NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

December 16, 2021

Mary Pat McKay, MD, MPH
Chief Medical Officer

A. ACCIDENT: HWY21FH007; Spring TX

Location:	Hammock Dunes Place westbound, in Spring, Harris County, Texas
Vehicle 1:	2019 Tesla Model S P100D
Operator 1:	Private Operator
Date:	April 17, 2021
Time:	9:07 p.m. Central Daylight Time (CDT)

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

2. Methods

   The autopsy report, toxicology findings, and post accident emergency treatment records were reviewed as well as the preliminary NTSB report. Relevant regulation and medical literature were reviewed as appropriate.

   Post Accident Emergency Medical Treatment Records (Prehospital)

   The 59 year old male driver was found in cardiac arrest with full thickness burns to the entire body. No resuscitation was attempted.

Autopsy

According to the autopsy issued by the Harris County Institute of Forensic Sciences, the cause of death was blunt force trauma and thermal injuries with smoke inhalation and the manner of death was accident. Mild coronary artery disease and an incidental renal carcinoma were identified.

Toxicology

Toxicology tests performed by NMS Labs on heart blood as requested by the medical examiner was positive for 0.157 gm/dl of ethanol, citalopram, chlorpheniramine (22 ng/ml), carboxyhemoglobin (40%), and cyanide (0.83 ug/ml) were identified.

Toxicology testing performed by the FAA Forensic Sciences Laboratory identified ethanol at 0.151 gm/dl, cetirizine (83 ng/ml), citalopram and its metabolite n-desmethylcitalopram, and chlorpheniramine (14 ng/ml) in heart blood.

Descriptions of Substances

Ethanol is the intoxicant commonly found in beer, wine, and liquor. After ingestion, at low doses, it impairs judgment, psychomotor functioning, and vigilance; at higher doses, it can cause coma and death. The effects of ethanol on crash risk are well understood; crash risk rises slowly between 0.020 gm/dl and exponentially above 0.080 gm/dl (the legal limit in most states).

Citalopram is an antidepressant not known to be directly impairing that carries this information for patients, "Although in controlled studies citalopram has not been shown to impair psychomotor performance, any psychoactive drug may impair judgment, thinking, or motor skills, so patients should be cautioned about operating hazardous machinery, including automobiles, until they are reasonably certain that citalopram therapy does not affect their ability to engage in such activities."[1]

Chlorpheniramine is a sedating antihistamine available over the counter in a variety of products. It carries this precaution for users: "When using this product, you may get drowsy; avoid alcoholic drinks; alcohol, sedatives and tranquilizers may increase drowsiness; be careful when driving a motor vehicle or operating machinery; excitability may occur, especially in children." The usual blood levels thought to be associated with effects, including side effects, are between 10 and 40 ng/ml.[2]

[1] National Institutes of Health. US National Library of Medicine. DailyMed. Citalopram. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2632b547-2e13-447f-ac85-c774e437d6a8 Accessed 10/12/2021.

[2] Federal Aviation Administration. Forensic Toxicology Drug Information. Chlorpheniramine. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=31dec627-f2e4-6dbe-e054-00144ff8d46c Accessed 10/12/2021.

Carboxyhemoglobin is formed when a person breathes in carbon monoxide (CO). CO 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.[3] Nonsmokers may normally have up to 3 percent carboxyhemoglobin in their blood; heavy smokers may have levels of 10 to 15 percent.[4] Acutely, low levels of CO may cause vague symptoms like headache and nausea but increasing levels (40 percent and above) lead to confusion, seizures, loss of consciousness, and death.[5]

Cyanide is a toxic product of combustion of a variety of materials including fabrics and plastic.

Cetirizine is a sedating antihistamine available over the counter with a number of trade names including Zyrtec. It carries the same warnings as chlorpheniramine, described above.[6] The usual blood levels though to be associated with effects, including side effects, are between 190 and 450 ng/ml.[7]

D. SUMMARY OF MEDICAL FINDINGS

According to the autopsy issued by the Harris County Institute of Forensic Sciences, the 59 year old male driver in this crash died as a result of blunt force trauma and thermal injuries with smoke inhalation. The manner of death was accident. Mild coronary artery disease and an incidental renal carcinoma were identified.

Toxicology tests performed by NMS Labs on heart blood as requested by the medical examiner was positive for 0.157 gm/dl of ethanol, citalopram, chlorpheniramine (22 ng/ml), carboxyhemoglobin (40%), and cyanide (0.83 ug/ml) were identified.

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[3] Clardy PF, Manaker S, Perry H. Carbon monoxide poisoning. UpToDate Reference Manual. http://www.uptodate.com/contents/carbon-monoxide-poisoning?source=preview&language=en-US&anchor=H9&selectedTitle=1~34#H9 Accessed 12/23/2015.
[4] Ernst A, Zibrak JD. Carbon monoxide poisoning. N Engl J Med 1998; 339:1603.
[5] Reisdorff Ej and Wiegnstein JG. Carbon Monoxide Poisoning. In Emergency Medicine, A Comprehensive Study Guide. Tintinalli, J ed. 4th edition. 1996: 914-919.
[6] National Institutes of Health. US National Library of Medicine. DailyMed. Cetirizine. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=06390749-5795-4e50-94bd-acb4b96e4b83 Accessed 10/12/2021.
[7] Federal Aviation Administration. Forensic Toxicology Drug Information. Cetirizine. https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=131 Accessed 10/12/2021.