



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

January 17, 2018

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Chief Medical Officer

A. ACCIDENT: WPR16FA124; Hawthorne, CA

On June 10, 2016, at 1710 Pacific daylight time, a Grumman American Aviation Corporation AA 1B, N4SU, was destroyed when it impacted a residence after takeoff from Jack Northrop Field/Hawthorne Municipal Airport (HHR), Hawthorne, California. The private pilot/owner and flight instructor were fatally injured. There were no ground injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the instructional flight, which was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

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, autopsy reports, toxicology results, and the investigator's reports were reviewed.

Pilot Receiving Instruction

FAA Medical Case Review

According to the FAA files, the 90 year old male pilot receiving instruction had reported 3,000 hours of civilian flight time as of his last medical exam, dated 8/19/2015. At that time, he was 70 inches tall and weighed 190 pounds. Over the years, the pilot had reported coronary

artery disease requiring coronary artery bypass graft surgery (CABG) and an aortic valve replacement (in 2000), atrial fibrillation, diabetes (2005) and chronic kidney disease. A stress test dated 7/22/2015 showed atrial fibrillation but was negative for exercise induced ischemia. A 24-hour Holter test on 5/26/2015, showed persistent atrial fibrillation with no pauses or significant bradycardia. An echocardiogram dated 2/24/2015, showed ejection fraction of 55%, ventricular hypertrophy, atrial enlargement, aortic valve prosthesis that was adequately functioning with a peak valve gradient of 32 mmHg and a mean of 16 mmHg – the aortic valve area was 1.3 cm². Blood glucose on 7/23/2015 was 115 and the most recent hemoglobin A1C was 7.4%.¹ His creatinine was stable at 1.7. At the time of his last application, the pilot reported using metoprolol and losartan for blood pressure, aspirin to prevent a heart attack, alfuzosin and dutasteride to treat symptoms of prostatism, allopurinol to prevent gouty arthritis, ferrous sulfate to prevent anemia, and atorvastatin to treat high cholesterol. None of these medications are considered impairing. He was granted a special issuance third class medical certificate limited by a requirement for corrective lenses and marked, “Not valid for any class after 8/31/2016.”

Autopsy

According to the autopsy performed by County of Los Angeles, Department of Medical Examiner - Coroner, the cause of death was multiple blunt injuries and the manner of death was accident. Contributing to the death was atherosclerotic cardiovascular disease.

Examination of the body for natural disease was limited by the severity of the pilot's injuries; the brain was not available for examination. The heart weighed 660 grams and showed biventricular enlargement. (Average for a 190 pound man is 362 grams with a range of 275- 478 grams.²) The left ventricular wall and septum were thickened at 2.2 cm and the right ventricular wall was thickened at 0.7 cm. (Averages are 1.23 cm for the left wall and septum and 0.3 cm for the right wall.) The aortic valve had been replaced with a porcine valve. The native coronary arteries were severely stenosed at 80% for the left anterior descending and 90% for the right and circumflex coronary arteries. The grafts were described as “patent.”

¹ Hemoglobin A1C is a measure of the percentage of hemoglobin molecules that have a glucose molecule attached to them (what percentage have been glycosylated). It is used as a measure of average blood glucose over the preceding several weeks. Non-diabetic levels are below 5.4%. Between 5.5 and 6.4% is considered “pre-diabetes” and above 6.5% indicates diabetes. For diabetic individuals, levels below 7.0% are considered “good control.”

² 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.

Toxicology

Toxicology testing performed by the Forensic Science Laboratories of the County of Los Angeles, Department of Medical Examiner - Coroner identified metoprolol in cavity blood.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified losartan in lung tissue, urine, and cavity blood; metoprolol in urine and blood and sitagliptin in lung tissue, urine and cavity blood.

Losartan and metoprolol are described above. Sitagliptin is a prescription medication used to treat diabetes, often marketed with the name Januvia. It can cause hypoglycemia but is not otherwise considered impairing.³

Certified Flight Instructor

FAA Medical Case Review

According to the FAA files, the 71 year old male certified flight instructor (CFI) had reported 18,000 total civilian flight hours as of his last medical exam, dated 5/16/2016. At that time, documents report he was 71 inches tall and weighed 165 pounds. The pilot had reported hypertension in 2009 and at his last exam reported using lisinopril, a prescription medication, to treat it. He also reported a left hernia repair in 2008 and a right hernia repair in 2015. Of note, the CFI had not obtained a medical certificate between 2011 and 2016. At his last exam, this pilot was issued a third class medical certificate with the following limitation(s): must wear corrective lenses.

Autopsy

According to the autopsy performed by the County of Los Angeles, Department of Medical Examiner - Coroner, the cause of death was flame burn injury and multiple blunt force injuries and the manner of death was accident.

The heart was described as severely enlarged and dilated. It weighed 500 grams; average for a 163 pound man is 336 grams with a range of 255-444 grams.⁴ The right ventricle was 0.3 cm thick, the left ventricle and septum was 1.6 cm thick. (Average thicknesses are 0.3 cm and 1.3 cm respectively.) The autopsy noted sternotomy wires from a previous procedure along with scarring of the pericardium but did not describe the

³ National Institutes of Health. US National Library of Medicine. DailyMed sitagliptin. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f85a48d0-0407-4c50-b0fa-7673a160bf01> Accessed 1/2/2018.

⁴ 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.

degree of stenosis in the left anterior descending coronary artery or describe the presence/patency of the graft from the left internal mammary artery. However, it did describe extensive atherosclerosis with 80% stenosis of the right coronary artery and 30% stenosis of the circumflex branch of the left coronary artery. The absence of the right kidney was also noted.

Toxicology

Toxicology testing performed by the Forensic Science Laboratories of the County of Los Angeles, Department of Medical Examiner - Coroner did not identify any tested-for substances.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified atorvastatin in liver; cetirizine, hydroxyzine, and warfarin in liver, lung, and muscle; and 0.063 ug/mL of tramadol in blood.

Atorvastatin, also called Lipitor, is a prescription medication for high cholesterol. It is not considered impairing.

Cetirizine is a potentially sedating antihistamine available over the counter and by prescription. It is often sold with the name Zyrtec. It carries a warning, "When using this product, drowsiness may occur; alcohol, sedatives, and tranquilizers may increase drowsiness; avoid alcoholic drinks; be careful when driving a motor vehicle or operating machinery."⁵

Hydroxyzine is a sedating antihistamine available by prescription and often sold with the names Atarax and Vistaril. Its warning says, "Since drowsiness may occur with use of this drug, patients should be warned of this possibility and cautioned against driving a car or operating dangerous machinery while taking hydroxyzine. Patients should also be advised against the simultaneous use of other CNS depressant drugs, and cautioned that the effects of alcohol may be increased."⁶

Tramadol is a prescription opioid available as a Schedule IV controlled substance, used to treat pain. It increases the risk of seizures via an unknown mechanism, even when used at usual doses. Tramadol can be sedating and "should be used with caution and in reduced dosages when administered to patients receiving other central nervous system depressants such as alcohol, opioids, anesthetic agents, narcotics,

⁵ National Institutes of Health. US National Library of Medicine DailyMed. Cetirizine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=879c8c4e-f9ab-42bf-bd5a-073c4203b14d> Accessed 1/2/2018.

⁶ National Institutes of Health. US National Library of Medicine DailyMed. Hydroxyzine <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=81f9d88f-c50b-4c6a-a25b-46fa162a503e> Accessed 1/2/2018.

phenothiazines, tranquilizers or sedative hypnotics. Tramadol hydrochloride increases the risk of CNS and respiratory depression in these patients.”⁷

Personal Medical Records

According to records from the treating VA over the 3 years preceding the accident, the CFI had developed kidney failure and Tuesday/Thursday/Saturday dialysis was begun in 2012 using an AV fistula created in the left arm. In early 2013, he developed severe coronary artery disease which required a coronary artery bypass graft procedure (left internal mammary to the left anterior descending artery (LAD)) in January 2013. He underwent a repeat catheterization in 6/2013 for ST depression that occurred during a planned surgery (that was canceled as a result of the finding). The catheterization demonstrated the graft was completely occluded and there was 100% stenosis of the LAD, but collateral flow was being provided from the patent right coronary artery. The proximal circumflex artery was 60-70% stenosed but no further intervention was performed. Also in 2013, he had the laparoscopic removal of an ileal mass, underwent hernia surgery, and had a cancerous right kidney removed. All of these procedures were complicated by paroxysmal atrial fibrillation (Afib). By 2015 he was chronically in Afib on warfarin for anticoagulation and rate controlled with medication. In addition to his hypertension, he had chronic low back pain, PTSD, an anxiety disorder, and restless leg syndrome. According to the VA records, he had 100% disability for his kidney disease and 70% disability for PTSD related to his military service.

On 6/9/2016, the day before the accident, the CFI checked in with his pharmacist about his medication. At that time, his 18 active, daily home medication prescriptions included acetaminophen, methocarbamol, lidocaine/prilocaine cream, and tramadol for pain; omeprazole for heartburn; aspirin to prevent a heart attack; carvedilol and losartan for his blood pressure; atorvastatin for cholesterol; cinacalcet to manage his calcium levels and lanthum to manage his phosphate levels; docusate to treat chronic constipation, ferrous sulfate to help prevent anemia; loratadine and hydroxyzine for chronic itching; pramipexole for restless leg syndrome; sertraline for depression; and warfarin to thin his blood.

Among these medications, methocarbamol, tramadol, pramipexole, and sertraline are either potentially impairing or indicate a potentially impairing condition. Tramadol is described above.

Methocarbamol, often marketed as Robaxin, is a prescription central nervous system depressant with muscle relaxant properties. It carries two

⁷ National Institutes of Health. US National Library of Medicine DailyMed. Tramadol <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=ae7c54b1-b440-4cca-97e8-e5b825413d32> Accessed 1/3/2018.

relevant warnings, “Methocarbamol may impair mental and/or physical abilities required for performance of hazardous tasks, such as operating machinery or driving a motor vehicle. Patients should be cautioned about operating machinery, including automobiles, until they are reasonably certain that methocarbamol therapy does not adversely affect their ability to engage in such activities.” And, “Since methocarbamol may possess a general CNS depressant effect, patients receiving methocarbamol tablets, USP should be cautioned about combined effects with alcohol and other CNS depressants.”⁸

Pramipexole, also marketed as Mirapex, is indicated for the treatment of Parkinson’s but often used to treat restless leg syndrome. The drug causes somnolence and carries this warning about suddenly falling asleep, “Patients treated with pramipexole have reported falling asleep while engaged in activities of daily living, including the operation of motor vehicles which sometimes resulted in accidents.” It can also cause changes in behavior and cognition including the development of psychosis.⁹

Sertraline is a prescription antidepressant. While not specifically known to directly cause impairment, the underlying depression is associated with significant cognitive degradation, particularly in executive functioning.^{10,11} As a result, the FAA has a specific process to certify pilots with depression who require antidepressant treatment. The FAA’s Guide for Aviation Medical Examiners states “The use of a psychotropic drug is disqualifying for aeromedical certification purposes – this includes all antidepressant drugs, including selective serotonin reuptake inhibitors (SSRIs). However, the FAA has determined that airmen requesting first, second, or third class medical certificates while being treated with one of four specific SSRIs may be considered (see Item 47., Psychiatric Conditions – Use of Antidepressant Medications). The Authorization decision is made on a case by case basis. The Examiner may not issue.”¹²

⁸ National Institutes of Health. US National Library of Medicine DailyMed. Methocarbamol <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=92123cfa-5bd5-4554-8d5d-b877d5cb9c02> Accessed 1/3/2018.

⁹ National Institutes of Health. US National Library of Medicine DailyMed. Pramipexole. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=92f6ef1e-3256-45a7-a409-80dd85e95187> Accessed 1/3/2018.

¹⁰ National Institutes of Health. US National Library of Medicine DailyMed. Sertraline. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f9641190-9151-4f7e-89ff-1e7a818c30ee> Accessed 1/3/2018.

¹¹ Snyder HR. Major depressive disorder is associated with broad impairments on neuropsychological measures of executive function: A meta-analysis and review. Psychol Bull. 2013;139(1):81-132.

¹² Federal Aviation Administration. Airman Medical Examiner’s Guide, 2013. Issued Jan 03, 2013. http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/guide.pdf Pg. 211. Accessed 1/15/2013

The four potentially allowable antidepressants are fluoxetine (Prozac), escitalopram (Lexapro), sertraline (Zoloft), and citalopram (Celexa).¹³

D. SUMMARY OF MEDICAL FINDINGS

The 90 year old male pilot receiving instruction had reported coronary artery disease requiring coronary artery bypass graft surgery and an aortic valve replacement (in 2000), atrial fibrillation, diabetes (2005) and chronic kidney disease to the FAA. At the time of his last application, the pilot reported using metoprolol and losartan for blood pressure, aspirin to prevent a heart attack, alfuzosin and dutasteride to treat symptoms of prostatism, allopurinol to prevent gouty arthritis, ferrous sulfate to prevent anemia, and atorvastatin to treat high cholesterol. None of these medications are considered impairing. He held a special issuance third class medical certificate limited by a requirement for corrective lenses and marked, "Not valid for any class after 8/31/2016."

According to the autopsy performed by County of Los Angeles, Department of Medical Examiner - Coroner, the cause of death for the pilot receiving instruction was multiple blunt injuries and the manner of death was accident. Contributing to the death was atherosclerotic cardiovascular disease. Examination of the body for natural disease was limited by the severity of the pilot's injuries; the brain was not available for examination. The heart weighed 660 grams and showed biventricular enlargement. The autopsy demonstrated severe coronary artery disease treated with bypass graft that were patent. The aortic valve had been replaced with a porcine valve.

Toxicology testing for the pilot receiving instruction identified losartan in lung tissue, urine, and cavity blood; metoprolol in urine and blood and sitagliptin in lung tissue, urine, and cavity blood.

The 71 year old male certified flight instructor (CFI) had reported hypertension to the FAA in 2009 and at his last exam reported using lisinopril, a prescription medication, to treat it. He also reported a left hernia repair in 2008 and a right hernia repair in 2015. Of note, the CFI had not obtained a medical certificate between 2011 and 2016. At his last exam, about a month before the accident, the CFI was issued a third class medical certificate with the following limitation(s): must wear corrective lenses.

Autopsy

According to the autopsy performed by the County of Los Angeles, Department of Medical Examiner - Coroner, the cause of death was flame burn injury and multiple blunt force injuries and the manner of death was accident.

In addition, the CFI's heart was described as severely enlarged and dilated. The autopsy noted sternotomy wires from a previous procedure along with scarring of the pericardium but did not describe the degree of stenosis in the left anterior descending coronary artery

¹³ Federal Aviation Administration. Aviation Medical Examiner's Guide, 2013. SSRI Decision Path 1. http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/SSRI%20Decision%20Path%20-%20I.pdf Accessed 1/16/2013

or describe the presence/patency of the graft from the left internal mammary artery. However, it did describe extensive atherosclerosis with 80% stenosis of the right coronary artery and 30% stenosis of the circumflex branch of the left coronary artery. The absence of the right kidney was also noted.

Toxicology testing identified atorvastatin in liver; cetirizine, hydroxyzine, and warfarin in liver, lung, and muscle; and 0.063 ug/mL of tramadol in blood.

According to records from the treating VA, over the 3 years preceding the accident, the CFI had developed kidney failure and Tuesday/Thursday/Saturday dialysis was begun in 2012 using an AV fistula created in the left arm. In early 2013, he developed severe coronary artery disease which required a coronary artery bypass graft procedure (left internal mammary to the left anterior descending artery (LAD)) in January 2013. He underwent a repeat catheterization in 6/2013 for ST depression that occurred during a planned surgery (that was canceled as a result of the finding). The catheterization demonstrated the graft was completely occluded and there was 100% stenosis of the LAD, but collateral flow was being provided from the patent right coronary artery. The proximal circumflex artery was 60-70% stenosed but no further intervention was performed. Also in 2013, he had the laparoscopic removal of an ileal mass, underwent hernia surgery, and had a cancerous right kidney removed. All of these procedures were complicated by paroxysmal atrial fibrillation (Afib). By 2015 he was chronically in Afib on warfarin for anticoagulation and rate controlled with medication. In addition to his hypertension, he had chronic low back pain, PTSD, an anxiety disorder, and restless leg syndrome. According to the VA records, he had 100% disability for his kidney disease and 70% disability for PTSD related to his military service.

On 6/9/2016, the day before the accident, the CFI checked in with his pharmacist about his medication. At that time, his 18 active, daily home medication prescriptions included acetaminophen, methocarbamol, lidocaine/prilocaine cream, and tramadol for pain; omeprazole for heartburn; aspirin to prevent a heart attack; carvedilol and losartan for his blood pressure; atorvastatin for cholesterol; cinacalcet to manage his calcium levels and lanthum to manage his phosphate levels; docusate to treat chronic constipation, ferrous sulfate to help prevent anemia; loratadine and hydroxyzine for chronic itching; pramipexole for restless leg syndrome; sertraline for depression; and warfarin to thin his blood.