



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

April 1, 2021

Turan Kayagil, MD, FACEP
Medical Officer

A. ACCIDENT INFORMATION

Identification: CEN20LA248

Location: Zavalla, Texas

Date: June 27, 2020 (0153 local time)

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 and toxicology reports were reviewed. Investigator reports and relevant regulation and medical literature were also reviewed.

3. Findings

a. FAA Medical Case Review

According to the FAA medical case review, the 40-year-old male pilot had his only aviation medical examination on December 5, 2016. At that time, he reported 0 total civilian flight hours. He was 70 inches tall and weighed 168 pounds. He reported no medical conditions or medication use. No significant issues were identified, and he was issued a third-class medical certificate without limitation.

b. Autopsy

Forensic Medical Management Services of Texas performed the pilot's autopsy. According to the autopsy report, the cause of death was blunt force injuries, and the manner of death was accident. Evaluation for natural disease was limited by thermal injuries, and structural examination of the brain could not be performed due to injury severity. Within those limitations, the autopsy did not identify any significant natural disease.

c. Toxicology

The FAA Forensic Sciences Laboratory performed toxicological testing on specimens from the pilot.¹ Methamphetamine was identified at 2112 nanograms per milliliter (ng/mL) in liver tissue and 2654 ng/mL in urine. Amphetamine (a metabolite of methamphetamine) was identified at 642 ng/mL in liver; urine testing for amphetamine was inconclusive. Delta-9-THC was identified at 6.4 ng/mL in liver and was not detected in urine. 11-hydroxy-delta-9-THC (a metabolite of delta-9-THC) was detected at 8.5 ng/mL in liver and was not detected in urine. Carboxy-delta-9-THC (another metabolite of delta-9-THC) was detected at 510 ng/mL in liver and 31 ng/mL in urine.² Phenylpropanolamine was detected in urine and liver.

d. Descriptions of Detected Substances

Methamphetamine is a central nervous system stimulant drug. Amphetamine is a metabolite of methamphetamine, and is also a central nervous system stimulant. Both methamphetamine and amphetamine are available as prescription drugs used to treat attention deficit hyperactivity disorder, narcolepsy, and occasionally obesity; each may also be a metabolite of certain other medications. Methamphetamine and amphetamine are Drug Enforcement Agency (DEA) Schedule II controlled substances, with a high potential for abuse and dependence. At low doses used as part of appropriate medical treatment, the drugs may improve reaction time, cognitive function, and fatigue, but may cause people to make higher-risk choices. At higher doses, the drugs may have a variety of impairing effects on psychomotor function, cognition, and perception. The drugs typically carry warnings that they may impair the ability to engage in potentially hazardous activities such as driving a motor vehicle.

¹ The FAA Forensic Sciences Laboratory tests specimens for over 1,300 compounds including toxins, prescription and over-the-counter medications, and illicit drugs; information about these compounds can be found at the Civil Aerospace Medical Institute WebDrugs website (<https://jag.cami.jccbi.gov/toxicology>).

² The toxicology report did not distinguish between nanograms per milliliter (ng/mL) and nanograms per gram (ng/g), which are equivalent units at water density.

Such impairment can result from drug or withdrawal effects.^{3,4,5} Both methamphetamine and amphetamine are considered “do not issue/do not fly” medications by the FAA.⁶

In addition to being used medicinally, methamphetamine and amphetamine are frequently produced illicitly and abused recreationally by ingestion, snorting, smoking, rectal insertion, or injection. Seeking an intense euphoric effect, abusers typically use much higher doses than are used medicinally. Effects from methamphetamine/amphetamine abuse follow a typical pattern. An abuser may experience early psychological effects including euphoria, excitation, exhilaration, rapid ideas and speech, increased sex drive, restlessness, hallucinations, delusions, psychosis, sleeplessness/reduced tiredness, an increased feeling of alertness, a heightened sense of wellbeing, a feeling of increased physical strength, and poor impulse control. Early physiologic effects may include rapid heart rate, increased blood pressure, increased breathing rate, elevated temperature, dry mouth, abdominal cramps, twitching, dilated pupils, faster reactions, and increased strength. Later, as initial drug effects wear off, an abuser may experience dysphoria, restlessness, agitation, itching, nervousness, paranoia/hypervigilance, irritability, anxiety/nervousness, aggressive/violent impulses, diminished coordination, hallucinations, delusions, scattered thoughts, psychosis, fatigue, and drug craving. Measuring an abuser’s drug level does not help distinguish whether the person is experiencing early versus late effects.³

Delta-9-THC (commonly known as THC) is the primary psychoactive chemical in marijuana and hashish, derived from the cannabis plant. It is commonly smoked or ingested recreationally by users seeking mind-altering effects. It may also be used medicinally to treat illness-associated nausea and appetite loss. It is present as an undeclared contaminant in some commercial cannabidiol (CBD)

³ 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 March 31, 2021.

⁴ National Institutes of Health National Library of Medicine. Methamphetamine hydrochloride. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f31f580f-1f08-4a0f-b078-0b9e3308f712>. Updated August 15, 2019. Accessed March 31, 2021.

⁵ National Institutes of Health National Library of Medicine. Amphetamine sulfate. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=79b9db39-7cdc-5607-f0ce-ac2a2cfd59d5>. Updated March 1, 2020. Accessed March 31, 2021.

⁶ An open prescription for any DEA controlled substance is disqualifying for FAA medical certification, and pilots should not fly while using any such substance. Pilots are prohibited from commanding an aircraft if they know or have reason to know of any medical condition that would make them unable to operate the aircraft in a safe manner, or if they are using any drug that affects their faculties in any way contrary to safety. [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 March 31, 2021.] [Office of the Federal Register. 14 CFR 61.53. Electronic Code of Federal Regulations. https://www.ecfr.gov/cgi-bin/text-idx?node=se14.2.61_153. Updated March 29, 2021. Accessed March 31, 2021.] [Office of the Federal Register. 14 CFR 91.17. Electronic Code of Federal Regulations. https://www.ecfr.gov/cgi-bin/text-idx?node=se14.2.91_117. Updated March 29, 2021. Accessed March 31, 2021.]

extracts and oils that may be used by a variety of routes for a variety of reasons. In the body, delta-9-THC is metabolized mainly to the psychoactive chemical 11-hydroxy-delta-9-THC, which is then further metabolized to the non-psychoactive chemical carboxy-delta-9-THC.^{3,7}

Psychoactive effects of THC vary depending on the user, dose, and route of administration, and may include relaxation, euphoria, disinhibition, disorientation, altered perception of time and space, impaired concentration and memory, altered thought formation and expression, sedation, panic, paranoia, heightened senses, emotional lability, psychosis, and dulled attention with the illusion of increased insight. THC can impair motor coordination, reaction time, decision making, problem solving, and vigilance.^{3,8} It is a DEA controlled substance with potential for abuse and dependence, and the FAA considers it unsuitable for flying, regardless of state cannabis laws.^{6,7}

Phenylpropanolamine is a chemical that can be used in the illicit manufacture of methamphetamine.⁹ It was previously available in the United States as a nasal decongestant and weight loss ingredient in multiple over-the-counter and prescription products. In 2000 the Food and Drug Administration requested that all drug companies discontinue marketing products with phenylpropanolamine, due to evidence of increased (although still very low) risk of brain bleeding.¹⁰

D. SUMMARY OF MEDICAL FINDINGS

The 40-year-old male pilot had his only aviation medical examination on December 5, 2016. At that time, he reported 0 total civilian flight hours. He reported no medical conditions or medication use. He was issued a third-class medical certificate without limitation.

Forensic Medical Management Services of Texas performed the pilot's autopsy. According to the autopsy report, the cause of death was blunt force injuries. The autopsy did not identify any significant natural disease.

The FAA Forensic Sciences Laboratory performed toxicological testing on specimens from the pilot. Methamphetamine was identified at 2112 nanograms per milliliter (ng/mL) in liver tissue and 2654 ng/mL in urine. Amphetamine was identified at

⁷ Berry M. Marijuana and derivatives: what are the aeromedical implications? *FAA Safety Briefing*. May/June 2019. https://www.faa.gov/news/safety_briefing/2019/media/mayjun2019.pdf. Accessed March 31, 2021.

⁸ Compton RP. Marijuana-Impaired Driving: A Report to Congress. National Highway Traffic Safety Administration. DOT HS 812 440. July 2017. <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/812440-marijuana-impaired-driving-report-to-congress.pdf>. Accessed March 31, 2021.

⁹ Drug Enforcement Administration. Notice - phenylpropanolamine can be used in illicit amphetamine manufacture. Diversion Control Division. https://www.deadiversion.usdoj.gov/chem_prog/advisories/ppa.htm. Updated December 1, 2011. Accessed March 31, 2021.

¹⁰ United States Food and Drug Administration. Phenylpropanolamine (PPA) information page. United States Food and Drug Administration website. <https://www.fda.gov/drugs/information-drug-class/phenylpropanolamine-ppa-information-page>. Updated October 14, 2016. Accessed March 31, 2021.

642 ng/mL in liver; urine testing for amphetamine was inconclusive. Delta-9-THC was identified at 6.4 ng/mL in liver and was not detected in urine. 11-hydroxy-delta-9-THC was detected at 8.5 ng/mL in liver and was not detected in urine. Carboxy-delta-9-THC was detected at 510 ng/mL in liver and 31 ng/mL in urine. Phenylpropanolamine was detected in urine and liver.