



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

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A. ACCIDENT: CEN19LA316; Eustace, TX

On September 12, 2019, about 0945 central daylight time, a tricycle-geared Infinity Power Parachutes IPP2 powered parachute (PPC), N6035L, impacted a wire during a low-level flight near Eustace, Texas. The private pilot and sole occupant sustained fatal injuries. The PPC sustained substantial damage. The PPC was registered to and operated by the pilot under the provision of Title 14 *Code of Federal Regulations* Part 91 as a visual flight rules personal flight. Day visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The flight originated from the pilot's property near Eustace about 0830.¹

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 FAA medical case review was reviewed. Selected past medical records from the pilot's primary physician were reviewed; these included copies of selected records that had been provided to the primary physician by specialists to which the pilot had been referred. The pilot's autopsy report was reviewed, and forensic pathologists associated with the case were contacted. NMS Labs and FAA toxicology reports were reviewed. Investigator reports (including witness statements) and relevant regulation and medical literature were also reviewed.

¹ Summary taken from this accident's National Transportation Safety Board Aviation Accident Preliminary Report, originally published September 18, 2019.

3. Findings

a. FAA Medical Case Review

According to the FAA medical case review, the 70-year-old male pilot's last aviation medical examination was July 11, 1997. At that time, he reported 100 total civil flight hours. He was 69 inches tall and weighed 231 pounds. He reported no active medical condition or medication use; previous high blood pressure was noted. No significant issues were identified, and the pilot was issued a third-class medical certificate limited by a requirement that he wear corrective lenses.

The pilot's most recent medical certificate expired for all classes on July 30, 1999. By 14 CFR 61.23(c), the pilot was not required to have a current medical certificate to exercise sport pilot privileges in a light-sport aircraft (such as the accident aircraft), provided he met other regulatory requirements.²

b. Past Medical Records

i. Most Recent Primary Physician Visit

According to medical records from the pilot's primary physician, the pilot's last visit was dated August 5, 2019. The purpose of the visit was to follow up the pilot's known high blood pressure and high cholesterol. A limited physical exam was relatively unremarkable, except that the pilot was noted to have high blood pressure and obesity.³

At the time, the pilot was taking atorvastatin (a prescription drug used to control cholesterol and decrease cardiovascular disease risk); meloxicam (a prescription drug often used to decrease inflammation associated with arthritis); aspirin (an over-the-counter drug often used to decrease cardiovascular disease risk; and/or to control pain, fever, and inflammation); and zinc, fish oil, and vitamin supplements.^{4,5,6} He was also taking hydrochlorothiazide (discontinued at the visit because he reported exertional dizziness), carvedilol, losartan, and amlodipine, which are all

² Office of the Federal Register. 14 CFR 61.23. Electronic Code of Federal Regulations. https://www.ecfr.gov/cgi-bin/text-idx?node=se14.2.61_123. Updated April 29, 2020. Accessed May 1, 2020.

³ The pilot was 69 inches tall and weighed 228 pounds, making his body mass index 33.7 (30 and above is considered obese). [Centers for Disease Control and Prevention. About adult BMI. Centers for Disease Control and Prevention website. https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html. Updated April 10, 2020. Accessed May 1, 2020.]

⁴ National Institutes of Health National Library of Medicine. Lipitor. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c6e131fe-e7df-4876-83f7-9156fc4e8228>. Updated December 6, 2019. Accessed May 1, 2020.

⁵ National Institutes of Health National Library of Medicine. Mobic. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=676e73fb-51d2-449a-8749-1a7bcc257b11>. Updated October 11, 2018. Accessed May 1, 2020.

⁶ National Institutes of Health National Library of Medicine. Bayer genuine aspirin. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=44a08904-68b9-4d06-a28d-21aae3d6140c>. Updated October 26, 2017. Accessed May 1, 2020.

prescription medications used to lower blood pressure.^{7,8,9,10} None of these medications is considered impairing.

As of his most recent primary physician visit, the pilot was taking hydrocodone/acetaminophen for pain. Reviewed records indicate that he had been doing so for years at a stable dosage.¹¹ Hydrocodone/acetaminophen, sometimes marketed as Norco or Vicodin, is a prescription pain medication. It contains the potentially impairing opioid hydrocodone (discussed separately below) and the non-impairing pain/fever drug acetaminophen (commonly marketed alone as Tylenol).¹²

ii. Other Medical and Surgical History

The pilot had sustained a previous ischemic stroke (disruption of blood flow to part of his brain), on April 10, 2017. According to a neurologist's note copied to the primary physician from June 29, 2017, the stroke affected the pilot's right occipital lobe, as confirmed on magnetic resonance imaging, and caused a deficit of the pilot's left upper field of vision that was still present as of the date of the neurologist's note, with no further stroke symptoms. According to separate documentation by the primary physician, the right cerebral peduncle had been affected by stroke and had caused left-sided body weakness. Recent records from the primary physician did not further specify the pilot's deficits or whether any deficits were ongoing.

The pilot also had worsening moderately severe arthritis of multiple joints, and had had numerous prior orthopedic issues/surgeries. In March 2019, he had been diagnosed with left wrist carpal tunnel syndrome, left index trigger finger, and right ulnar neuropathy. On May 10, 2019, he had undergone surgery for the left carpal tunnel syndrome and trigger finger;

⁷ National Institutes of Health National Library of Medicine. Coreg. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c57982f2-c7da-488a-7ea9-b9609439ac68>. Updated September 15, 2017. Accessed May 1, 2020.

⁸ National Institutes of Health National Library of Medicine. Cozaar. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5ac32c20-169d-475a-fc8a-934f758d6ab0>. Updated November 14, 2019. Accessed May 1, 2020.

⁹ National Institutes of Health National Library of Medicine. Hydrochlorothiazide. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=7b38ac8a-4540-4eb2-aedd-9aa966d22190>. Updated March 27, 2007. Accessed May 1, 2020.

¹⁰ National Institutes of Health National Library of Medicine. Norvasc. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=abd6a2ca-40c2-485c-bc53-db1c652505ed>. Updated March 14, 2019. Accessed May 1, 2020.

¹¹ The reviewed primary doctor visit notes went back as far as June 16, 2017; on that and all subsequent visit notes, the pilot was documented to be taking two oral doses per day of 10 milligrams hydrocodone/325 milligrams acetaminophen. Neither the starting date of, nor the disease-specific indication for, hydrocodone/acetaminophen use was specified in reviewed records. Selected spine clinic records copied to the primary physician from 2018 listed the dosing frequency as every six hours as needed.

¹² National Institutes of Health National Library of Medicine. Norco. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=66a328bc-055f-4107-8b81-f6f939bea0a7>. Updated November 28, 2019. Accessed May 1, 2020.

these were doing well as of follow-up 11 days later. He had also undergone multiple procedures for chronic back pain with symptoms radiating to his legs (most recently, spine surgery on July 2, 2018).

c. Autopsy

The pilot's autopsy was performed by American Forensics (Mesquite, Texas). According to the autopsy report, the pilot's cause of death was: (I) blunt force injuries due to paragliding accident; (II) hypertensive and atherosclerotic cardiovascular disease. According to the report, the manner of death was accident.

The autopsy of the heart found an area of greater than 99% stenosis at the midportion of the left anterior descending coronary artery. The heart weighed 466 grams and was described as enlarged.¹³ Both cardiac ventricles were described as appearing dilated, left more than right. Visual (non-microscopic) examination of the heart was otherwise unremarkable, and did not identify any scarring from old heart attack.

The autopsy of the brain identified an inferior right occipital lobe cavitory lesion measuring $2.0 \times 1.5 \times 1.0$ centimeters, and a right basal ganglia cavitory lesion measuring $0.4 \times 0.4 \times 0.3$ centimeters. These cavitory lesions were consistent with areas of old ischemic stroke.¹⁴ The brain was otherwise unremarkable.

The remainder of the autopsy did not demonstrate any significant natural disease.

d. Toxicology

NMS Labs performed toxicology testing at the request of American Forensics. This testing identified hydrocodone at 32 nanograms per milliliter (ng/ml), and its active metabolite hydromorphone at 1.3 ng/ml, in femoral blood.¹⁵

¹³ The pilot weighed 228 pounds at his most recent primary doctor visit, and 248.5 pounds at autopsy. For a 225-pound male, normal heart weight is about 395 grams (95% confidence interval 299 – 521 grams). For a 251-pound male, normal heart weight is about 418 grams (95% confidence interval 316 – 551 grams). [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 Clin Proc.* 1988;63(2):137-146.]

¹⁴ The autopsy report does not explicitly state that these lesions were areas of stroke, and the pathologist who performed the autopsy is no longer with American Forensics. The FAA medical case review notes that the FAA physician reviewer discussed the case with the pathologist, who felt that the lesions could have resulted from a previous stroke. In a living person, after an acute ischemic stroke, macroscopic tissue changes occur gradually, from little visible change in the first 6 hours, to cavitation weeks later. The tissue liquefaction that leads to cavitation does not begin until about 10 days after the stroke. [Frosch MP, Anthony DC, De Girolami U. The central nervous system. In: Kumar V, Abbas AK, Fausto N, eds. *Robbins and Cotran Pathologic Basis of Disease*. 7th ed. Philadelphia, PA: Elsevier Inc; 2005:1347-1420.]

¹⁵ NMS Labs screened femoral blood via immunoassay for amphetamines, barbituates, benzodiazepines, buprenorphine/metabolite, cannabinoids, cocaine/metabolites, fentanyl/acetyl fentanyl, methadone/metabolite, methamphetamine/MDA, opiates, oxycodone/oxymorphone, and phencyclidine; and via gas chromatography for acetone, ethanol, isopropanol, and methanol. NMS Labs performed confirmation testing of femoral blood via high performance liquid chromatography/tandem mass

The FAA's Forensic Sciences Laboratory identified hydrocodone at 28 ng/ml in femoral blood and 2770 ng/ml in urine. Hydromorphone was measured in urine at 2851 ng/ml. Dihydrocodeine, another active metabolite of hydrocodone, was detected in femoral blood, and was measured in urine at 312 ng/ml. Carvedilol, atorvastatin, and amlodipine were detected in femoral blood and urine. Salicylate was detected in urine, and acetaminophen was measured in urine at 108 micrograms per milliliter (µg/ml).¹⁶

e. Descriptions of Detected Substances

Hydrocodone is a prescription opioid pain medication. It is a Drug Enforcement Agency Schedule II controlled substance and can be addicting. It is often marketed in combination with acetaminophen as Norco or Vicodin. It typically carries a warning that it may impair mental or physical abilities needed to perform potentially hazardous activities such as driving a car or operating machinery, and that patients should be warned not to drive or operate dangerous machinery unless they are tolerant to the effects of the medication and know how they will react to it. Other potential adverse effects of hydrocodone include slow/shallow breathing, low blood pressure, and increased susceptibility to seizure.¹² Hydrocode is considered a “do not fly” medication by the FAA.¹⁷

Hydromorphone and dihydrocodeine are active metabolites of hydrocodone.¹⁸ Salicylate is a metabolite of aspirin.¹⁹ All detected substances were medications (or metabolites of medications) that the pilot was taking as of his most recent primary doctor visit.

D. SUMMARY OF MEDICAL FINDINGS

The 70-year-old male pilot did not hold an active medical certificate. His last Federal Aviation Administration (FAA) medical examination was July 11, 1997. At that time, he reported no active medical condition or medication use; he had previously reported

spectrometry for free opiates: 6-monoacetylmorphine, codeine, dihydrocodeine/hydrocodol (reporting limit 5.0 nanograms per milliliter), hydrocodone, hydromorphone, morphine, oxycodone, and oxymorphone.

¹⁶ 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 (<http://jag.cami.jccbi.gov/toxicology>).

¹⁷ According to the FAA, no pilot should fly while using hydrocodone. An open prescription for hydrocodone is disqualifying for medical certification. Pilots operating under sport pilot rules without medical certification 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 21, 2019. Accessed May 1, 2020.] [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 April 29, 2020. Accessed May 1, 2020.] [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 April 29, 2020. Accessed May 1, 2020.]

¹⁸ Molina DK, Hargrove VM. *Handbook of Forensic Toxicology for Medical Examiners*. 2nd ed. Boca Raton, FL: CRC Press; 2019.

¹⁹ Stringer JL. *Basic Concepts in Pharmacology*. 3rd ed. New York, NY: McGraw-Hill; 2006.

hypertension. He was issued a third-class medical certificate limited by a requirement that he wear corrective lenses; this certificate expired for all classes on July 30, 1999.

According to personal medical records, the pilot had high blood pressure, high cholesterol, and arthritis; had previously sustained a stroke with an associated visual deficit; and had undergone multiple surgeries for various neuromusculoskeletal issues. In August 2019 he was taking hydrocodone/acetaminophen, a combination of an opioid and a non-opioid pain medication. He was also taking the blood pressure medications carvedilol, losartan, and amlodipine; the cholesterol medication atorvastatin; the anti-inflammatory medications meloxicam and aspirin; and zinc, fish oil, and vitamins.

The pilot's autopsy was performed by American Forensics. His reported cause of death was: (I) blunt force injuries due to paragliding accident; (II) hypertensive and atherosclerotic cardiovascular disease. The autopsy identified an area of greater than 99% stenosis at the midportion of his left anterior descending coronary artery. His heart was described as enlarged, with dilation of both ventricles. Cavitary brain lesions of his inferior right occipital lobe and right basal ganglia were identified, consistent with areas of old ischemic stroke. No other significant natural disease was identified.

NMS Labs toxicology detected hydrocodone (32 ng/ml in femoral blood) and hydromorphone (1.3 ng/ml in femoral blood). FAA toxicology detected hydrocodone (28 ng/ml in femoral blood, and 2770 ng/ml in urine), dihydrocodeine (in femoral blood, and 312 ng/ml in urine), hydromorphone (2851 ng/ml in urine), carvedilol (in femoral blood and urine), atorvastatin (in femoral blood and urine), amlodipine (in femoral blood and urine), salicylate (in urine), and acetaminophen (108 µg/ml in urine).