National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

WPR23LA112

MEDICAL

Specialist's Factual Report

December 19, 2024

TABLE OF CONTENTS

A ACCIDENT

Location: Corning, California
Date: February 15, 2023

B MEDICAL SPECIALIST

Specialist JE Tuttle MD MHA FACS
National Transportation Safety Board
Washington, DC

C DETAILS OF THE INVESTIGATION

1.0 Purpose

This investigation was performed to evaluate the student pilot for potentially impairing substances and potentially impairing medical conditions.

2.0 Methods

The Federal Aviation Administration (FAA) medical case review and the student pilot's autopsy and toxicology reports were reviewed. Selected investigator reports and relevant regulation and medical literature were also reviewed.

D FACTUAL INFORMATION

1.0 FAA Medical Case Review

According to the FAA medical case review, the 35-year-old male student pilot's last aviation medical examination was September 4, 2021. At that time, he was 67 inches tall and weighed 251 pounds. He reported no medical conditions or medication use. He was issued a third-class medical certificate without limitation.

2.0 Autopsy

Bennet Omalu Pathology performed the autopsy of the student pilot. According to the autopsy report and accompanying Tehama County Coroner investigation report, the student pilot's cause of death was acceleration-deceleration polytrauma of the body and the manner of death was accident. The right and left ventricles of his heart were described as showing moderate dilatation without heart muscle thickening. Due to the extent of injuries, brain, heart, and lung examinations

were limited. Within these limitations, the autopsy did not identify other significant natural disease. There was no evidence of thermal injury and there was no soot in the airways.

A Tehama County Coroner death investigation report was included with the autopsy report. The report contained the student pilot's medical history obtained from the student pilot's wife. According to the student pilot's wife, the student pilot had recently been diagnosed as having bipolar disorder and was being treated for attention-deficit/hyperactivity disorder (ADHD), and borderline high blood pressure.

3.0 Toxicology

At the request of Bennet Omalu Pathology, Central Valley Toxicology performed toxicological testing of postmortem cavity blood of the student pilot. Hydroxybupropion was detected at 160 ng/mL. Bupropion was not detected. No other tested-for substances were detected.[1] At the request of Central Valley Toxicology, NMS Labs tested the pilot's postmortem cavity blood for cyanide. Cyanide was detected at 0.055 µg/mL.[2]

4.0 FAA Toxicology Report

The FAA Forensic Sciences Laboratory performed toxicology testing of postmortem specimens from the student pilot.[3] Amphetamine was detected in cavity blood at 149 ng/mL and in liver tissue at 144 ng/g. Bupropion was detected in cavity blood at 40 ng/mL and in liver tissue at 38 ng/g. Hydroxybupropion was detected in cavity blood at 122 ng/mL and in liver tissue at 1345 ng/g.[4]

---

[1] Central Valley Toxicology tested-for substances can be found at their website. According to an e-mail from Central Valley Toxicology, drug names on the list are routine for postmortem testing. Drug tests for drug names on the list that are italicized are only by request for expanded testing. In this case, only the routine tests were performed. Accessed November 6, 2024.

[2] Information about the cyanide testing procedure is available on the NMS Labs website at Test Code 1380B. https://www.nmslabs.com/tests/1380B.

[3] The FAA Forensic Sciences laboratory has the capability to test for around a thousand substances including toxins, prescription and over-the-counter medications, and illicit drugs.

[4] According to the FAA Forensic Sciences Laboratory methodology website, the laboratory performs blood cyanide testing only if carboxyhemoglobin is measured at or above a reporting cutoff of 10%. . When cyanide testing is performed, the laboratory reports blood cyanide results based on a reporting cutoff of 0.25 µg/mL. In this case, carboxyhemoglobin was not detected (indicating a carboxyhemoglobin value below 10%).

5.0 Descriptions of Detected Substances

Amphetamine is a prescription Federal Schedule II controlled substance. Amphetamine may be prescribed for attention-deficit/hyperactivity disorder, narcolepsy, and obesity. Amphetamine usually carries a warning that the drug may impair the ability to operate a vehicle, and care should be taken until the effects of the drug are assessed after initiation of use. Amphetamine also generally carries a warning that use in individuals diagnosed with bipolar disorder without an additional medication to stabilize mood can precipitate mania.[5] Amphetamine can be used recreationally by users seeking euphoric effects and to increase alertness and relieve fatigue. Abuse of amphetamine may lead to psychosis, paranoia, auditory and visual hallucinations.[6] In addition to being available as a drug itself, amphetamine is a metabolite of methamphetamine, another drug in the same class. According to the FAA medical case review, the FAA considers amphetamine or methamphetamine use disqualifying for pilot medical certification.

Bupropion is a prescription medication that acts on the central nervous system (CNS) and can be used to treat depression and to help people quit smoking.[7,8] Bupropion is sometimes used as part of the treatment of ADHD or of depression in bipolar disorder. Hydroxybupropion is a metabolite of bupropion. Bupropion's mechanism of action and side-effect profile differs from other antidepressants; it does not typically cause sedation but may cause insomnia; to avoid adverse events including an increased risk of seizures, strict dosing guidelines are recommended.[9,10] One small study of healthy subjects found no significant impact of sustained-release bupropion on psychomotor performance, including on tests intended to simulate flying performance.[11] In patients with major depression, bupropion may improve

[5] National Institutes of Health National Library of Medicine. Amphetamine sulfate- tablet. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=53d40847-e0d3-48ec-81a7-ec5478553565. Updated October 13, 2023. Accessed December 13, 2024., 2024.

[6] National Highway Traffic Safety Administration (NHTSA). April 2014 (Revised). Drugs and Human Performance Fact Sheets. Methamphetamine (and Amphetamine). Accessed December 13, 2024. https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf.

[7] National Institutes of Health National Library of Medicine. Wellbutrin XL. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a435da9d-f6e8-4ddc-897d-8cd2bf777b21. Updated March 1, 2024. Accessed December 17, 2024.

[8] National Institutes of Health National Library of Medicine. Wellbutrin SR. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=cbc8c074-f080-4489-a5ae-207b5fadeba3. Updated April 22, 2024. Accessed December 17, 2024.

[9] Steinert T, Rascher W. Epileptic Seizures Under Antidepressive Drug Treatment: Systematic Review. Pharmacopsychiatry, 2018;51(4):121-135

[10] Snehal I, Lorenzen G, Sharma A. Seizure and Other Catastrophes due to Bupropion Overdose: Recent Case Report and Review of Published Cases. Innov Clin Neurosci. 2023;20(4-6):49-52.

[11] Paul MA, Gray G, Kenny G, Lange M. The impact of bupropion on psychomotor performance. Aviat Space

associated neurocognitive deficits.[12] Research on motor vehicle crash risk indicates that depression, antidepressants, or the combination of depression and antidepressants may present a safety hazard, but the independent contributions of antidepressants to that hazard generally are not well-defined.[13] Typically, bupropion carries a warning that any drug that acts on the CNS may impair users' ability to perform tasks requiring judgment or motor and cognitive skills, and that bupropion users should not drive or operate hazardous machinery until they are reasonably certain that the drug does not adversely affect their performance.[7,8,15] Bupropion also generally carries a warning that use in individuals with bipolar disorder without an additional medication to stabilize mood, can precipitate mania.[14] At the time of this accident and the final FAA medical case review for this accident, bupropion use was unacceptable for pilots; however, in April 2024, sustained- and extended-release formulations of bupropion were designated as conditionally acceptable by the FAA for use as a single agent to treat depression, subject to case-by-case review for Special Issuance medical certification.[15]

Cyanide is a toxin that can occur naturally or as a byproduct of industrial processes such as burning waste, mining, vehicle exhaust and creation of pesticides. Cyanide can be found in small amounts in water and soil, mostly as environmental contaminants from industrial production of plastics.[16,17] Cyanide exposure can also occur by inhaling smoke from combustion of nitrogen-containing polymers.[18] Blood

---

Environ Med. 2002;73(11):1094-1099.

[12] Gualtieri CT, Johnson LG. Bupropion normalizes cognitive performance in patients with depression. MedGenMed. 2007;9(1):22.

[13] Hill LL, Lauzon VL, Winbrock EL, Li G, Chihuri S, Lee KC. Depression, antidepressants and driving safety. Inj Epidemiol. 2017;4(1):10. doi:10.1186/s40621-017-0107-x.

[14] National Institutes of Health National Library of Medicine. Bupropion hydrochloride. DailyMed. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=9196568e-aec8-4d56-993e-4cbb78d4a3a6. Updated February 29, 2024. Accessed July 10, 2024.

[15] Federal Aviation Administration. Guide for Aviation Medical Examiners. Decision Consideration-Aerospace medical dispositions. Item 47. Psychiatric Conditions-Use of Antidepressant Medications. https://www.faa.gov/ame_guide/app_process/exam_tech/item47/amd/antidepressants. Updated April 24, 2024. Accessed July 10, 2024.

[16] Center for Disease Control. Agency for Toxic Substances and Disease Registry. Public Health Statement for Cyanide. https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=70&toxid=19. Updated October 24, 2011. Accessed July 10, 2024.

[17] Logue BA, Hinkens DM, Baskin SI, Rockwood GA. The Analysis of Cyanide and its Breakdown Products in Biological Samples. Critical Reviews in Analytical Chemistry. 2010;40(2):122-147. doi: https://doi.org/10.1080/10408340903535315.

[18] Eckstein M, Maniscalco PM. Focus on Smoke Inhalation—The Most Common Cause of Acute Cyanide Poisoning. Prehospital and Disaster Medicine. 2006;21(S2): s49-s55. doi:10.1017/S1049023X00015909.

cyanide levels of 0.5 µg/mL or higher in a living person generally are toxic and may cause rapid heart rate and diminished consciousness, progressing to death near levels of about 3 µg/mL.[19]

E SUMMARY OF MEDICAL FACTS

According to the FAA medical case review, the 35-year-old male student pilot's last aviation medical examination was September 4, 2021. At that time, he was 67 inches tall and weighed 251 pounds. He reported no medical conditions or medication use. He was issued a third-class medical certificate without limitation.

Bennet Omalu Pathology performed the autopsy of the student pilot. According to the autopsy report and accompanying Tehama County Coroner investigation report, the student pilot's cause of death was acceleration-deceleration polytrauma of the body and the manner of death was accident. The right and left ventricles of his heart were described as showing moderate dilatation without heart muscle thickening. Due to the extent of injuries, brain, heart, and lung examinations were limited. Within these limitations, the autopsy did not identify other significant natural disease. There was no evidence of thermal injury and there was no soot in the airways.

A Tehama County Coroner death investigation report was included with the autopsy report. The report contained the student pilot's medical history obtained from the student pilot's wife. According to the student pilot's wife, the student pilot had recently been diagnosed as having bipolar disorder and was being treated for attention-deficit/hyperactivity disorder, and borderline high blood pressure.

At the request of Bennet Omalu Pathology, Central Valley Toxicology performed toxicological testing of postmortem cavity blood of the student pilot. Hydroxybupropion was detected at 160 ng/mL. Bupropion was not detected. No other tested-for substances were detected. At the request of Central Valley Toxicology, NMS Labs tested the pilot's postmortem cavity blood for cyanide. Cyanide was detected at 0.055 µg/mL.

The FAA Forensic Sciences Laboratory performed toxicology testing of postmortem specimens from the student pilot. Amphetamine was detected in cavity blood at 149 ng/mL and in liver tissue at 144 ng/g. Bupropion was detected in cavity blood at 40 ng/mL and in liver tissue at 38 ng/g. Hydroxybupropion was detected in cavity blood at 122 ng/mL and in liver tissue at 1345 ng/g.

[19] Desai S, Su MK. Cyanide poisoning. In: Post TW, ed. UpToDate. Waltham, MA: UpToDate Inc. https://www.uptodate.com/contents/cyanide-poisoning. Updated October 3, 2024. Accessed December 2, 2024.

Submitted by:

JE Tuttle MD MHA FACS
National Transportation Safety Board