



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

MEDICAL FACTUAL REPORT

April 2, 2019

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Medical Officer

A. ACCIDENT: WPR18FA053 - Thompson's Station, Tennessee

On December 21, 2017, about 1307 central standard time, a Gregory S. Browning Zodiac 601XL experimental, amateur-built airplane, N929GB, was substantially damaged following a loss of control and impact with terrain while maneuvering at a low altitude near Thompson's Station, Tennessee. The airplane was registered to and operated by the private pilot, the sole occupant, as a 14 *Code of Federal Regulations* Part 91 personal flight. The pilot was fatally injured. Instrument meteorological conditions prevailed at the time of the accident. The flight departed Bomar Field-Shelbyville Municipal Airport (SYI), Shelbyville, Tennessee about 1230, with an intended destination to Whifferdill Airport (TN77), Chapmansboro, Tennessee. No flight plan was filed for the flight.

B. GROUP IDENTIFICATION:

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

C. DETAILS OF INVESTIGATION

Purpose

This investigation was performed to evaluate the pilot for medical conditions, the use of medications/illicit drugs, and the presence of toxins.

Methods

The FAA medical case review, pilot's FAA medical certification file, FAA Bioaeronautical Sciences Research Laboratory toxicology report, autopsy report, and personal medical records were reviewed. Other pertinent scientific and regulatory issues were reviewed.

FAA Medical Case Review and FAA Medical Certification File

According to the FAA records, at the time of his most recent FAA medical certification exam dated April 4, 2005, the 78-year-old male pilot was 66 inches tall, weighed 184 pounds, and reported he had accrued 1,000 total flight hours. The pilot reported he had no recent health care visits, no known significant medical conditions, and used no medications. The pilot failed color vision testing but the physical examination did not identify any other significant medical issues. The pilot was issued a third class medical certificate with a limitation that he was to wear corrective lenses and was not to fly at night or by color signal control.

According to the FAA medical case review, the FAA's pilot records showed the pilot was involved in an airplane accident on September 6, 2012 and following that accident had voluntarily surrendered his private pilot's license. The pilot's medical certificate was not valid after April 2007. In this accident, the pilot was operating an airplane that did not require a current medical certificate but did required a pilot or sport pilot certificate.

Autopsy

The Nashville Tennessee Office of the Medical Examiner's autopsy documented the cause of death was multiple blunt force injuries and the manner was accident. The pilot weighed 153 pounds and had an enlarged heart with left ventricular and septal hypertrophy; his heart weighed 690 grams; the average for a man his weight is 327 grams (range 248-431 grams).¹ The mid left circumflex coronary artery showed up to 75 percent narrowing and the mid left anterior descending and proximal first diagonal coronary arteries showed 50 and 60 percent narrowing, respectively. A stent was identified in the right coronary artery. A Medtronic Protecta XT implanted defibrillator was identified in the subcutaneous tissues of the left chest. According to the Medtronic interrogation report, the device delivered shocks to the heart on December 22nd at 1251 and 1317, one day after the accident (December 21, 2017 at about 1307).² The Medtronic interrogation did not identify evidence that the pilot had an arrhythmia around the time of the accident.

Toxicology

NMS Laboratory toxicology testing of femoral blood conducted as part of the autopsy was negative for drugs of abuse or alcohol.³

FAA Bioaeronautical Sciences Research Laboratory toxicology testing detected: the non-narcotic pain medication naproxen in urine;^{4,5} the blood pressure medication metoprolol in blood and urine;⁶ the cholesterol medication rosuvastatin in blood and urine;⁷ the antidepressant sertraline and its metabolite were detected in blood and urine;⁸ and the blood thinner clopidogrel in blood and urine.⁹ These medications are not generally considered

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 anatomic study of 765 specimens from subjects 20 to 99 years old. *Mayo Clinic Proc.*, 1988. 63(2): p. 137-46.

² A defibrillator can discharge in a post-mortem environment when the algorithms interpret movement of the decedent or the leads as an arrhythmia.

³ Femoral blood was tested for amphetamines, barbiturates, benzodiazepines, buprenorphine / metabolite, cannabinoids, cocaine / metabolites, fentanyl / acetyl fentanyl, methadone / metabolite, methamphetamine / MDMA, opiates, oxycodone / oxymorphone, phencyclidine, acetone, ethanol, isopropanol, and methanol.

⁴ The FAA Bioaeronautical Sciences Research laboratory tests for more than 1300 substances including toxins, common prescription and over-the-counter medications as well as illicit drugs. See: <http://jag.camii.jccbi.gov/toxicology/default.asp?offset=0> for a complete listing. The toxicology report can be found in the docket.

⁵ National Institute of Health, National Library of Medicine, *DailyMed* 2019: Naproxen. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=dc0f8bfc-669a-40b8-81e4-b9492a7b617c> Accessed 3/7/2019

⁶ National Institute of Health, National Library of Medicine, *DailyMed* 2019: Metoprolol. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=90aa06a3-100f-4466-b950-506303707b01> Accessed 3/7/2019

⁷ National Institute of Health, National Library of Medicine, *DailyMed* 2019: Rosuvastatin. <https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=ROSUVASTATIN> Accessed 3/7/2019

⁸ National Institute of Health, National Library of Medicine, *DailyMed* 2019: Sertraline. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f9641190-9151-4f7e-89ff-1e7a818c30ee> Accessed 3/7/2019

⁹ National Institute of Health, National Library of Medicine, *DailyMed* 2019: Clopidogrel. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=edae8df1-caf9-ff72-1304-5ae8b355f8e7> Accessed 3/7/2019

impairing. Additionally, the potentially impairing, Schedule IV sedating benzodiazepine clonazepam and its metabolite were detected in blood and urine.^{10,11}

Personal Medical Records

Family medicine clinic records from March 2016 through October 11, 2017 were evaluated. The record documented a history of high blood pressure treated with metoprolol; hypothyroidism treated with thyroid hormone replacement; type II diabetes since 1995 treated with metformin; coronary artery disease with stent placement in right the coronary artery in October 2006, a heart attack in November 2007, and hypertrophic cardiomyopathy treated with a defibrillator implanted December 2011.

On September 18, 2017 the pilot's family physician worked with the pilot's caregiver to coordinate rehabilitation care due to weakness following a September 6, 2017 right total knee arthroplasty (knee replacement). The patient was not present for the evaluation; but the caregiver who was coordinating care stated that the pilot was often short tempered and impulsive, would occasional hear something that no one else did, and needed help with directions while driving along a route that he traveled many times. Based on this history, the physician wrote in the pilot's medical record that the pilot had possible early dementia with heightened impulsivity. The physician referred the pilot to a rehabilitation center and prescribed clonazepam 0.5 mg with up to 2 pills every 12 hours. The patient terminated care with the office on October 11, 2017 when he was told the physician was not available to refill medications and no additional primary care treatment records were available.

Records from the rehabilitation center from September 20 through October 4, 2017 were reviewed. The pilot was admitted due to progressive weakness at home following his total knee surgery. During his stay he underwent physical therapy and his strength and mobility improved. During his rehabilitation, he was noted to have anxiety treated with clonazepam. Neurologic and psychiatric examinations during the course of his rehabilitation documented no abnormalities. However, the pilot declined a formal neuropsychiatric evaluation during his rehabilitation stay. He was discharged to outpatient physical therapy. No additional post-rehabilitation progress or neuro-psychiatric evaluations were available.

D. SUMMARY OF MEDICAL FINDINGS

The 78-year-old male pilot was issued a third class medical certificate on April 4, 2005 with a limitation not to fly at night or by color signal control because of a color vision defect. On that examination he denied any medical concerns or the use of medications. The pilot's medical certificate was not valid after April 30, 2007. However, he was operating an airplane that did not require a medical certificate but did require a pilot or sport pilot certificate. Finally, the pilot was involved in an airplane accident on September 6, 2012 and following that accident had voluntarily surrendered his private pilot's license.

The Nashville Tennessee Office of the Medical Examiner's autopsy documented the cause of death was multiple blunt force injuries and the manner was accident. He had a significantly enlarged heart with left ventricular and septal hypertrophy. Additionally, he had significant coronary artery disease with a stent in the right coronary artery. The mid left circumflex coronary artery showed up to 75 percent narrowing and the mid left anterior descending and proximal first diagonal

¹⁰ National Institute of Health, National Library of Medicine, *DailyMed* 2019: Clonazepam. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=542f22e8-dad2-47a8-93b6-30936715d73b> Accessed 3/7/2019

¹¹ According to the CAMI toxicologist, the blood level of clonazepam was below the detection device's calibration curve and significantly below lower end of therapeutic.

coronary arteries each show 50 and 60 percent narrowing respectively. Interrogation of a Medtronic implanted defibrillator did not identify evidence of a heart rhythm that would have resulted in defibrillation around the time of the accident.

About 3 months before the accident, the pilot was experiencing weakness following a September 6, 2018 right total knee replacement. On September 18, 2017, a caregiver coordinated post-surgical rehabilitation care for the pilot with the pilot's family medicine provider. The pilot was not present during the visit, and the caregiver reported to the provider that the pilot was often short tempered and impulsive, would occasional hear something that no one else did, and needed help with directions while driving along a route that he traveled many times. The provider wrote in the patient record that the pilot may have possible early dementia with heightened impulsivity, but no formal testing was conducted to confirm this diagnosis. Additionally, during the subsequent inpatient rehabilitation stay, the pilot was diagnosed with anxiety treated with clonazepam but was found to have otherwise normal neurologic and psychiatric evaluations. He was referred for a psychiatric evaluation but elected not to undergo evaluation. No additional information was available concerning the pilot's neurologic or psychiatric conditions.

FAA Bioaeronautical Sciences Research Laboratory toxicology testing was negative for ethanol and carbon monoxide. Testing detected the non-narcotic pain medication naproxen in urine; the blood pressure medication metoprolol in blood and urine, the cholesterol medication rosuvastatin in blood and urine, the antidepressant sertraline and its metabolite in blood and urine, and the blood thinner clopidogrel in blood and urine. These medications are generally considered not to be impairing. Additionally, the potentially impairing Schedule IV benzodiazepine clonazepam and its metabolite were detected in urine and in blood below quantifiable/therapeutic levels.