



MEMORANDUM FOR RECORD

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Air Safety Investigator
Eastern Region Aviation

June 14, 2021

Subject: NTSB investigation ERA19FA249, N303TL, Cessna T303, Lagrangeville, New York, August 17, 2019. Autopsy and Medical Information – Pilot

Medical and Pathological Information:

An autopsy of the pilot was performed by the Office of the Medical Examiner, Dutchess County, New York. The cause of death was thermal injuries and smoke inhalation. A contributing cause of death was atherosclerotic cardiovascular disease.

NTSB Medical Officer Factual Review:

I reviewed the Federal Aviation Administration (FAA) medical case review and the pilot's autopsy and FAA Forensic Sciences Laboratory toxicology^[1] reports. I also reviewed relevant medical information.

Reports Provided

At the time of the accident, the male pilot was 65 years old. According to the FAA medical case review, the pilot held a third class medical certificate with the limitation that he must wear corrective lenses. At the most recent medical certification exam (11/10/17), the pilot reported 1,500 total flight hours. He was 71 inches tall and weighed 190 pounds. He reported no use of any medications. He reported a history of right eye trouble—non arteritic ischemic optic neuropathy; the pilot had been issued a statement of demonstrated ability (SODA) in 2012 for his right visual field defects.

According to the Office of the Medical Examiner, Dutchess County, Poughkeepsie, New York, autopsy report, the cause of death of the pilot was thermal injuries and smoke inhalation, the contributing cause of death was atherosclerotic cardiovascular disease, and the manner of death was accident. The medical examiner reported carbonaceous material in the airways. He reported to that the pilot had moderate to marked coronary artery and

^[1] See <https://jag.cami.iccbi.gov/toxicology/> for a complete list of tested-for substances.

aortic atherosclerosis, with approximately 70 to 80% stenosis in the left circumflex and right coronary arteries and 80 to 90% stenosis in the left anterior descending coronary artery.

Toxicology testing by FAA Forensic Sciences laboratory identified cocaine at 51 nanograms per milliliter (ng/mL) in the pilot's urine; cocaine was not detected in his iliac blood. The FAA laboratory also reported benzoylecgonine, an inactive cocaine metabolite, in his iliac blood and urine at 72 ng/mL and 3,084 ng/mL, respectively. Ecgonine methyl ester, a minor inactive metabolite of cocaine, was detected in the pilot's blood and urine. Anhydroecgonine methyl ester, a pyrolysis product of smoked crack cocaine, was detected in the pilot's urine. No carboxyhemoglobin level was reported in the pilot's iliac blood.^[2]

Relevant medical information

Cocaine is a central nervous system stimulant. Initial effects include euphoria, excitation, general arousal, dizziness, increased focus and alertness. At higher doses, effects may include psychosis, confusion, paranoia, and aggressiveness. Depending upon the method of intake, effects can start within seconds (injection) to an hour (oral ingestion) and general effects last 1 to 2 hours. Late effects begin at about 2 hours and continue for several hours as the drug is metabolized to inactive substances. These effects include dysphoria, depression, agitation, nervousness, drug craving, general central nervous system depression, fatigue, and insomnia. Studies have found that cocaine may enhance performance of simple tasks, but not complex tasks such as driving.

Cocaine is rapidly metabolized to several compounds. *Benzoylecgonine* and *ecgonine methyl ester* are inactive metabolites of cocaine, benzoylecgonine is the major urinary metabolite. The half-life of cocaine is short, around 1 hour; the half-life of benzoylecgonine is around 6 hours. A study found that following intranasal administration of 106 mg of cocaine, average peak plasma concentrations of cocaine and benzoylecgonine were 220 ng/mL at 30 minutes and 610 ng/mL at 3 hours, respectively. Very low concentrations of cocaine can be detected in urine during the initial few hours, benzoylecgonine may persist in the urine at detectable concentrations from 2 to 4 days.^[3]

Crack cocaine refers to cocaine that has been processed from cocaine hydrochloride for smoking in crack pipes. A hit of smoked crack cocaine has almost immediate intense effects which last about 5 to 15 minutes.^[4] When crack cocaine is smoked, the pyrolysis

^[2] Carboxyhemoglobin is formed when carbon monoxide binds to hemoglobin. Carbon monoxide is a gaseous byproduct of combustion, such as from an exhaust system or fire. Levels of carboxyhemoglobin above 10%, the FAA laboratory reporting limit, suggest greater than usual exposure to carbon monoxide.

^[3] National Highway Traffic Safety Administration. April 2014. Drugs and Human Performance Fact Sheets. Cocaine. <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>

^[4] *Ibid.*

product *anhydroecgonine methyl ester* is formed. The compound is believed to not be biologically active but neurotoxic; it can be a useful indicator of crack cocaine use. [5]^[6]

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^[5] FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Anhydroecgonine Methyl Ester. <https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=13>

^[6] Garcia, RCT, LMM Dati, S Fukuda, et al. 2012. Neurotoxicity of anhydroecgonine methyl ester, a crack cocaine pyrolysis product. *Toxicological Sciences*. 128(1):223-234.