charles C Thomas; 2006:1218-1229.

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

seriousness of pilot errors tends to increase with blood ethanol level.⁸ Ethanol can also be produced by microbes in a person's body after death; this occurs less commonly in urine and vitreous than it does in blood.^{6,9}

Cocaine is a stimulant drug that is commonly used illicitly by recreational users who may snort it, smoke it, inject it, ingest it, or apply it to gums / mucous membranes. Users may seek euphoric effects, feelings of increased alertness, strength, and decisiveness, and appetite suppressant effects. Cocaine is also occasionally used in healthcare settings as a topical agent to produce local anesthesia and vasoconstriction during ear, nose, and throat procedures. Cocaine is a DEA Schedule II controlled substance, with a high potential for abuse and dependence, and the FAA considers its use unacceptable for flight.^{10,11,12} Impairing effects that occur early after recreational cocaine use may include dizziness, restlessness, poor impulse control, and increased risk taking. Attention, perception, coordination, decision making, and task execution may be impaired by effects of cocaine and cocaine withdrawal. A cocaine level measured in blood does not reliably predict the degree or nature of related impairment.^{10,13}

Cocaethylene is a substance that forms when cocaine is metabolized in the presence of ethanol in a living person's body. Cocaethylene has psychoactive effects similar to those of cocaine.^{14,15} Benzoylecgonine and ecgonine methyl ester are inactive metabolites of cocaine.¹⁰

⁸ Cook CCH. Alcohol and aviation. *Addiction*. 1997;92(5):539-555.

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 Couper FJ, Logan BK. Drugs and Human Performance Fact Sheets. National Highway Traffic Safety Administration. DOT HS 809 725. April 2014 (Revised). <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>. Accessed July 29, 2022.

¹¹ Drug Enforcement Administration. Cocaine. Drug Fact Sheets. <https://www.dea.gov/factsheets/cocaine>. Updated June 15, 2020. Accessed July 29, 2022.

¹² Federal Aviation Administration. Guide for aviation medical examiners: pharmaceuticals (therapeutic medications) do not issue - do not fly. Federal Aviation Administration website. <https://www.faa.gov/go/dni>. Updated February 19, 2021. Accessed July 29, 2022.

¹³ Logan BK, Smirnow D, Gullberg RG. Lack of predictable site-dependent differences and time-dependent changes in postmortem concentrations of cocaine, benzoylecgonine, and cocaethylene in humans. *J Anal Toxicol*. 1997;21(1):23-31. doi:10.1093/jat/21.1.23.

¹⁴ Jones AW. Forensic drug profile: cocaethylene. *J Anal Toxicol*. 2019;43(3):155-160. doi:10.1093/jat/bkz007.

¹⁵ Pergolizzi J, Breve F, Magnusson P, LeQuang JK, Varrassi G. Cocaethylene: when cocaine and alcohol are taken together. *Cureus*. 2022;14(2):e22498. doi:10.7759/cureus.22498.

D. SUMMARY OF MEDICAL FINDINGS

The 25-year-old male pilot's last aviation medical examination was on November 16, 2015. At that time, he reported no medical conditions or medication use. No significant issues were identified, and he was issued a third-class medical certificate limited by a requirement to wear corrective lenses.

The Imperial County Coroner's Office performed the pilot's autopsy. According to the autopsy report, the cause of death was acute cocaine and ethanol intoxication. The accompanying coroner investigative report stated the manner of death as accidental. The forensic pathologist who performed the autopsy characterized the pilot's injuries as "nonfatal blunt force traumatic injuries." The autopsy did not identify significant natural disease.

At the request of the Imperial County Coroner's Office, Bio-Tox Laboratories performed toxicological testing of postmortem blood from the pilot. Ethanol was detected at 0.233 g/dL. Cocaine was detected at 0.006 mg/L. The cocaine metabolite benzoylecgonine was detected at 0.022 mg/L. Cocaethylene, a substance that forms when cocaine is metabolized in the presence of ethanol, was detected at a level reported as less than 0.005 mg/L.

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