

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR24FA072

MEDICAL

Specialist's Factual Report

January 27, 2025

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A ACCIDENT

Location: Eloy, Arizona
Date: January 14, 2024
Time: 07:47 AM Mountain Standard Time (MST)

B MEDICAL SPECIALIST

Specialist JE Tuttle MD MHA FACS
National Transportation Safety Board
Washington, DC

C DETAILS OF THE INVESTIGATION

1.0 Purpose

This investigation was performed to evaluate the balloon pilot for potentially impairing conditions and potentially impairing substances.

2.0 Methods

The balloon pilot's Federal Aviation Administration (FAA) medical case review, pre-crash videos, post-crash medical records, autopsy, and toxicology reports were reviewed. Selected NTSB investigator reports, and relevant regulation and medical literature were also reviewed.

D FACTUAL INFORMATION

1.0 FAA Medical Case Review

According to the FAA medical case review, the 37-year-old male balloon pilot's last aviation medical examination was on April 29, 2022. At that time, the balloon pilot reported 500 total civilian flight hours. He was 73 inches tall and weighed 226 pounds. He reported no medical issues, and no medication use. He was issued a first-class medical certificate without limitation. At the time of the accident, this certificate had expired for operations requiring first- and second-class medical certification and had not expired for operations requiring third-class medical certification.

2.0 Pre-crash Video

Video from video data recorders (VDRs) in the balloon basket (facing inward and outside the balloon basket) pre-flight and during flight showed throughout the

video, the pilot was persistently coughing, sniffing, and occasionally supporting himself on the rail of the basket, resting.

3.0 Post-crash medical records

According to the post-crash pre-hospital and hospital records of the balloon pilot, the pilot was given ketamine by emergency medical services (EMS) and was transported to the hospital. On arrival to the hospital, the pilot received donated blood products and other resuscitative efforts.¹ Resuscitative efforts by hospital personnel were unsuccessful, and the balloon pilot was declared dead shortly after his arrival to the emergency department at 9:46 AM MST.

4.0 Autopsy

The Pinal County Medical Examiner performed the balloon pilot's autopsy. According to the autopsy report, the balloon pilot's cause of death was multiple blunt force injuries, and his manner of death was accident. The heart examination revealed mild coronary artery disease, with 30% stenosis of the left anterior descending coronary artery and minimally increased interstitial fibrosis of the heart muscle. The remainder of the autopsy examination, including of the heart, did not reveal additional significant natural disease.

5.0 Toxicology

5.1 NMS Labs

At the request of the Pinal County Medical Examiner, NMS Labs performed toxicological testing of the balloon pilot's postmortem heart blood. Ketamine was detected at 1200 ng/mL and caffeine was presumptively positive.^{2,3} No other tested-for substances were detected.

¹Donated blood may contain drugs. The screening routinely performed on donated blood does not test for drugs.

Centers for Disease Control and Prevention. Clinical Testing Guidance for Blood Safety. Centers for Disease Control and Prevention website. <https://www.cdc.gov/blood-safety/hcp/diagnosis-testing/index.html>. Updated February 20, 2024. Accessed October 8, 2024.

² A presumptive positive indicates a substance is present on a screening test. In order to confirm presence or quantity of the detected substance, a confirmatory test must be performed.

³ Information about blood testing procedures including tested-for substances is available on the NMS Labs website at Test Code 8042B.

5.2 FAA Forensic Sciences Laboratory

The FAA Forensic Sciences Laboratory performed toxicology testing of postmortem specimens of heart blood, vitreous fluid, and liver tissue of the balloon pilot.⁴ Ketamine was detected at 1102 ng/mL in heart blood and at 1479 ng/g in liver tissue. Chlorpheniramine was detected at 7 ng/g in liver tissue and not detected in heart blood. Hydroxybupropion was detected in heart blood and was not detected in liver tissue.⁵ Dextromethorphan, dextrophan, and chlorothiazide were detected in liver tissue, and were not detected in heart blood.

5.2.1 Description of Detected Substances

Ketamine is an intravenous anesthetic medication. It was administered to the pilot during his post-crash care, as confirmed by review of EMS records.

Chlorpheniramine is an over-the-counter first-generation antihistamine commonly used to treat symptoms of seasonal allergies and colds. It generally carries a warning that use may cause drowsiness and to use caution when driving a motor vehicle or operating heavy machinery. Chlorpheniramine is often found in combination with dextromethorphan, a cough suppressant, and in combination with anti-fever medications such as acetaminophen and ibuprofen in cold medications.⁶ According to the FAA, chlorpheniramine is only acceptable for pilots if it is used no more than one or two times a week, and five days have passed since the last dose prior to flying.⁷

Dextromethorphan is an over-the-counter cough suppressant found in numerous common cough syrups and cold medications.⁸ Dextromethorphan is not typically impairing at levels associated with medicinal use. The FAA states that pilots should not fly after using dextromethorphan until at least five dosage intervals have

⁴ The FAA Forensic Sciences laboratory has the capability to test for around a thousand substances including toxins, prescription and over-the-counter medications, and illicit drugs.

⁵ According to an email from one of the forensic toxicologists at the FAA Forensic Sciences laboratory, hydroxybupropion detected was below the quantifiable threshold at a very low level.

⁶ National Institute of Health National Library of Medicine. Chlorpheniramine maleate. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=4d974959-25fc-4707-9b72-9afb47b76f1>. Updated November 14, 2017. Accessed February 25, 2025.

⁷ Federal Aviation Administration. What over-the-counter medications can I take and still be safe flying? https://www.faa.gov/sites/faa.gov/files/licenses_certificates/medical_certification/medications/OTCMedicationsforPilots.pdf. Updated November 13, 2019. Accessed February 25, 2025.

⁸ National Institutes of Health National Library of Medicine. Acetaminophen, dextromethorphan, phenylephrine. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=563452d1-0c19-4094-895a-805c859bc49b>. Updated January 15, 2015. Accessed February 25, 2025.

elapsed, to allow time for the drug to be cleared from circulation⁷ Dextrorphan is a metabolite of dextromethorphan.

Hydroxybupropion is a metabolite of bupropion. Bupropion, which was not detected in this case, is a prescription medication commonly used to treat major depression, and seasonal affective disorders. It is also approved for use as an adjunct to smoking cessation programs in a non-extended-release preparation.^{9,10} Bupropion's mechanism of action and side-effect profile differs from other antidepressants; it does not typically cause sedation but may cause insomnia and may increase susceptibility to seizures.¹¹ One small study of healthy subjects found no significant impact of sustained-release bupropion on psychomotor performance, including tests intended to simulate flying performance. In patients with major depression, bupropion may improve associated neurocognitive deficits. Typically, bupropion carries a warning that any drug that acts on the central nervous system (CNS) may impair users' ability to perform tasks requiring judgment or motor and cognitive skills, and that bupropion users should not drive or operate hazardous machinery until they are reasonably certain that the drug does not adversely affect their performance.¹² According to the FAA medical case review for this crash, bupropion was considered disqualifying for pilot medical certification. In May 2023, the FAA added extended-release and sustained-release (but not immediate-release) formulations of bupropion to the list of antidepressants that may be considered for FAA medical certification via Special Issuance.¹¹

Chlorothiazide is a prescription diuretic medication commonly used to treat hypertension, and swelling associated with liver and heart failure, it is also used in hospitals as an injection for severe heart failure. Chlorothiazide may also be an impurity in some pharmacological preparations of the blood pressure medication hydrochlorothiazide (which was not detected here).¹² Chlorothiazide is not generally considered impairing.

⁹ National Institutes of Health National Library of Medicine. Bupropion hydrochloride tablet, extended release. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=24ede961-8849-4f44-b007-8d120624a578>. Updated February 11, 2025. Accessed February 25, 2025.

¹⁰ Bupropion as a sustained release or extended-release preparation is not approved for smoking cessation; however, bupropion under the brand name of Zyban® is approved for this indication.

National Institutes of Health National Library of Medicine. Wellbutrin XL. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=7d6bdc28-f334-47f3-8336-c3bebbf57461>. Updated August 22, 2012. Accessed February 25, 2025.

¹¹ Federal Aviation Administration. Guide for Aviation Medical Examiners. Decision Considerations-Aerospace Medical Dispositions Item 47: Psychiatric Conditions-Use of Antidepressant Medications. https://www.faa.gov/ame_guide/app_process/exam_tech/item47/amd/antidepressants. Updated April 24, 2024. Accessed February 18, 2025.

¹² National Institutes of Health National Library of Medicine. Chlorothiazide sodium injection, powder, lyophilized, for solution. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5b5d8a97-1428-4047-8e6c->

Caffeine is a CNS stimulant that is commonly ingested, including in coffee, tea, soft drinks, and chocolate, and is also an ingredient in certain anti-drowsiness medications and headache medications.¹³ Caffeine is not generally considered impairing.

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Video from video data recorders (VDRs) in the balloon basket showed that prior to takeoff, there was no pre-flight check or passenger safety briefing and only two of the four scoop's outer attachments were secured. Throughout the video, the pilot was noted to be persistently coughing, sniffing, and occasionally supporting himself on the rail of the basket, resting.

According to the post-crash pre-hospital and hospital records of the balloon pilot, the pilot was given ketamine by emergency medical services (EMS) and was transported to the hospital. On arrival to the hospital, the pilot received donated blood products and other resuscitative efforts. Resuscitative efforts by hospital personnel were unsuccessful, and the balloon pilot was declared dead shortly after his arrival to the emergency department at 9:46 AM MST.

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[b778429a26e4](#). Updated May 13, 2023. Accessed February 25, 2025.

¹³ National Institutes of Health National Library of Medicine. Caffeine. DailyMed. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=6d9b3926-7198-5e00-e053-2a91aa0a9580>. Updated May 8, 2024. Accessed February 25, 2025.

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Submitted by:

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