



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

June 15, 2022

Mary Pat McKay, MD, MPH
Chief Medical Officer

A. ACCIDENT: HWY22FH001; Big Spring, TX

Date and time: November 19, 2021

Injuries: 3 fatal; 13 injured

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

2. Methods

For the two deceased drivers, the autopsy reports, toxicology findings, and the investigator's preliminary report were reviewed. For the deceased wrong way driver, pre-crash medical records were also obtained and reviewed. For the bus driver, pre-crash commercial driver medical examinations and post-crash treatment records were also reviewed. Relevant regulation and medical literature were reviewed as appropriate.

Ford F-350 Driver

Autopsy

According to the autopsy report issued by South Plains Forensic Pathology, PA, the cause of death for the 59 year old male Ford driver was multiple blunt force injuries. The left kidney was noted to have been surgically removed.

In addition, he had severe coronary artery disease with 95% stenosis of the left anterior descending coronary artery, 80% stenosis of the first diagonal, and 40% stenosis of the right coronary artery. The heart was enlarged with left ventricular hypertrophy (420 gm; 1.5 cm thickness for the left ventricular thickness and 1.7 cm for the septum). The average heart weight for a man of his weight (216 pounds; see below) is 387 gm with a range from 293 to 511 gm and the average thickness for both the ventricular and septal walls is 1.3 cm.¹ No other significant disease was identified.

Toxicology

Toxicology testing performed by the FAA's Forensic Sciences Laboratory identified amlodipine in blood and urine. In addition, 0.011 gm/dl of ethanol was identified in cavity blood but none was identified in urine.

Toxicology testing performed at the request of the pathologist by NMS Labs identified 0.031 gm/dl of ethanol in abdominal blood. In addition, clinical testing of vitreous identified significantly elevated amounts of creatinine at 5.56 mg/dl (normal is up to 1.3 mg/dl); potassium at >20 mmol/l (normal post mortem levels are <15 mmol/l); and urea nitrogen at >100 mg/dl (normal is less than 20 mg/dl). These results are consistent with severe kidney disease. Other tests including sodium, chloride, and glucose were normal in vitreous. A conversation with the NMS toxicologist revealed there was no remaining vitreous specimen for further confirmatory testing.

Substance Descriptions

Amlodipine is a blood pressure medication that is not generally considered impairing.²

Ethanol is primarily a social drug with a powerful central nervous system depressant. After absorption, ethanol is quickly distributed throughout the body's tissues and fluids fairly uniformly. The distribution pattern parallels the water content and blood supply of each organ. Ethanol may also be produced in the body after death by microbial activity.³ When it is produced postmortem, levels may vary considerably and some specimens may contain zero ethanol.

Creatinine is a toxin produced by protein breakdown in the body that is normally excreted by the kidneys. Elevated levels point to poorly

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 Study of 765 Specimens from 20 to 99 Years Old. Mayo Clin Proc. 1988; 63:137-146.

² National Institutes of Health. US National Library of Medicine. DailyMed. Amlodipine <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=b52e2905-f906-4c46-bb24-2c7754c5d75b> Accessed 3/14/2022.

³ Federal Aviation Administration. Forensic Toxicology Drug Information. Ethanol. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60> Accessed 03/02/2015

functioning kidneys; postmortem vitreous levels mirror antemortem blood levels. The elevated level for this driver indicates severe kidney disease.

Primary Care Physician Records

According to records obtained from the F-350 driver's primary care physician over the 3 years preceding the crash, the most recent visit was on September 14, 2021. At that time, the physician noted the driver had donated a kidney in May 2021. He had a history of hypertension, high cholesterol, and hypothyroidism (low thyroid function). He had had negative reactions to treatments for his high cholesterol (including rash and muscle pain) and had refused to continue them. As a result, at the last visit, the driver was taking amlodipine for his high blood pressure, aspirin to try and prevent heart disease, and thyroid hormone replacement. He was recorded as being 71 inches tall and weighing 216 pounds (BMI of 30.1 kg/m²).

Blood and urine kidney function testing performed before the Ford driver's kidney donation were normal. However, testing on this visit noted an increase in the driver's creatinine from 0.86 mg/dl (normal is up to about 1.1 mg/dl) in February 2021 to 1.46 mg/dl. The remainder of his laboratory testing showed some elevated cholesterol but other kidney function tests (blood urea nitrogen and potassium) were normal. The primary care physician noted the creatinine increase and recommended that he follow up within a month with the team who had performed his kidney donation.

Renal Transplant Records

Records from the Ford driver's renal transplant team were reviewed. They demonstrated a fairly unremarkable hospital course during his donation and a single follow up visit in June 2021 when his creatinine was 1.4 mg/dl. There were no records of any follow up visits between September and the November 2021 crash.

Motorcoach Driver

Commercial Driver Medical Examinations

According to the motorcoach driver's most recent commercial driver medical examination application dated 7/31/2020, the 69 year old male driver had previously had a stone removed from his prostate but had no other significant medical conditions and used no medications. No significant abnormalities were identified and he was issued a standard 2 year certificate. Previous examinations going back to 2016 did not identify any other concerns.

Post-Crash Emergency Treatment Records

According to the post-crash emergency treatment records, the motorcoach driver was deeply unconscious from the time emergency responders

arrived at the scene. Multiple attempts were made at the scene to secure his airway, which required a surgical intervention. On arrival to the hospital, he was critically injured and briefly lost his pulse. He was taken emergently to the operating room where he was successfully resuscitated but then found to have a critical intracranial injury and he died. During the course of his care, he received a massive amount of transfused blood products. Ketamine, a dissociative anesthetic, was administered during his initial post-crash medical care.

Autopsy

According to the external examination performed by the Tarrant County Medical Examiner's Office, the cause of death for the motorcoach driver was multiple blunt force trauma and the manner of death was accident.

Toxicology

Toxicology testing performed on admission blood obtained from the hospital by the Tarrant County, Texas, Toxicology Laboratory identified only the ketamine initially administered.⁴

D. SUMMARY OF MEDICAL FINDINGS

Ford F-350 Driver

The cause of death for the 59 year old male Ford driver was multiple blunt force injuries. The left kidney was noted to have been surgically removed.

In addition, at autopsy the Ford driver was found to have severe coronary artery disease with 95% of the left anterior descending coronary artery, 80% stenosis of the first diagonal, and 40% stenosis of the right coronary artery. The heart was enlarged with left ventricular hypertrophy (420 gm; 1.5 cm thickness for the left ventricular thickness and 1.7 cm for the septum). The average for a man of his weight (216 pounds; see below) is 387 gm with a range from 293 to 511 gm and the average thickness for both the ventricular and septal walls is 1.3 cm. No other significant disease was identified.

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⁴ At the NTSB's request, the FAA Forensic Sciences Laboratory also performed toxicological testing on specimens from the motorcoach driver. However, these were postmortem autopsy specimens, obtained after extensive medical care including massive transfusion of donor blood. Consequently, the relevance of the results to this medical investigation could not be established, and the results were excluded from analysis.

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Motorcoach Driver

According to the motorcoach driver's most recent commercial driver medical examination application dated 7/31/2020, the 69 year old male driver had previously had a stone removed from his prostate but had no other significant medical conditions and used no medications. No significant abnormalities were identified, and he was issued a standard 2 year certificate. Previous examinations going back to 2016 did not identify any other concerns.

According to the post-crash emergency treatment records, the motorcoach driver was deeply unconscious from the time emergency responders arrived at the scene. Multiple attempts were made at the scene to secure his airway, which required a surgical intervention. On arrival to the hospital, he was critically injured and briefly lost his pulse. He was taken emergently to the operating room where he was successfully resuscitated but then found to have a critical intracranial injury and he died. During the course of his care, he received a massive amount of transfused blood products and ketamine, a dissociative anesthetic, was administered.

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Toxicology testing performed on admission blood obtained from the hospital by the Tarrant County, Texas, Toxicology Laboratory identified only the ketamine administered by the hospital.