



## **NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Research and Engineering  
Washington, DC

### **Medical Factual Report**

**March 5, 2021**

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Medical Officer

#### **A. ACCIDENT: CEN20LA272; Grosse Ile, Michigan**

Date/Time: July 11, 2020; 4:47 p.m. (EDT)  
Aircraft: Golden Circle Air T-Bird; N50JH  
Injuries: 1 Fatal  
Flight Conducted under Part 91 personal flight

#### **B. GROUP IDENTIFICATION**

No group was formed for the medical evaluation in this accident.

#### **C. DETAILS OF INVESTIGATION**

##### **Purpose**

This investigation was performed to evaluate the pilot for medical conditions, the use of medications/illicit drugs, and the presence of toxins.

##### **Methods**

The Federal Aviation Administration (FAA) medical case review and the pilot's autopsy and Forensic Sciences Laboratory toxicology<sup>1</sup> reports were reviewed. Other pertinent scientific and regulatory issues were reviewed.

##### **FAA Medical Case Review**

According to the FAA medical case review, there were no records of the 55-year-old male sport pilot having applied for a medical certificate.

##### **Autopsy**

According to the autopsy report from the Wayne County Medical Examiner, Detroit, Michigan, the pilot's death was caused by multiple injuries and the manner of death was accident. The medical examiner reported that the pilot had 50% stenosis in his left anterior descending coronary artery and moderate atherosclerosis of his aorta. No other significant natural disease was identified.

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<sup>1</sup> See <https://jag.cami.jccbi.gov/toxicology/> for a complete list of tested-for substances.

### Toxicology

Toxicology testing performed for the medical examiner's office detected the stimulant amphetamine at 440 nanograms per milliliter (ng/mL), the anti-anxiety benzodiazepine diazepam at 280 ng/mL, and its metabolite nordiazepam at 290 ng/mL in the pilot's peripheral blood. The laboratory also reported that the pilot's urine screened positive for amphetamine and benzodiazepines.

FAA Forensic Sciences Laboratory toxicology testing detected amphetamine in the pilot's cavity blood at 315 ng/mL and urine. Diazepam at 268 ng/mL and its psychoactive metabolites nordiazepam at 330 ng/mL and oxazepam were detected in the pilot's cavity blood. These compounds and another psychoactive metabolite of diazepam, temazepam, were also all detected in the pilot's urine. The antidepressant citalopram was detected in the pilot's cavity blood at 33 ng/mL and urine; its active metabolite n-desmethylocitalopram was also detected in his cavity blood and urine. The sedating antihistamine diphenhydramine was detected in the pilot's urine, but not in his cavity blood.

### Relevant Toxicological and Medical Information

*Amphetamine* is a prescription medication used for the treatment of attention deficit hyperactivity disorder (ADHD), narcolepsy, and obesity. In some preparations, the prescription drug is metabolized to amphetamine; commonly marketed names include Adderall, Dexedrine, and Vyvanse. Therapeutic concentrations of amphetamine ranges from 20 to 100 ng/mL; concentrations greater than 200 ng/mL represent abuse. The half-life is between 10 to 13 hours. It is a central nervous stimulant and widely used drug of abuse. Amphetamine carries a boxed warning about its potential for abuse and drug dependence. It also carries warnings about an increased risk of sudden death and the potential for mental health and behavioral changes. At lower doses, amphetamine has few effects on cognitive functioning; risk-taking increases at higher doses.<sup>2,3,4</sup>

*Diazepam*, commonly marketed as Valium, is a sedating benzodiazepine available by prescription as a controlled substance and used to treat anxiety; it is also useful to help treat muscle spasms, alcohol withdrawal, and seizures. It is metabolized to the active metabolites *nordiazepam* or *temazepam*. These compounds are further metabolized to the active metabolite *oxazepam*. Diazepam and its metabolites carry the warning that they may impair the mental and physical ability to perform hazardous tasks. The therapeutic range of diazepam and nordiazepam

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<sup>2</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Amphetamine.  
<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=11>

<sup>3</sup> National Institutes of Health. U.S. National Library of Medicine. Updated 11/26/19. Amphetamine sulfate.  
<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=828c84a6-a317-4e4d-9521-0c3865ff732f>.

<sup>4</sup> National Highway Traffic Safety Administration. April 2014. Drugs and Human Performance Fact Sheets. Methamphetamine (and Amphetamine). <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/809725-drugshumanperformfs.pdf>

is 100 to 2,000 ng/mL in the blood. Diazepam has a half-life of 21 to 82 hours; nordiazepam has a half-life of 25 to 200 hours.<sup>5,6,7,8,9</sup>

*Citalopram* is a prescription antidepressant medication marketed under the trade name Celexa. *N-desmethylocitalopram* is the active metabolite of citalopram. Both carry the warning that their use may impair mental or physical ability for performing hazardous tasks. The therapeutic range for citalopram is 50 to 110 ng/mL and its half-life is 25 to 35 hours.<sup>10,11</sup> Citalopram is one of the FAA approved antidepressant medications.<sup>12</sup>

*Diphenhydramine* is a sedating antihistamine (commonly marketed as Benadryl) and is available over the counter in many products used to treat colds, allergies, and insomnia. The therapeutic range is 25 to 100 ng/mL and it has a half-life of 3 to 14 hours.<sup>13</sup> FAA provides guidance on wait times before flying after using this medication.<sup>14</sup>

#### D. SUMMARY OF MEDICAL FINDINGS

The 55-year-old male pilot had never applied for an FAA medical certificate. According to the autopsy report from the Wayne County Medical Examiner, Detroit, Michigan, the pilot's death was caused by multiple injuries and the manner of death was accident. With the exception of moderate stenosis in his left anterior descending coronary artery (50%) and aorta, no other significant natural disease was identified.

Toxicology testing detected amphetamine (440 ng/mL and 315 ng/mL), diazepam (280 ng/mL and 268 ng/mL), its metabolites nordiazepam (290 ng/mL and 330 ng/mL) and oxazepam, and citalopram (33 ng/mL) and its metabolite n-desmethylocitalopram in the pilot's peripheral or cavity blood. The pilot's urine was positive for amphetamine, benzodiazepines, diazepam, nordiazepam, oxazepam, temazepam, citalopram, n-desmethylocitalopram, and diphenhydramine.

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<sup>5</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Diazepam.

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=44>

<sup>6</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Nordiazepam.

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=85>

<sup>7</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Temazepam.

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=193>

<sup>8</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Oxazepam.

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=93>

<sup>9</sup> National Institutes of Health (NIH). U.S. National Library of Medicine (NLM). DailyMed. Diazepam. Updated 9/13/18. <https://www.dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=75c7d502-0178-5ba1-e053-2a91aa0a7d67>

<sup>10</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Citalopram.

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=208>

<sup>11</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Desmethylocitalopram (N-).

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=178>

<sup>12</sup> FAA. Last modified 7/23/18. Guide for Aviation Medical Examiners, Item 47. Psychiatric Conditions - Use of Antidepressant Medications.

[https://www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/aam/ame/guide/app\\_process/exam\\_tech/item\\_47/amd/antidepressants/](https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item_47/amd/antidepressants/)

<sup>13</sup> FAA. Updated 1/16/19. Forensic Toxicology's WebDrugs. Diphenhydramine.

<https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=50>

<sup>14</sup> FAA. 11/13/19. What over-the-counter (OTC) medications can I take and still be safe to fly? OK-20-0302

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