NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

August 26, 2022

Mary Pat McKay, MD, MPH
Chief Medical Officer

A. CRASH: WPR22FA026; Shafter, CA

Date and time: November 3, 2021
Injuries: 1 fatal

B. GROUP IDENTIFICATION

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

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, autopsy report, toxicology findings, and the investigator's preliminary report were reviewed. Relevant regulation and medical literature were reviewed as appropriate.

   FAA Medical Case Review

   According to the FAA medical case review, the 62 year old male pilot had reported 18,400 total flight hours as of his last aviation medical exam, dated 9/29/2021. At that time, he was 68 inches tall and 230 pounds. He had reported no chronic medical conditions and no use of medications to the FAA but had reported DUIs in 1979 and 2009. No significant abnormalities were identified on the most recent exam and he was issued a second class medical certificate limited by a requirement that he wear corrective lenses.

Autopsy

According to the autopsy report issued by the Sheriff-Coroner, Coroner Section, Bakersfield, CA, the cause of death was multiple blunt force trauma and the manner of death was accident. The pilot was noted to have an enlarged heart (cardiomegaly) with a total heart weight of 420 gm. In addition, his left ventricular wall was somewhat thickened at 1.4 cm (average is 1.3 cm).[1] A comment was made that there was "severe four chamber dilation with a globoid left ventricle." No other significant natural disease was identified. Of note, the body was severely burned and the autopsy was not carried out for 12 days after crash; toxicology specimens were collected at the time of the autopsy.

Toxicology

Toxicology tests performed by NMS Labs at the request of the pathologist identified ethanol at 0.021 gm/dl, delta-9-tetrahydracannabinol (THC) at 1.2 ng/ml, and its inactive metabolite carboxy-delta-9-THC at 11 ng/ml in heart blood.

Toxicology testing performed by the FAA's Forensic Sciences Laboratory identified ethanol at 0.026 gm/dl in muscle, testing for ethanol was inconclusive in urine and negative in brain. Testing for another alcohol, N-butanol, was identified in urine, inconclusive in muscle, and negative in brain. Testing for a third type of alcohol, N-propanol, was identified in urine, but negative in both muscle and brain. No other tested-for substances were identified in urine.

Substance Descriptions

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.[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] Ethanol may also be produced in the body after death by microbial activity.[4]

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[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 Study of 765 Specimens from 20 to 99 Years Old. Mayo Clin Proc. 1988; 63:137-146.

[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. Available from: https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-91/subpart-A/section-91.17

[4] Federal Aviation Administration. Forensic Toxicology Drug Information. Ethanol. https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60

Delta-9-THC is the primary psychoactive compound found in cannabis (marijuana). Delta-9-THC is rapidly metabolized, but the rate of metabolism is not linear and depends on the means of ingestion (smoking, oil, and edibles), potency of the product, frequency of use, and user characteristics. Significant performance impairments are usually observed for at least 1-2 hours following marijuana use, and residual effects have been reported up to 24 hours later. Delta-9-THC concentrations typically peak during the act of smoking, levels decline rapidly and are often less than 5 ng/mL after 3 hours.[5]

N-butanol and n-propanol are other forms of alcohols commonly formed on body tissues and fluids by microbial activity after death.

D. SUMMARY OF MEDICAL FINDINGS

The 62 year old male pilot had reported no chronic medical conditions and no use of medications to the FAA.

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[5] National Highway Traffic Safety Administration. April 2014. Drugs and Human Performance Fact Sheets. Cannabis/Marijuana. https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf