



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

August 31, 2022

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A. CRASH INFORMATION

Identification: HWY22MH006

Location: Andrews, Texas

Date: March 15, 2022

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 vehicle drivers for medical conditions, substance use, and toxic exposures.

2. Methods

Autopsy (external examinations only) and toxicology reports were reviewed for the two involved drivers.¹ Selected National Transportation Safety Board (NTSB) investigator reports and relevant regulation and medical literature were also reviewed.

¹ According to the NTSB Motor Carrier Factual Report, the van driver did not hold required commercial driver medical certification and had never undergone a commercial driver physical qualification examination.

3. Findings

a. Pickup Truck Driver

I. Autopsy

South Plains Forensic Pathology performed the 38-year-old male pickup truck driver's autopsy, at the request of an Andrews County, Texas, Justice of the Peace. At the discretion of the Justice of the Peace, the autopsy was limited to an external examination only; no internal autopsy examination was performed. According to the autopsy report, the pickup truck driver's cause of death was blunt force and thermal injuries.

II. Toxicology

At the request of South Plains Forensic Pathology, as authorized by the Andrews County Justice of the Peace, NMS Labs performed toxicological testing of postmortem femoral blood from the pickup truck driver.² This testing identified methamphetamine at 1900 ng/mL, as well as the methamphetamine metabolite amphetamine at 250 ng/mL.

At the request of the NTSB, the Federal Aviation Administration (FAA) Forensic Sciences Laboratory tested postmortem femoral blood from the pickup truck driver to confirm the presence of methamphetamine and amphetamine. FAA testing measured methamphetamine at 1949 ng/mL and amphetamine at 185 ng/mL. Too little specimen was available for any additional FAA toxicological testing.

III. Descriptions of Detected Substances

Methamphetamine is a central nervous system stimulant drug. Amphetamine is a metabolite of methamphetamine, and is also a central nervous system stimulant. Both methamphetamine and amphetamine are available as prescription medications used to treat attention deficit hyperactivity disorder, narcolepsy, and occasionally obesity; each may also be a metabolite of certain other medications. Methamphetamine and amphetamine are Drug Enforcement Administration (DEA) Schedule II controlled substances, with a high potential for abuse and dependence. At low doses used as part of appropriate medical treatment, the drugs may improve reaction time, cognitive function, and fatigue, but may cause people to make higher-risk choices. At higher doses, the drugs may have a variety of impairing effects on psychomotor function, cognition, and perception. The drugs typically carry warnings that they may impair the

² The NMS Labs toxicology report listed tested-for substances as: amphetamines, barbiturates, benzodiazepines, buprenorphine/metabolite, cannabinoids, cocaine/metabolites, fentanyl/acetyl fentanyl, methadone/metabolite, methamphetamine/MDMA, opiates, oxycodone/oxymorphone, phencyclidine, acetone, ethanol, isopropanol, and methanol. Testing for carbon monoxide exposure was also performed.

ability to engage in potentially hazardous activities. Such impairment can result from drug or withdrawal effects.^{3,4,5}

In addition to being used medicinally, methamphetamine and amphetamine are frequently produced illicitly and abused recreationally by ingestion, snorting, smoking, rectal insertion, or injection. Seeking an intense euphoric effect, abusers typically use much higher doses than are used medicinally. Consequently, methamphetamine blood levels can sometimes be used to distinguish abuse from medicinal use. In living people, methamphetamine blood levels above 200 ng/mL generally represent abuse (there is no evidence that levels above this improve task performance), whereas typical levels seen with medicinal use are between 20 ng/mL and 50 ng/mL. Levels in recreational users typically do not exceed 2,500 ng/mL, above which severe toxicity is likely. The elimination half-life of methamphetamine is about 6-15 hours.³

Effects from methamphetamine/amphetamine abuse follow a typical pattern. An abuser may experience early psychological effects including euphoria, excitation, exhilaration, rapid ideas and speech, increased sex drive, restlessness, hallucinations, delusions, psychosis, sleeplessness/reduced tiredness, an increased feeling of alertness, a heightened sense of wellbeing, a feeling of increased physical strength, and poor impulse control. Early physiologic effects may include rapid heart rate, increased blood pressure, increased breathing rate, elevated temperature, dry mouth, abdominal cramps, twitching, dilated pupils, faster reactions, and increased strength. Later, as initial drug effects wear off, an abuser may experience dysphoria, restlessness, agitation, itching, nervousness, paranoia/hypervigilance, irritability, anxiety/nervousness, aggressive/violent impulses, diminished coordination, hallucinations, delusions, scattered thoughts, psychosis, excessive sleepiness, and drug craving. Measuring an abuser's drug level does not help distinguish whether the person is experiencing early versus late effects.³

Methamphetamine/amphetamine abuse may impair driving performance at any stage from early drug effects through withdrawal. Attention, perception, judgment, and motor function may be adversely affected. Driving behaviors that have been observed in drivers impaired by effects

³ Couper FJ, Logan BK. Drugs and Human Performance Fact Sheets. National Highway Traffic Safety Administration. DOT HS 809 725. April 2014 (Revised). <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>. Accessed May 3, 2022.

⁴ National Institutes of Health National Library of Medicine. Methamphetamine hydrochloride. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f31f580f-1f08-4a0f-b078-0b9e3308f712>. Updated April 15, 2022. Accessed May 3, 2022.

⁵ National Institutes of Health National Library of Medicine. Amphetamine sulfate. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=79b9db39-7cdc-5607-f0ce-ac2a2cfd59d5>. Updated March 1, 2020. Accessed May 3, 2022.

of methamphetamine have included leaving the lane of travel, speeding, pulling into oncoming traffic, erratic driving, failing to stop when required, colliding with other vehicles, and running off the road.^{3,6}

b. Van Driver

I. Autopsy

South Plains Forensic Pathology performed the 26-year-old male van driver's autopsy, at the request of an Andrews County, Texas, Justice of the Peace. At the discretion of the Justice of the Peace, the autopsy was limited to an external examination only; no internal autopsy examination was performed. According to the autopsy report, the van driver's cause of death was blunt force and thermal injuries.

II. Toxicology

At the request of South Plains Forensic Pathology, as authorized by the Andrews County Justice of the Peace, NMS Labs performed toxicological testing of postmortem cardiac blood from the van driver.² This testing was negative for tested-for substances.

At the request of the NTSB, the FAA Forensic Sciences Laboratory also tested postmortem cardiac blood from the van driver.⁷ This testing detected cetirizine at 193 ng/mL.

III. Description of Detected Substance

Cetirizine, sometimes marketed as Zyrtec, is a second-generation antihistamine medication that is available over the counter and is commonly used to treat allergy symptoms. Cetirizine typically carries a warning that users may experience drowsiness and should be careful when driving a motor vehicle or operating machinery.⁸ Data on sedation and psychomotor impairment from cetirizine are mixed, with some studies but

⁶ Logan BK. Methamphetamine and driving impairment. *J Forensic Sci.* 1996;41(3):457-464.

⁷ The FAA Forensic Sciences Laboratory tests for a wide variety of substances including toxins, prescription and over-the-counter medications, and illicit drugs. Many of these substances are listed at <https://jag.cami.jcabi.gov/toxicology>. In this case, because of limited available specimen, FAA toxicological testing for the van driver comprised general drug testing and testing for volatiles (including ethanol and other alcohols), without separate testing for drugs of abuse or carbon monoxide exposure.

⁸ National Institutes of Health National Library of Medicine. Zyrtec Allergy. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=b165db38-b302-4220-8627-77cb07bb078c>. Updated April 25, 2022. Accessed August 24, 2022.

not others finding some sedating and impairing effects.^{9,10,11} In living people, the intended medicinal effects of cetirizine generally occur at blood cetirizine levels in a range of about 100 ng/mL to 600 ng/mL.¹²

D. SUMMARY OF MEDICAL FINDINGS

1. Pickup Truck Driver

The 38-year-old male pickup truck driver's autopsy was an external examination only; no internal autopsy examination was performed. According to the autopsy report, the pickup truck driver's cause of death was blunt force and thermal injuries. Toxicological testing of postmortem femoral blood from the pickup driver by two laboratories identified methamphetamine, at 1900 ng/mL and 1949 ng/mL, respectively. Both laboratories also detected the methamphetamine metabolite amphetamine, at 250 ng/mL and 185 ng/mL, respectively.

2. Van Driver

The 26-year-old male van driver's autopsy was an external examination only; no internal autopsy examination was performed. According to the autopsy report, the van driver's cause of death was blunt force and thermal injuries. Toxicological testing of postmortem cardiac blood from the van driver detected cetirizine at 193 ng/mL.

⁹ Adelsberg BR. Sedation and performance issues in the treatment of allergic conditions. *Arch Intern Med.* 1997;157(5):494-500.

¹⁰ Moskowitz H, Wilkinson CJ. *Antihistamines and Driving-Related Behavior: A Review of the Evidence for Impairment.* National Highway Traffic Safety Administration. DOT HS 809 714. May 2004. <https://www.nhtsa.gov/sites/nhtsa.gov/files/antihistamines20text.pdf>. Accessed August 24, 2022.

¹¹ Du Q, Zhou Y. Placebo-controlled assessment of somnolence effect of cetirizine: a meta-analysis. *Int Forum Allergy Rhinol.* 2016;6(8):871-879. doi:10.1002/alr.21746.

¹² Schulz M, Schmoltdt A, Andresen-Streichert H, Iwersen-Bergmann S. Revisited: therapeutic and toxic blood concentrations of more than 1,100 drugs and other xenobiotics. *Crit Care.* 2020;24(1):195. doi:10.1186/s13054-020-02915-5.