

FORENSIC TOXICOLOGY REPORT



FAA Civil Aerospace Medical Institute
Bioaeronautical Sciences Research Branch, Forensic Sciences
P.O. Box 25082, Oklahoma City, Oklahoma 73125
Ph: 405-954-6254, Fax: 405-954-3705



December 11, 2019

NAME Pilot **CAMI #** 201900246001 **NTSB #** ERA20FA022
LOCATION Ocala, FL **MODE** Aviation **N #** 959CM
DATE OF ACCIDENT 10/31/2019 **DATE RECEIVED** 11/6/2019 **STATUS** FATAL

SPECIMENS Brain, Gastric, Heart, Kidney, Liver, Lung, Muscle, Spleen

PUTREFACTION No

Screening tests employed

- Muscle - Volatiles (HS GC/FID)
- Brain - Volatiles (HS GC/FID)
- Liver - Drugs of abuse (Immunoassay)
- Liver - General drug screen (LC/MS, GC/MS)

<u>Analyte</u>	<u>Result</u>	<u>Specimen</u>	<u>Instrument</u>
Ethanol	Not Detected	Muscle	HSGC/FID
Ethanol	Not Detected	Brain	HSGC/FID
Diazepam	Detected	Liver	LC/MS
Diazepam	Detected	Muscle	LC/MS
Nordiazepam	Detected	Liver	LC/MS
Nordiazepam	Detected	Muscle	LC/MS
Oxazepam	Detected	Liver	LC/MS
Oxazepam	Detected	Muscle	LC/MS
Valsartan	Detected	Liver	LC/MS
Valsartan	Detected	Muscle	LC/MS

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ou=AMC, cn=RUSSELL J LEWIS
2019.12.11 15:55:34 -06'00'

Russell Lewis, Ph.D., F-ABFT
Supervisor, Forensic Sciences
Bioaeronautical Sci. Research Lab
CAMI, FAA

This record may be releasable under the FOIA request 15 days after signature date, unless FOIA exemptions apply.
Results listed in this report relate to tested specimen(s) only. See Forensic Toxicology web site for testing methodology and cutoffs as well as drug, FOIA, and contact information.

<http://www.faa.gov/go/toxlab>



NMS Labs

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200 Welsh Road, Horsham, PA 19044-2208

Phone: [REDACTED]
e-mail: [REDACTED]

Robert A. Middleberg, PhD, F-ABFT, DABCC-TC, Laboratory Director

Toxicology Report

Report Issued 11/20/2019 17:23

Patient Name [REDACTED]
Patient ID 2019-2021
Chain 19341183
Age 73 Y DOB [REDACTED]
Gender Male
Workorder 19341183

To: 10810
Medical Examiner's Office - District 5
Attn: Dr. Barbara C. Wolf
[REDACTED]
Leesburg, FL 34748

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Positive Findings:

<u>Compound</u>	<u>Result</u>	<u>Units</u>	<u>Matrix Source</u>
Diazepam	96	ng/mL	001 - Chest Blood
Nordiazepam	94	ng/mL	001 - Chest Blood
Delta-9 THC	0.69	ng/mL	001 - Chest Blood

See Detailed Findings section for additional information

Testing Requested:

<u>Analysis Code</u>	<u>Description</u>
1002B	Carbon Monoxide Exposure Biouptake Screen, Blood
8051B	Postmortem, Basic, Blood (Forensic)

Specimens Received:

<u>ID</u>	<u>Tube/Container</u>	<u>Volume/ Mass</u>	<u>Collection Date/Time</u>	<u>Matrix Source</u>	<u>Miscellaneous Information</u>
001	Gray Top Tube	6.5 mL	11/01/2019 10:00	Chest Blood	
002	Gray Top Tube	8.75 mL	11/01/2019 10:00	Chest Blood	
003	Red Top Tube	1 mL	11/01/2019 10:00	Vitreous Fluid	

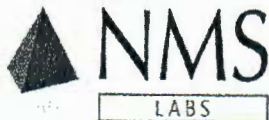
All sample volumes/weights are approximations.

Specimens received on 11/06/2019.



Handwritten signature and date: 11/22/19

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Workorder 19341183
Chain 19341183
Patient ID 2019-2021

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Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Diazepam	96	ng/mL	20	001 - Chest Blood	LC-MS/MS
Nordiazepam	94	ng/mL	20	001 - Chest Blood	LC-MS/MS
Delta-9 THC	0.69	ng/mL	0.50	001 - Chest Blood	LC-MS/MS

Other than the above findings, examination of the specimen(s) submitted did not reveal any positive findings of toxicological significance by procedures outlined in the accompanying Analysis Summary.

Reference Comments:

1. Delta-9 THC (Active Ingredient of Marijuana) - Chest Blood:

Marijuana is a DEA Schedule I hallucinogen. Pharmacologically, it has depressant and reality distorting effects. Collectively, the chemical compounds that comprise marijuana are known as Cannabinoids.

Delta-9-THC is the principle psychoactive ingredient of marijuana/hashish. It rapidly leaves the blood, even during smoking, falling to below detectable levels within several hours. Delta-9-carboxy-THC (THCC) is the inactive metabolite of THC and may be detected for up to one day or more in blood. Both delta-9-THC and THCC may be present substantially longer in chronic users.

THC concentrations in blood are usually about one-half of serum/plasma concentrations. Usual peak levels in serum for 1.75% or 3.55% THC marijuana cigarettes: 50 - 270 ng/mL at 6 to 9 minutes after beginning smoking, decreasing to less than 5 ng/mL by 2 hrs.

2. Diazepam (Valium®) - Chest Blood:

Diazepam is a benzodiazepine used primarily for its sedative anxiolytic or muscle relaxing effects. It is a U.S. DEA Schedule IV listed central nervous system depressant, and patients using this medication are warned accordingly, especially concerning motor functions. It is habituating, and frequently abused. It is metabolized to several pharmacologically active compounds: nordiazepam, oxazepam and temazepam. In order to evaluate the effects of this compound, concentrations of these metabolites must also be considered.

The reported diazepam concentration in a chronic steady-state regimen of 5 mg twice daily ranges from 100 - 400 ng/mL with nordiazepam being in the range of 130 - 500 ng/mL. Oxazepam and temazepam may be present in low concentrations.

Toxic effects may be produced by blood concentrations in excess of 1500 ng/mL; fatalities produced by diazepam alone are rare, but may occur at blood concentrations greater than 5000 ng/mL. Alcohol greatly enhances the activity of the benzodiazepines.

3. Nordiazepam (Chlordiazepoxide Metabolite) - Chest Blood:

Nordiazepam is a pharmacologically active metabolite of several benzodiazepines, including diazepam (Valium®) and chlordiazepoxide (Librium®). The action of this compound is based on its central nervous system depressant activity. Nordiazepam has a very long elimination half-life and may be identified long after the parent drug has been completely eliminated from the circulation.

Psychiatric patients taking chronic diazepam doses ranging from 2 to 55 mg daily had steady state plasma concentrations of nordiazepam averaging 390 ng/mL (range 26 to 1600 ng/mL). Chronic therapy with a daily oral dose of 22.5 mg clorazepate produced reported steady-state plasma concentrations of nordiazepam of 660 +/- 140 ng/mL. The active metabolites oxazepam and temazepam may be present in low concentrations. The blood to plasma ratio of nordiazepam is 0.6.

A fatal case was reported with a nordiazepam blood concentration of 5500 ng/mL along with 0.180 g/dL ethanol and 7000 ng/mL chlordiazepoxide. Alcohol greatly enhances the activity of the benzodiazepines.

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded two (2) years from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed.

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Workorder 19341183
Chain 19341183
Patient ID 2019-2021

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Workorder 19341183 was electronically signed on 11/20/2019 15:42 by:



Jennifer L. Turri Swatek, M.S.F.S., D-ABFT-FT
Certifying Scientist

Analysis Summary and Reporting Limits:

All of the following tests were performed for this case. For each test, the compounds listed were included in the scope. The Reporting Limit listed for each compound represents the lowest concentration of the compound that will be reported as being positive. If the compound is listed as None Detected, it is not present above the Reporting Limit. Please refer to the Positive Findings section of the report for those compounds that were identified as being present.

Acode 1002B - Carbon Monoxide Exposure Biouptake Screen, Blood - Chest Blood

-Analysis by Spectrophotometry (SP) for:

Table with 4 columns: Compound, Rpt. Limit, Compound, Rpt. Limit. Row 1: Carboxyhemoglobin, 5 %Saturation

Acode 50012B - Benzodiazepines Confirmation, Blood - Chest Blood

-Analysis by High Performance Liquid Chromatography/ Tandem Mass Spectrometry (LC-MS/MS) for:

Table with 4 columns: Compound, Rpt. Limit, Compound, Rpt. Limit. Lists various benzodiazepines and their reporting limits.

Acode 52198B - Cannabinoids Confirmation, Blood - Chest Blood

-Analysis by High Performance Liquid Chromatography/ Tandem Mass Spectrometry (LC-MS/MS) for:

Table with 4 columns: Compound, Rpt. Limit, Compound, Rpt. Limit. Lists 11-Hydroxy Delta-9 THC and Delta-9 Carboxy THC.

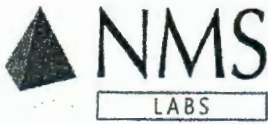
Acode 8051B - Postmortem, Basic, Blood (Forensic) - Chest Blood

-Analysis by Enzyme-Linked Immunosorbent Assay (ELISA) for:

Table with 4 columns: Compound, Rpt. Limit, Compound, Rpt. Limit. Lists various substances like Amphetamines, Barbiturates, Benzodiazepines, etc.

-Analysis by Headspace Gas Chromatography (GC) for:

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Chain 19341183
Patient ID 2019-2021

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Analysis Summary and Reporting Limits:

<u>Compound</u>	<u>Rpt. Limit</u>	<u>Compound</u>	<u>Rpt. Limit</u>
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	5.0 mg/dL

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P.O. Box 25082, Oklahoma City, Oklahoma 73125
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December 11, 2019

NAME A&P Mechanic/Pax
LOCATION Ocala, FL
DATE OF ACCIDENT 10/31/2019

CAMI # 201900246002
MODE Aviation
DATE RECEIVED 11/6/2019

NTSB # ERA20FA022
N # 959CM
STATUS FATAL

SPECIMENS Blood (Cavity), Brain, Gastric, Heart, Kidney, Liver, Lung, Muscle, Urine, Vitreous

PUTREFACTION No

Screening tests employed

- Blood (Cavity) - Carboxyhemoglobin (UV/VIS)
- Blood (Cavity) - Volatiles (HS GC/FID)
- Vitreous - Glucose (Chemical Analyzer)
- Urine - Glucose (Chemical Analyzer)
- Urine - Drugs of abuse (Immunoassay)
- Urine - General drug screen (LC/MS, GC/MS)

<u>Analyte</u>	<u>Result</u>	<u>Specimen</u>	<u>Instrument</u>
Carboxyhemoglobin	Not Detected	Blood (Cavity)	UV/VIS
Ethanol	Not Detected	Blood (Cavity)	HSGC/FID
Glucose	15 (mg/dL)	Vitreous	Analyzer
Glucose	8 (mg/dL)	Urine	Analyzer
Loratadine	Detected	Blood (Cavity)	LC/MS
Loratadine	Negative	Urine	LC/MS
Desloratadine	Detected	Blood (Cavity)	LC/MS
Desloratadine	Detected	Urine	LC/MS
Ibuprofen	Detected	Blood (Cavity)	LC/MS
Ibuprofen	Detected	Urine	LC/MS

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cn=RUSSELL J LEWIS
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