



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
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Medical Factual Report

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Chief Medical Officer

A. ACCIDENT: CEN16FA130; Ellsworth, NE

On March 20, 2016, about 1110 mountain daylight time, an Aeronca 7AC airplane, N84580, impacted terrain near Ellsworth, Nebraska. The airplane was destroyed and the pilot sustained fatal injuries. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Day visual meteorological conditions prevailed for the local flight, which departed from the Alliance Municipal Airport (AIA), Alliance, Nebraska without a flight plan.

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 any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins.

2. Methods

The FAA medical case review, personal medical records, autopsy report, toxicology findings, and the investigator's reports were reviewed.

FAA Medical Case Review

According to the FAA files, the 68 year old male pilot had last had an aviation medical examination on 7/07/2005. At that time, he reported 400 total flight hours and had reported no medical conditions and no medications to the FAA. He was 67 inches tall and weighed 179 pounds. He was issued a third class medical certificate limited by a requirement to wear corrective lenses.

Autopsy

According to the autopsy performed by the Regional West Medical Center, Western Pathology Consultants, P.C., Pathology Department, the cause of death was blunt force trauma and the manner of death was accident. A bottle of nitroglycerin was noted in the pilot's pocket. The body was found to be 66 inches tall and weigh 174 pounds.

Examination of the body for natural disease identified coronary artery disease with a 50% stenosis in the proximal left anterior descending artery. The heart weighed 380 grams; average for a 176 pound man is 349 grams with a range of 265 - 461 grams.¹ The remainder of the heart was reported as unremarkable by the pathologist.

Toxicology

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified carbon monoxide (carboxyhemoglobin) at 40% in subclavian blood.

In addition, metoprolol, buspirone, and temazepam (0.123 ug/ml) were identified in subclavian blood. These drugs and diazepam, clopidogrel, oxazepam, and ranitidine were identified in urine.

Carbon monoxide is an odorless, tasteless, colorless, nonirritating gas formed by hydrocarbon combustion. CO binds to hemoglobin with much greater affinity than oxygen, forming carboxyhemoglobin; elevated levels result in impaired oxygen transport and utilization.² Nonsmokers may normally have up to 3 percent carboxyhemoglobin in their blood; heavy smokers may have levels of 10 to 15 percent.³ This pilot was not a smoker.

Carbon monoxide and oxygen compete for the same receptor site on hemoglobin. Once CO is bound to a hemoglobin molecule, any oxygen molecules also attached to that hemoglobin are stuck and unable to offload from blood into tissues. This magnifies the negative effect on oxygen delivery to tissues. Finally, CO also binds to cellular proteins involved in the utilization of oxygen, further impairing tissue oxygenation. The primary acute effects of acute carbon monoxide poisoning are on the brain and heart and include headache, arrhythmias, confusion, coma, and death.

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):137-46.

² Clardy PF, Manaker S, Perry H. Carbon monoxide poisoning. In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA <http://www.uptodate.com/contents/carbon-monoxide-poisoning?source=preview&language=en-US&anchor=H9&selectedTitle=1~34#H9> Accessed 3/28/2017.

³ Ernst A, Zibrak JD. Carbon monoxide poisoning. N Engl J Med 1998; 339:1603.

Metoprolol is a blood pressure medication also used to prevent recurrent heart attacks; it is also marketed with the names Lopressor and Toprol.⁴

Buspirone is an antianxiety medication with an unknown mechanism of action. It carries the following warning information, “Studies indicate that buspirone hydrochloride tablets are less sedating than other anxiolytics and that it does not produce significant functional impairment. However, its CNS effects in any individual patient may not be predictable. Therefore, patients should be cautioned about operating an automobile or using complex machinery until they are reasonably certain that buspirone treatment does not affect them adversely.”⁵

Temazepam is a benzodiazepine sedative-hypnotic used to treat anxiety and insomnia, also marketed with the name Restoril. It carries a number of warnings including warnings about respiratory depression when co-administered with opioids, and a concern about cognitive and behavioral changes, “Other kinds of behavioral changes can also occur, for example, bizarre behavior, agitation, hallucinations, and depersonalization. Complex behaviors such as “sleep-driving” (i.e., driving while not fully awake after ingestion of a sedative-hypnotic, with amnesia for the event) have been reported. These events can occur in sedative-hypnotic-naïve as well as in sedative-hypnotic-experienced persons. Although behaviors such as “sleep-driving” may occur with temazepam alone at therapeutic doses, the use of alcohol and other CNS depressants with temazepam appears to increase the risk of such behaviors, as does the use of temazepam at doses exceeding the maximum recommended dose.”⁶

While diazepam and oxazepam are each also benzodiazepines available by prescription, their presence only in urine in this case indicates they were most likely present as metabolites of temazepam. Clopidogrel, also known as Plavix, is an antiplatelet drug used to prevent recurrent clots forming in coronary stents.⁷ Ranitidine, a heartburn medication, is available over the counter and by prescription, often with the name Zantac.⁸

⁴ National Institutes of Health. US National Library of Medicine. DailyMed. Metoprolol. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5ef12832-15cd-40f4-bf11-6cea7e48ff7f> Accessed 11/6/2017.

⁵ National Institutes of Health. US National Library of Medicine. DailyMed. Buspirone. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=33999f17-f689-40a1-955a-fb19c0590e0e> Accessed 11/6/2017.

⁶ National Institutes of Health. US National Library of Medicine. DailyMed. Temazepam. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a4370eb4-b00d-4247-af8d-980e59fbbec6> Accessed 11/6/2017.

⁷ National Institutes of Health. US National Library of Medicine. DailyMed. Clopidogrel. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=edae8df1-caf9-ff72-1304-5ae8b355f8e7> Accessed 11/6/2017.

⁸ National Institutes of Health. US National Library of Medicine. DailyMed. Ranitidine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c0b66aaf-b40d-4827-ae13-549d1ddcf96c> Accessed 11/6/2017.

Personal Medical Records

Personal medical records were obtained from the pilot's usual provider, the local VA hospital, for the period from March 2007 to the accident date. Records indicate the pilot had been treated with brachytherapy for prostate cancer in 2000 as well as having longstanding hypertension and high cholesterol.

In April 2009, the pilot was treated for chest pain and evidence of a heart attack with placement of two coronary stents, in the obtuse marginal artery and the circumflex. The latter area restenosed requiring repeat angioplasty in May 2009. The pilot had recurrent chest pain and underwent placement of a second stent in the obtuse marginal in July 2009. In April 2011, he had an additional stent placed in the obtuse marginal.

In 2011, the pilot was diagnosed with mild obstructive sleep apnea (AHI = 7.2 episodes/hour) and treated with continuous positive airway pressure (CPAP). There are records for a single visit in March 2016 documenting his use of CPAP during the preceding 6 months. The pilot had used his machine on 72% of nights but had only used the device for 4 hours or more on 43% of nights. He was asked to increase his use of the machine.

In February 2013, the pilot was initially evaluated for stress, insomnia, and anxiety. Treatment was begun with temazepam and then buspirone was added in August 2013. These medications were continued with reported relief of symptoms through the time of the accident.

The last medication reconciliation was performed on February 18, 2016. At that time, the pilot was taking the following medications: aspirin (an antiplatelet drug to decrease the risk of recurrent heart attack), finasteride and tamsulosin to treat symptoms from his prostate gland (known also as Proscar and Flomax respectively), simvastatin (a cholesterol lowering drug also known as Zocor), as well as metoprolol, buspirone, clopidogrel, and temazepam (described above). Finally, the pilot used nitroglycerin as needed for chest pain.

D. SUMMARY OF MEDICAL FINDINGS

The 68 year old male pilot had reported no chronic medical conditions and no chronic medication use to the FAA, with a last FAA medical exam in 2005. However, according to his personal medical records, in 2000 he had been treated for prostate cancer and had intermittently been treated for hypertension. In 2009 and 2011, he underwent a series of interventions (angioplasty and stenting) for severe coronary artery disease. Since 2013, he had been treated for stress, insomnia, and anxiety with two antianxiety medications, temazepam and buspirone; both of these carry warnings about behavior changes. In 2011, he had been diagnosed with obstructive sleep apnea and instructed to use CPAP

(continuous positive airway pressure). A review in 2016 revealed he was not using his machine to the desired extent (at least 4 hours/night).

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According to the autopsy performed by the Regional West Medical Center, Western Pathology Consultants, P.C., Pathology Department, the cause of death was blunt force trauma and the manner of death was accident. The autopsy also identified coronary artery disease with a 50% stenosis in the proximal left anterior descending artery but no other findings.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified carbon monoxide (carboxyhemoglobin) at 40% in subclavian blood. In addition, metoprolol, buspirone, and temazepam (0.123 ug/ml) were identified in subclavian blood. These drugs and clopidogrel, diazepam and oxazepam (both potentially impairing benzodiazepine drugs but when found only in urine represent metabolites of temazepam), and ranitidine were identified in urine.