

**OFFICE OF THE MEDICAL EXAMINER
WEST TENNESSEE REGIONAL FORENSIC CENTER**

REPORT OF INVESTIGATION BY COUNTY MEDICAL EXAMINER

Shelby County Medical Examiner: Marco Ross M.D.

State Number: 23-79-0102

Judicial District Number: 30

Case Number: MEC2023-0074

District Attorney: Honorable Steve Mulroy

Name of Decedent Tyre Deandre Nichols		Age 29 Years	Race Black	Date of Birth [REDACTED]	Sex Male
Address [REDACTED]					
Date of Death 01/10/2023 1:41 PM	Type of Death In Jail/Prison/In Police Custody	Investigating Agency/Complaint #: Memphis Police Department, Complaint #: 2301003691ME			
Place of Death [REDACTED]					
Narrative Summary On 01/10/2023 at 1412 hours, RN Keadrian Edward from St. Francis Park Hospital contacted the West Tennessee Regional Forensic Center to report the death of a 29 year old male black positively identified as Tyre Nichols. Reportedly, the decedent was involved in altercation with Memphis Police Department when he was admitted to the hospital on 01/07/2023 at 2228 hours. The decedent's health continued to deteriorate with Dr. Matthew Mabie pronouncing death at 1341 hours this date. Due to the circumstances, jurisdiction was accepted by the Medical Examiner's Office. McCulley Removal Service transported the decedent to West Tennessee Regional Forensic Center for further examination, confirm positive identification and final disposition to the funeral home. Michelle M. Anderson, Investigator 01/10/2023					
Jurisdiction Accepted Yes	Autopsy Ordered Yes	Toxicology Ordered Yes			
Physician Responsible for Death Certificate Laura Bagwell, M.D.					
Cremation Approved No	Funeral Home M.J. Edwards Funeral Home (Airways Ave)				
Cause of Death Blunt force injuries of the head					
Contributory Cause of Death [REDACTED]					
Manner of Death Homicide					

CERTIFIED TO BE A TRUE AND EXACT COPY OF THE ORIGINAL
[Signature]

[Handwritten Signature]

West Tennessee Regional Forensic Center
Office of the Medical Examiner
637 Poplar Avenue
Memphis, Tennessee 38105-4510
Telephone (901) 222-4600 Fax (901) 222-4645

REPORT OF AUTOPSY EXAMINATION

CASE NUMBER: 2023-0074 **DECEDENT:** Tyre Nichols
AGE: 29 years **RACE:** Black **SEX:** Male
Authorized by: Marco Ross, M.D. **Received from:** Shelby County
Date of Examination: 01/11/2023 **Time:** 10:00 AM
Body Identified by: Fingerprints **Person present at autopsy:** Ryan Spencer

PATHOLOGICAL DIAGNOSES

- I. Blunt force injuries of the head and neck
 - A. Multiple cortical contusions
 - B. Rotational/torsional injury of the brain
 - 1. Hemorrhagic tears of the parenchyma
 - 2. Axonal injury
 - C. Cerebral edema and acute hypoxic-ischemic changes
 - D. Subscalpular and subgaleal hemorrhages
 - E. Intramuscular hemorrhages
 - F. Abrasions and contusions
 - II. Blunt force injuries of the torso
 - A. Abrasions and contusions
 - B. Intramuscular hemorrhages of the chest and back
 - III. Blunt force injuries of the extremities
 - A. Abrasions and contusions
 - B. Diffuse intramuscular hemorrhages of the extremities
 - IV. Status post cardiopulmonary arrest and resuscitation
 - A. Hepatic necrosis
 - B. Pulmonary edema
-

CAUSE OF DEATH: Blunt force injuries of the head

The facts stated herein are correct to the best of my knowledge and belief.

 04/25/2023

Laura Bagwell, M.D., Forensic Pathology Fellow Date

 4/25/2023

Marco Ross, M.D., Forensic Pathologist Date

EVIDENCE OF INJURY - *The following description reflects the order in which the injuries are examined and is not intended to indicate the order in which they may have occurred.*

I. BLUNT FORCE INJURIES OF THE HEAD AND NECK: There is a right periorbital hematoma. Both eyelids of the right eye are severely edematous and have a dark purple discoloration. There are scleral hemorrhages of both eyes. Lateral to the right eye is a 2 x 1/2 inch red brown abrasion. The right central incisor is chipped and there is an associated abrasion of the upper lip. There are several 3/4 inch to 1 inch superficial thin linear red-brown abrasions on the left cheek. There is a 1/8 inch red abrasion on the right cheek. On the left side of the neck is a 1/4 x 1/4 inch red brown abrasion and contusion.

There are subscalpular and subgaleal hemorrhages involving the left occipital scalp and left frontal scalp, and there is extensive hemorrhage of the right temporo-parieto-occipital scalp. The right temporalis muscle has an intramuscular hemorrhage (3 x 3 inches).

Superficial cortical contusions are present in the inferior frontal gyrus, the bilateral orbitofrontal cortices and the left superior temporal cortex. Dissecting intraparenchymal hemorrhages involve the left inferior frontal lobe, left lateral genu of the corpus callosum, and left external capsule extends from the genu of the corpus callosum in the left frontal lobe the left putamen. Scant hemorrhage is present in the lateral ventricles and the septum pellucidum is torn. See separate Neuropathology Report.

A 3 x 2 inch area of intramuscular hemorrhage involves the right sternocleidomastoid and scalene muscles. 1/16 inch to 1/4 inch hemorrhages are scattered over the superficial and deep surfaces of the bilateral semispinalis capitis and splenius capitis muscles. Overlying the spinous processes of the cervical vertebra is a 1 x 1/2 inch intramuscular hemorrhage of the spinalis cervicis muscles.

II. BLUNT FORCE INJURIES OF THE TORSO: Overlying the sternum is a 1/2 x 1/2 inch red-brown abrasion. The lower right aspect of the abdomen has a 1/2 x 1/4 inch purple contusion and a 1/2 x 1/2 inch purple contusion. The superior aspect of the right shoulder has a 3/4 x 1/4 inch red-brown abrasion and a 1 x 1/2 inch red-brown abrasion. The lateral aspect of the left shoulder has a 1 x 1/2 inch area of multiple 1/16 to 1/2 inch red-brown abrasions. The lateral aspect of the right buttock has a 1 x 1 inch purple contusion.

On the lateral aspect of the right pectoral muscle is a 2 x 2 inch intramuscular hemorrhage. A 1 x 3/4 inch area of the hemorrhage on the left lower back involves the external and internal oblique muscles.

III. BLUNT FORCE INJURIES OF THE EXTREMITIES: The left elbow has a 1/2 x 1/4 inch red abrasion. The posterior aspect of the left forearm has a 2 x 2 inch purple contusion. On the anterior aspect of the left wrist is a 1 x 1/16 inch red abrasion. The dorsal surface of the left hand has a 1/4 x 1/4 inch purple contusion.

On the lateral aspect of the right upper arm is a 2 x 2 inch purple contusion. The right elbow has a 1/2 x 1/2 red-brown abrasion. The proximal and medial aspect of the anterior surface of the right forearm has a 3 x 2 inch purple contusion. The dorsal aspects of the right 3rd and 4th fingers each have a 1/4 x 1/4 inch red abrasion.

The left knee has a 3/4 x 1/2 inch tan abrasion. The anterior aspect of the left lower leg has three dark purple contusions measuring, from superior to inferior, 5 x 1/2 inches, 1 x 1 inch and 2 x 1 inches. Covering the right knee is a 4 x 4 inch area of multiple, 1/16 inch to 3/4 inch, red-brown abrasions. The anterior aspect of the right ankle has a 1 x 1 inch dark purple contusion.

On the left upper arm, a 2 x 2 inch intramuscular hemorrhage involves the anterior and lateral aspects of the deltoid muscle. The anterior aspect of the left brachioradialis muscle has a 2 x 2 inch intramuscular hemorrhage. On the posterolateral aspect of the distal left forearm and wrist, a 3 x 2 inch area of hemorrhage involves the distal portions of the extensor muscles and the dorsal carpal ligament. The right upper extremity (upper arm, forearm, and wrist) has extensive intramuscular hemorrhage over a 25 x 5 inch area involving: the posterolateral aspects of the deltoid, triceps and biceps muscles; the brachioradialis muscle; and the flexor muscles and tendons.

On the left thigh there is a 6 x 2 inch hemorrhage of the vastus medialis muscle, a 6 x 2 inch hemorrhage involving the lateral aspect of the vastus lateralis and tensor fascia latae muscles, and a 4 x 4 inch hemorrhage of the distal rectus femoris and quadriceps tendon. The left lower leg has a 5 x 4 inch hemorrhage involving the lateral head of the gastrocnemius muscle. Centered over the right patella and involving the quadriceps tendon and patellar ligament is a 5 x 4 inch area of hemorrhage.

EXTERNAL EXAMINATION

The body is that of a well-developed, well-nourished, 73 inch, 209 pound man who appears the reported age of 29 years. The body is refrigerated, well preserved, and not embalmed. Rigor mortis is full in the jaw, neck and extremities. Livor mortis is red, posterior and blanching. Anasarca is present. Injuries are as previously described.

The scalp has black hair in a normal distribution. Facial hair consists of a black mustache and beard. The irides are brown. The corneas are clear. The sclerae are edematous and icteric. The congested conjunctivae have petechiae and hemorrhages. The external auditory canals are unremarkable. The ear lobes are cosmetically pierced. The nasal septum and nasal bones are intact. The teeth are natural. The oral mucosa and tongue are not injured. The frenula are not lacerated. The neck and chest are symmetrical.

The abdomen is firm and slightly protuberant. The back is symmetrical. The uninjured external genitalia are those of a fully developed adult man. The anus is unremarkable.

The arms have no track marks. The wrists have no scars. Scars and tattoos are photographed and diagrammed. There is an identification tag around the left first toe.

EVIDENCE OF MEDICAL INTERVENTION

An endotracheal tube and orogastric tube are in place in the mouth. A central venous access catheter is secured to the right side of the neck. Four electrocardiogram leads are on the chest. A central venous access catheter is in place in the right groin. A Foley catheter is in the urethra. A bowel management system is in the anus and rectum. Intravenous access is in place in the left antecubital fossa. A soft splint with gauze is around the left wrist. The left and right index fingers have pulse oximeter strips. Pads are on the right elbow and both knees.

INTERNAL EXAMINATION

GENERAL DESCRIPTION

The body is opened by a standard Y-shaped thoraco-abdominal incision. All viscera occupy their appropriate anatomic relationships. Serous surfaces are smooth and glistening throughout. The left pleural cavity and the abdominal cavity each contain 125 milliliters of serous fluid.

HEAD AND CENTRAL NERVOUS SYSTEM

Injuries to the scalp and head are as previously described. The calvarium and skull base have no fractures. The dura mater and falx cerebri are intact. The leptomeninges are thin and delicate. There is no evidence of epidural or subdural hemorrhage. The diffusely softened, unfixed brain weighs 1357 grams. The cerebrum appears dusky and edematous, with diffuse flattening of the gyri and narrowing of the sulci. The vessels at the base of the brain are intact with no evidence of aneurysms or significant atherosclerosis. The brain is fixed in formalin prior dissection. Serial sectioning of the cerebrum reveals the injuries previously described above. Serial sections of the cerebellum show poor gray-white matter distinction. The cerebellar tonsils are notched. Sectioning of the brainstem shows appropriately pigmented for age substantia nigra, and unremarkable medulla and pontine white matter. The pituitary gland is unremarkable. The atlanto-occipital ligaments and cervical spine are intact. The cervical spinal cord and dura are grossly unremarkable.

NECK

There are hemorrhages of neck musculature as previously described. The hyoid bone, thyroid cartilage, cricoid cartilage, and larynx are intact.

CARDIOVASCULAR SYSTEM

The epicardium of the 392 gram heart is smooth, glistening, and intact. The vena cavae and pulmonary arteries are without thrombus or embolus. The coronary arteries arise normally and follow the usual courses with no evidence of atherosclerotic stenosis. The chambers and valves exhibit the usual positional relationships and structure. The valves show no evidence of vegetation or thickening. The tricuspid, pulmonic, mitral, and aortic valve circumferences are 11.0 centimeters, 7.0 centimeters, 8.0 centimeters, and 6.0 centimeters, respectively. The endocardium is thin and glistening. The atrial and

ventricular septa are intact. The papillary muscles and chordae are unremarkable. The myocardium is red-brown and shows no areas of fibrosis, hyperemia or mottling. The right, left, and septal ventricular walls are 0.2 centimeters, 1.5 centimeters, and 1.7 centimeters thick, respectively. The aorta is smooth and shiny with intimal fatty streaking and no atherosclerosis.

PULMONARY SYSTEM

The upper airway is clear of debris and foreign material. The mucosal surfaces are smooth, pink-gray, and unremarkable. The trachea and mainstem bronchi are clear of debris and foreign material. The right and left lungs weigh 984 grams and 1150 grams, respectively. The pleural surfaces are glistening and smooth. The parenchyma is red-purple and edematous with no areas of consolidation or focal lesions.

HEPATOBIILIARY SYSTEM

The smooth, glistening, intact capsule of the 1150 gram liver covers yellow-tan parenchyma. The liver has no focal lesions. The extra and intrahepatic vessels are patent. The gallbladder contains yellow-green mucoid bile and no calculi. The gallbladder's mucosa is green and velvety. The pink-tan pancreas has an intact lobular architecture and patent duct.

ENDOCRINE SYSTEM

The adrenal glands are unremarkable. The tan-brown thyroid gland has a normal size and shape and unremarkable parenchyma.

HEMATOPOIETIC SYSTEM

The 220 gram spleen has an intact capsule covering red-purple, soft parenchyma. The bone marrow of the ribs is soft and dark red. Regional lymph nodes have their usual distribution and appearance.

GASTROINTESTINAL SYSTEM

The oropharynx and tongue are grossly normal and unobstructed. The esophagus is lined by gray-white smooth mucosa and is not dilated or stenosed and has no varices. The stomach has a normal size and shape and contains 500 milliliters of liquid. The gastric mucosa is free of ulcerations and is arranged with the usual folds. The small intestine is normal in length, configuration, and diameter and has a smooth, shiny serosal surface. The mesentery has a normal insertion. The large intestine has a smooth, shiny serosal surface and no palpable masses or obstructions. The appendix is previously surgically removed.

GENITOURINARY SYSTEM

The right and left kidneys weight 229 grams and 219 grams, respectively. The renal capsules are smooth, thin, semi-transparent, and cover smooth, red-brown cortical surfaces. Serial sections of the kidneys show cortices of normal thickness, slightly congested, and with well delineated corticomedullary junctions. The renal vessels are patent. The ureters have a normal course and caliber. The bladder contains 15 milliliters of dark yellow urine and the bladder's mucosa is tan, mildly trabeculated, and intact.

The prostate gland is unremarkable. The two intrascrotal testes have homogenous tan parenchyma with no masses or ecchymoses.

MUSCULOSKELETAL SYSTEM

The musculoskeletal system is well developed. The pelvic bones and vertebral bodies of the cervical, thoracic, and lumbar spine are unremarkable.

ADDITIONAL PROCEDURES

Toxicology: Samples of postmortem blood (from the heart and iliac vein), vitreous fluid, urine, and liver are submitted to toxicology, along with samples of hospital admission blood, hospital admission urine, and post hospital admission blood. See separate toxicology report.

Radiographs: Full body x-rays revealed no fractures.

Evidence collected: Blood spot cards; fingerprints; pulled head hair; right and left fingernail clippings and clippers.

Clothing and personal effects: The body was received clad in a green hospital gown. No personal effects were received with the body.

MICROSCOPIC DESCRIPTION

Intramuscular hemorrhages (Right sternocleidomastoid (A); Right temporalis muscle (B, C); Right arm (E); Left arm (F); Left leg (G); Right leg (H); Left posterior neck (L)): The right sternocleidomastoid muscle and sections of muscular tissue from the left arm and right leg show intramuscular hemorrhage with focal acute to mixed inflammation. The right temporalis muscle and sections of muscular tissue from the right arm, left leg, and left posterior neck show intramuscular hemorrhage without significant inflammation.

Liver (D): Extensive ischemic necrosis with some periportal sparing and some periportal mixed inflammatory cell infiltrates.

Kidney (D): Generalized autolysis limits interpretation. Some tubules have more prominent eosinophilic change and epithelial loss that may be due to tubular necrosis, but postmortem autolytic changes in these tubules cannot be excluded.

Heart (I): Scattered hypertrophic myocytes. Focal epicardial hemorrhage.

Lungs (J, left; K, right): Congestion with focal intra-alveolar hemorrhage. Scattered subpleural hemorrhages. Scattered intra-alveolar clusters of pigmented macrophages. Focal peribronchiolar and submucosal bronchial chronic inflammation.

Brain and cervical spinal cord: See separate Neuropathology Report.

SUMMARY AND INTERPRETATION

The decedent was a 29-year-old man who was struck multiple times during a law enforcement encounter. He subsequently became unresponsive, and EMS assessment determined that he was in asystole and CPR was initiated. He was transported to the hospital where CPR was continued and there was return of spontaneous circulation. He remained unresponsive on the ventilator. Initial imaging did not detect acute intracranial findings, but subsequent imaging revealed intraparenchymal and subarachnoid hemorrhages of the brain. He developed acute kidney injury, disseminated intravascular coagulation, and liver failure. Three days after hospital admission, brain death was pronounced and he expired.

The autopsy revealed blunt force injuries of the head with multiple cortical contusions and rotational/torsional injury of the brain (hemorrhagic tears of the parenchyma and axonal injury), multiple blunt force injuries of the neck and torso and extremities with abrasions and contusions, cerebral edema and acute hypoxic-ischemic changes of the brain, pulmonary edema, and hepatic necrosis. Toxicology analysis of a hospital admission urine sample detected ethanol and a metabolite of tetrahydrocannabinol (THC). Toxicology analysis of hospital blood samples detected ethanol (49 mg/dL; 0.049% BAC), THC (and metabolite), lorazepam, and levetiracetam. The lorazepam and levetiracetam were administered during hospitalization.

The cause of death is blunt force injuries of the head. Based on the reported circumstances, the manner of death is classified as homicide.

Rebecca Folkerth, MD
Forensic Neuropathologist
MooseHenge Medical Consulting, PLLC
1066 Berme Rd, High Falls NY 12440

CONSULTATION REPORT

Case: West Tennessee Regional Forensic Center OCME, #MEC2023-0074, Tyre Nichols

Date: 21 April, 2023

FINAL NEUROPATHOLOGIC DIAGNOSIS:

I. TRAUMATIC INJURY OF HEAD, RECENT (SEE AUTOPSY REPORT)

A. BLUNT IMPACT INJURY, INCLUDING:

- i. CONTUSIONS, FRONTOTEMPORAL, WITH ASSOCIATED SUBARACHNOID AND CORTICAL HEMORRHAGE

B. ROTATIONAL/TORSIONAL INJURY, INCLUDING:

i. HEMORRHAGIC TISSUE TEARS OF:

- a. LEFT INFEROLATERAL FRONTAL GYRAL WHITE MATTER, EXTENDING TO INVOLVE THE LEFT EXTERNAL CAPSULE AND ROSTRAL CORPUS CALLOSUM
- b. RIGHT INFEROLATERAL FRONTAL GYRAL WHITE MATTER
- c. SEPTUM PELLUCIDUM

1. SLIGHT INTRAVENTRICULAR HEMORRHAGE

- ii. MICROSCOPIC PATTERN OF TRAUMATIC AXONAL INJURY IN MULTIPLE SUPRATENTORIAL SITES

C. SECONDARY DIFFUSE BRAIN SWELLING AND ACUTE HYPOXIC-ISCHEMIC CHANGES

NOTES: Brain slides are received (2/10/2023) from Dr. Bagwell. Details of the decedent's recent history and autopsy examinations are reviewed in part (in Forensic DiDi; not repeated here). Also reviewed (in Forensic DiDi) are macroscopic photos. A DVD with hospital imaging studies is also received, and the neuroimaging studies (from 1/7/2023 and 1/10/2023) are reviewed for context (no interpretation will be offered here).

MACROSCOPIC FINDINGS: Photos of the unfixed brain, which reportedly weighed 1357g, show diffuse swelling and duskiness. Slight subarachnoid hemorrhage is noted along the left superior frontal sulcus and at the left foramen of Luschka. The fixed brain specimen photos confirm the flattening of the gyral crests and narrowing of sulci, as well as crowding of the base of the brain by the medial temporal lobes. The cerebellar tonsils are tightly apposed to the medulla, the cut surface of which is swollen.

Photos of coronal sections of the fixed cerebral hemispheres confirm the overall swelling, and further show duskiness at the depths of sulci. Superficial cortical contusions are present in: the lateral aspect of the right inferior frontal gyrus (at the level of the left subthalamic nucleus); in the right superior temporoparietal cortex; along the left inferior frontal and superior temporal cortices (at the level of the striatum); in the left middle and inferior temporal gyral cortices; and in the left mesial temporal cortex. Dissecting linear hemorrhages (hemorrhagic tissue tears) are noted in the left inferior frontal intragyral white matter, extending to involve the lateral callosal genu, with accompanying petechiae, and also into the left external capsule just lateral to the striatum. A similar but smaller horizontal linear tear is identified in the right inferior frontal gyral white matter (at the level of the right subthalamic nucleus). The septum pellucidum is torn, and there is a small amount of blood in the ventricular system. Slight left-to-right shift affects the frontal hemispheres, causing narrowing of the left lateral ventricle.

Sections of the fixed brainstem and cerebellum disclose obliteration of the aqueduct and fourth ventricle, and overall poor gray-white distinction. There is faint red-brown discoloration in the hilum of the left dentate nucleus.

MICROSCOPIC FINDINGS (Brain slides from autopsy tissue blocks, per requisition sheet of Dr. Bagwell [dated 1/11/2023], comprising H&E and iron stains on all blocks, and APP immunostains on blocks M-Z):

All brain sections show patchy acute hypoxic-ischemic changes, characterized by shrunken nuclei, fine vacuolization of neuropil, and microvascular hypercellularity, with very sparse perivascular acute inflammatory infiltrates. These changes are overall worse at sulcal depths. Iron stains are negative on all blocks.

“M. L frontal lobe lesion”: Hemorrhage dissecting along intragyral and subcortical white matter. APP-immunopositive axonal bulbs and beaded profiles in a predominantly scattered (traumatic) pattern, with occasional irregularly clustered profiles (indeterminate pattern).

“N. L frontal lobe lesion”: Changes as in block M.

“O. L frontal lobe lesion”: Hemorrhage dissecting along white matter, up to ependymal surface on one edge of section. APP-immunopositive axonal bulbs and beaded profiles in a predominantly scattered (traumatic) pattern, with occasional irregularly clustered profiles (indeterminate pattern).

“P. Corpus callosum, IVH cingulate gyrus”: Hemorrhage dissecting along white matter, up to ependymal surface, and including portion of septum. APP-immunopositive axonal bulbs and beaded profiles in a predominantly scattered (traumatic) pattern, with grouped profiles in the septum (consistent with septal tear).

“Q. R frontal punctate hmx”: Hemorrhage in subarachnoid space and cortical ribbon. Scattered APP-immunopositive axonal swellings in subcortical white matter (traumatic pattern).

“R. R cortical frontal hmx”: Linear hemorrhage from cortex into subcortical white matter, focally associated with axonal swellings on H&E. Scattered APP-immunopositive axonal swellings in subcortical white matter (traumatic pattern), and around hemorrhage.

“S. L parietal hmx”: Hemorrhage in subarachnoid space and superficial cortex (contusion). APP immunostain with sectioning artifact, precluding interpretation.

"T. Hmx near R hippo": Red blood cells in subarachnoid space. Scattered APP-immunopositive axonal swellings in subcortical white matter (traumatic pattern).

"U. L temporal lobe hmx, B hippocampus": Hemorrhage in subarachnoid space and superficial temporal cortex (contusion). Rare APP-immunopositive axonal bulbs and beaded profiles in a predominantly scattered (traumatic) pattern, with occasional irregularly clustered profiles (indeterminate pattern).

"V. "L hippo, WM": Rare APP-immunopositive axonal bulbs and beaded profiles in a predominantly scattered (traumatic) pattern in internal capsule.

"W. L parieto-occipital cortex, L amygdala": Red blood cells in subarachnoid space. Rare APP-immunopositive axonal bulbs and beaded profiles in a predominantly scattered (traumatic) pattern, with occasional irregularly clustered profiles (indeterminate pattern).

"X. "L basal ganglia, thalamus": Scattered APP-immunopositive axonal swellings in internal capsule and other small white matter tracts (traumatic pattern).

"Y. B cingulate gyri, dura": Scattered APP-immunopositive axonal swellings in callosal white matter (traumatic pattern).

"Z. Cerebellum (dentate), cervical spinal cord": Multifocal petechial hemorrhage, some with slight neutrophilic infiltrates, in spinal cord parenchyma. Patchy bundled APP immunostaining (ischemic pattern) in cerebellar white matter and subpial zones in cervical spinal cord.

"AA. C spine dura": Slight focal hemorrhage between collagen bundles (indeterminate as to sub- or epidural location).



Rebecca D. Folkerth, MD



NMS Labs

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200 Welsh Road, Horsham, PA 19044-2208
Phone: (215) 657-4900 Fax: (215) 657-2972
e-mail: nms@nmslabs.com

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

Corrected Report

Report Issued 01/31/2023 14:12

Last Report Issued 01/26/2023 07:00

To: 10505
University of Tennessee Forensic Center
Attn: Marco Ross
637 Poplar Avenue
Memphis, TN 38105

Patient Name NICHOLS, TYRE
Patient ID MEC#2023-0074
Chain NMSCP229603
DOB
Sex Male
Workorder 23014788

Page 1 of 4

RECEIVED

JAN 31 2023

BY: [Signature]

Positive Findings:

Table with 4 columns: Analyte, Result, Units, Matrix Source. Rows include Caffeine, Naloxone, Lorazepam, Levetiracetam, Delta-9 Carboxy THC, and Delta-9 THC.

See Detailed Findings section for additional information

Testing Requested:

Table with 2 columns: Test, Test Name. Row: 8042B Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood (Forensic)

Specimens Received:

Table with 6 columns: ID, Tube/Container, Volume/Mass, Collection Date/Time, Matrix Source, Labeled As. Lists 8 specimens with details on container type, volume, collection date, and source.

All sample volumes/weights are approximations.
Specimens received on 01/12/2023.



Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Caffeine	Presump Pos	mcg/mL	0.40	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Naloxone	Presump Pos	ng/mL	2.0	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Lorazepam	28	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Levetiracetam	8.6	mcg/mL	1.0	001 - Hospital Blood	LC-MS/MS
Delta-9 Carboxy THC	47	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Delta-9 THC	3.5	ng/mL	0.50	001 - Hospital 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:

- Delta-9 Carboxy THC (Inactive Metabolite) - Hospital Blood:

Delta-9 THC is the principle psychoactive ingredient of marijuana/hashish. Delta-9 carboxy THC (THCC) is the inactive metabolite of THC. The usual peak concentrations in serum for 1.75% or 3.55% THC marijuana cigarettes are 10-101 ng/mL attained 32 to 240 minutes after beginning smoking, with a slow decline thereafter. The ratio of whole blood concentration to plasma concentration is unknown for this analyte. THCC 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. THCC is usually not detectable after passive inhalation.
- Delta-9 THC (Active Ingredient of Marijuana) - Hospital Blood:

Delta-9 THC is the principle psychoactive ingredient of marijuana (cannabis, hashish). It is also the active component of the prescription medication Marinol®. Marijuana use causes relaxation, distorted perception, euphoria and feelings of well being, along with confusion, dizziness, somnolence, ataxia, speech difficulties, lethargy and muscular weakness.

After smoking a user-preferred 300 mcg/kg dose average plasma THC concentrations at 35 minutes were reported at 16.1 (range 4.7-30.9) ng/mL, and had declined to 1.5 (range 0.4-3.2) ng/mL after 190 minutes. 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. Whole blood THC concentrations are typically half those in a corresponding plasma sample.
- Levetiracetam (Keppra®) - Hospital Blood:

Levetiracetam is an antiepileptic drug that is chemically unrelated to other antiepileptic compounds available for clinical use. The drug is indicated for adjunct therapy in children and adults with epilepsy. Levetiracetam is marketed in normal release tablets of 250 to 1000 mg. A commonly used initial dosage is 500 mg given twice daily; additional dosing increments may be given after a 2-week stabilization period. Oral absorption of levetiracetam is rapid and complete with peak plasma concentrations occurring in about 1 hour. Steady-state plasma concentrations are achieved after 2 days of twice daily dosing. The plasma half-life of levetiracetam is about 7 hours.

Steady-state trough plasma concentrations following doses of 500 to 3000 mg/day: 1.1 to 33 mcg/mL. A fatal overdose reported postmortem blood concentrations of approximately 200 mcg/mL. The most frequent adverse effects associated with the drug are somnolence, dizziness, asthenia, and infection. The blood to plasma ratio is approximately 0.9. This test is not chiral specific. Levetiracetam cannot be distinguished from its inactive isomer etiracetam.



CONFIDENTIAL

Workorder 2301788
Chain NMSCP229603
Patient ID MEC#2023-0074

Reference Comments:

4. Lorazepam (Ativan®) - Hospital Blood:

Lorazepam is a benzodiazepine used for sedation and for short-term relief of anxiety associated with depressive symptoms. It shares the actions and adverse reactions of other CNS-depressants. Lorazepam can be administered by oral, IV and IM routes. Daily divided oral doses of up to 10 mg are generally prescribed for anxiety. Its adverse effects can include sedation, dizziness, weakness, unsteadiness and disorientation.

Fatalities with lorazepam are relatively rare and generally have postmortem blood concentrations exceeding 300 ng/mL; however, such concentrations are not necessarily fatal.

Sample Comments:

- 001 Physician/Pathologist Name: BAGWELL, L
- 001 County: SHELBY
- 001 Autopsy ID: MEC#2023-0074
- 006 * Specimen Source modified 01/30/23. Previous value: Not Given

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded one (1) year from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed.

Workorder 23014788 was electronically signed on 01/31/2023 13:53 by:

Daniel T. Anderson, M.S., D-ABFT-FT, ABC-GKE
Forensic Toxicologist

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.

Test 50012B - Benzodiazepines Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
7-Amino Clonazepam	5.0 ng/mL	Flurazepam	2.0 ng/mL
Alpha-Hydroxyalprazolam	5.0 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Alprazolam	5.0 ng/mL	Hydroxytriazolam	5.0 ng/mL
Chlordiazepoxide	20 ng/mL	Lorazepam	5.0 ng/mL
Clobazam	20 ng/mL	Midazolam	5.0 ng/mL
Clonazepam	2.0 ng/mL	Nordiazepam	20 ng/mL
Desalkylflurazepam	5.0 ng/mL	Oxazepam	20 ng/mL
Diazepam	20 ng/mL	Temazepam	20 ng/mL
Estazolam	5.0 ng/mL	Triazolam	2.0 ng/mL

Test 52060B - Levetiracetam Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Levetiracetam	1.0 mcg/mL		



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Workorder 23088
Chain NMSCP229603
Patient ID MEC#2023-0074

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Analysis Summary and Reporting Limits:

Test 52198B - Cannabinoids Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
11-Hydroxy Delta-9 THC	2.0 ng/mL	Delta-9 THC	0.50 ng/mL
Delta-9 Carboxy THC	5.0 ng/mL		

Test 8042B - Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood (Forensic) - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Barbiturates	0.040 mcg/mL	Gabapentin	5.0 mcg/mL
Cannabinoids	10 ng/mL	Salicylates	120 mcg/mL

-Analysis by Headspace Gas Chromatography (GC) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	10 mg/dL

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of analyte classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified analyte class are included. Some specific analytes outside of these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs. Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotics, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnotics, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.



NMS Labs

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200 Welsh Road, Horsham, PA 19044-2208
Phone: (215) 657-4900 Fax: (215) 657-2972
e-mail: nms@nmslabs.com

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

Corrected Report

Report Issued 03/01/2023 12:01

Last Report Issued 02/10/2023 23:00

To: 10505
University of Tennessee Forensic Center
Attn: Marco Ross
637 Poplar Avenue
Memphis, TN 38105

Patient Name NICHOLS, TYRE
Patient ID MEC#2023-0074
Chain NMSCP229603
DOB
Sex Male
Workorder 23014788

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MAR 01 2023

BY:

Positive Findings:

Table with 4 columns: Analyte, Result, Units, Matrix Source. Rows include Ethanol, Caffeine, Naloxone, Lorazepam, Levetiracetam, Delta-9 Carboxy THC, Delta-9 THC, Ethanol, Nicotine, and Delta-9 Carboxy THC - Total.

See Detailed Findings section for additional information

Testing Requested:

Table with 2 columns: Test, Test Name. Rows include 0170B Alcohol Panel, Blood; 8042B Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood (Forensic); 8052U Postmortem, Expanded, Urine (Forensic).

Specimens Received:

Table with 6 columns: ID, Tube/Container, Volume/Mass, Collection Date/Time, Matrix Source, Labeled As. Rows 001-007 detailing specimen collection details.



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Workorder 23088
 Chain NMSCP229603
 Patient ID MEC#2023-0074

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ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Labeled As
008	Clear Cap Plastic Container	26.6 g	01/11/2023	Liver Tissue	MEC#2023-0074
001	1/8/23 02:00				
002	1/7/23 21:37; 1/7/23 23:02				
006	1/7/23 23:02				

All sample volumes/weights are approximations.
 Specimens received on 01/12/2023.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Ethanol	49	mg/dL	10	002 - Hospital Blood	Headspace GC
Ethanol	None Detected	mg/dL	10	001 - Hospital Blood	Headspace GC
* Result modified 03/01/23. Previous result: None Detected.					
Blood Alcohol Concentration (BAC)	See Comment	g/100 mL	0.010	001 - Hospital Blood	Headspace GC
* Result modified 03/01/23. Previous result: None Detected. Unable to calculate					
Caffeine	Presump Pos	mcg/mL	0.40	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Naloxone	Presump Pos	ng/mL	2.0	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Lorazepam	28	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Levetiracetam	8.6	mcg/mL	1.0	001 - Hospital Blood	LC-MS/MS
Delta-9 Carboxy THC	47	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Delta-9 THC	3.5	ng/mL	0.50	001 - Hospital Blood	LC-MS/MS
Ethanol	60	mg/dL	10	006 - Hospital Urine	Headspace GC
Nicotine	Presump Pos	ng/mL	1000	006 - Hospital Urine	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Delta-9 Carboxy THC - Total	90	ng/mL	5.0	006 - Hospital Urine	LC-MS/MS
Ethanol	Confirmed	mg/dL	10	006 - Hospital Urine	Headspace GC

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:

- Delta-9 Carboxy THC (Inactive Metabolite) - Hospital Blood:

Delta-9 THC is the principle psychoactive ingredient of marijuana/hashish. Delta-9 carboxy THC (THCC) is the inactive metabolite of THC. The usual peak concentrations in serum for 1.75% or 3.55% THC marijuana cigarettes are 10-101 ng/mL attained 32 to 240 minutes after beginning smoking, with a slow decline thereafter. The ratio of whole blood concentration to plasma concentration is unknown for this analyte. THCC 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. THCC is usually not detectable after passive inhalation.



Reference Comments:

2. Delta-9 Carboxy THC - Total (Inactive Metabolite) - Hospital Urine:

Marijuana is a DEA Schedule I hallucinogen. Collectively, the chemical analytes that comprise marijuana are known as Cannabinoids.

Delta-9-THC is the principle psychoactive ingredient of marijuana/hashish. Delta-9-carboxy-THC (THCC) is the inactive metabolite of THC.

3. Delta-9 THC (Active Ingredient of Marijuana) - Hospital Blood:

Delta-9 THC is the principle psychoactive ingredient of marijuana (cannabis, hashish). It is also the active component of the prescription medication Marinol®. Marijuana use causes relaxation, distorted perception, euphoria and feelings of well being, along with confusion, dizziness, somnolence, ataxia, speech difficulties, lethargy and muscular weakness.

After smoking a user-preferred 300 mcg/kg dose average plasma THC concentrations at 35 minutes were reported at 16.1 (range 4.7-30.9) ng/mL, and had declined to 1.5 (range 0.4-3.2) ng/mL after 190 minutes. 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. Whole blood THC concentrations are typically half those in a corresponding plasma sample.

4. Ethanol (Ethyl Alcohol) - Hospital Blood:

Ethyl alcohol (ethanol, drinking alcohol) is a central nervous system depressant and can cause effects such as impaired judgment, reduced alertness and impaired muscular coordination. Ethanol can also be a product of decomposition or degradation of biological samples.

5. Ethanol (Ethyl Alcohol) - Hospital Urine:

Ethyl alcohol (ethanol, drinking alcohol) is a central nervous system depressant and can cause effects such as impaired judgment, reduced alertness and impaired muscular coordination. Ethanol can also be a product of decomposition or degradation of biological samples.

6. Levetiracetam (Keppra®) - Hospital Blood:

Levetiracetam is an antiepileptic drug that is chemically unrelated to other antiepileptic compounds available for clinical use. The drug is indicated for adjunct therapy in children and adults with epilepsy. Levetiracetam is marketed in normal release tablets of 250 to 1000 mg. A commonly used initial dosage is 500 mg given twice daily; additional dosing increments may be given after a 2-week stabilization period. Oral absorption of levetiracetam is rapid and complete with peak plasma concentrations occurring in about 1 hour. Steady-state plasma concentrations are achieved after 2 days of twice daily dosing. The plasma half-life of levetiracetam is about 7 hours.

Steady-state trough plasma concentrations following doses of 500 to 3000 mg/day: 1.1 to 33 mcg/mL. A fatal overdose reported postmortem blood concentrations of approximately 200 mcg/mL. The most frequent adverse effects associated with the drug are somnolence, dizziness, asthenia, and infection. The blood to plasma ratio is approximately 0.9. This test is not chiral specific. Levetiracetam cannot be distinguished from its inactive isomer etiracetam.

7. Lorazepam (Ativan®) - Hospital Blood:

Lorazepam is a benzodiazepine used for sedation and for short-term relief of anxiety associated with depressive symptoms. It shares the actions and adverse reactions of other CNS-depressants. Lorazepam can be administered by oral, IV and IM routes. Daily divided oral doses of up to 10 mg are generally prescribed for anxiety. Its adverse effects can include sedation, dizziness, weakness, unsteadiness and disorientation.

Fatalities with lorazepam are relatively rare and generally have postmortem blood concentrations exceeding 300 ng/mL; however, such concentrations are not necessarily fatal.

Sample Comments:

- 001 * Miscellaneous Information modified 02/28/23. Previous value: Not Given
- 001 Physician/Pathologist Name: BAGWELL, L
- 001 County: SHELBY
- 001 Autopsy ID: MEC#2023-0074
- 002 * Miscellaneous Information modified 02/28/23. Previous value: Not Given



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Workorder 23014788
Chain NMSCP229603
Patient ID MEC#2023-0074

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Sample Comments:

- 006 * Miscellaneous Information modified 02/28/23. Previous value: Not Given
- 006 * Specimen Source modified 01/30/23. Previous value: Not Given

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded one (1) year from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed.

Workorder 23014788 was electronically signed on 03/01/2023 09:53 by:

Daniel T. Anderson, M.S., D-ABFT-FT, ABC-GKE
Forensic Toxicologist

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.

Test 0170B - Alcohol Panel, Blood - Hospital Blood

-Analysis by Headspace Gas Chromatography (GC) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	10 mg/dL

Test 50012B - Benzodiazepines Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
7-Amino Clonazepam	5.0 ng/mL	Flurazepam	2.0 ng/mL
Alpha-Hydroxyalprazolam	5.0 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Alprazolam	5.0 ng/mL	Hydroxytriazolam	5.0 ng/mL
Chlordiazepoxide	20 ng/mL	Lorazepam	5.0 ng/mL
Clobazam	20 ng/mL	Midazolam	5.0 ng/mL
Clonazepam	2.0 ng/mL	Nordiazepam	20 ng/mL
Desalkylflurazepam	5.0 ng/mL	Oxazepam	20 ng/mL
Diazepam	20 ng/mL	Temazepam	20 ng/mL
Estazolam	5.0 ng/mL	Triazolam	2.0 ng/mL

Test 50013U - Cannabinoids Confirmation, Urine - Hospital Urine

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Delta-9 Carboxy THC - Total	5.0 ng/mL		

Test 52060B - Levetiracetam Confirmation, Blood - Hospital Blood

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



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Workorder
Chain
Patient ID

230 88
NMSCP229603
MEC#2023-0074

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Analysis Summary and Reporting Limits:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Levetiracetam	1.0 mcg/mL		

Test 52198B - Cannabinoids Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
11-Hydroxy Delta-9 THC	2.0 ng/mL	Delta-9 THC	0.50 ng/mL
Delta-9 Carboxy THC	5.0 ng/mL		

Test 52250U - Alcohols and Acetone Confirmation, Urine - Hospital Urine

-Analysis by Headspace Gas Chromatography (GC) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	10 mg/dL

Test 8042B - Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood (Forensic) - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Barbiturates	0.040 mcg/mL	Gabapentin	5.0 mcg/mL
Cannabinoids	10 ng/mL	Salicylates	120 mcg/mL

-Analysis by Headspace Gas Chromatography (GC) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	10 mg/dL

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of analyte classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified analyte class are included. Some specific analytes outside of these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs. Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotics, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnotics, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.

Test 8052U - Postmortem, Expanded, Urine (Forensic) - Hospital Urine

-Analysis by Enzyme Immunoassay (EIA) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Barbiturates	0.30 mcg/mL	Cannabinoids	50 ng/mL

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Gabapentin	5.0 mcg/mL	Salicylates	120 mcg/mL



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Workorder 23088
Chain NMSCP229603
Patient ID MEC#2023-0074

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Analysis Summary and Reporting Limits:

-Analysis by Headspace Gas Chromatography (GC) for:

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

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of analyte classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified analyte class are included. Some specific analytes outside of these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs. Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotics, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnotosedatives, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.



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200 Welsh Road, Horsham, PA 19044-2208
Phone: (215) 657-4900 Fax: (215) 657-2972
e-mail: nms@nmslabs.com

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

Corrected Report

Report Issued 02/10/2023 23:00
Last Report Issued 01/31/2023 14:12

Patient Name NICHOLS, TYRE
Patient ID MEC#2023-0074
Chain NMSCP229603
DOB
Sex Male
Workorder 23014788

To: 10505
University of Tennessee Forensic Center
Attn: Marco Ross
637 Poplar Avenue
Memphis, TN 38105

Page 1 of 5

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FFP 1/30/23
BY: [Signature]

Positive Findings:

Table with 4 columns: Analyte, Result, Units, Matrix Source. Rows include Caffeine, Naloxone, Lorazepam, Levetiracetam, Delta-9 Carboxy THC, Delta-9 THC, Ethanol, Nicotine, and Delta-9 Carboxy THC - Total.

See Detailed Findings section for additional information

Testing Requested:

Table with 2 columns: Test, Test Name. Rows include 8042B (Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood) and 8052U (Postmortem, Expanded, Urine).

Specimens Received:

Table with 6 columns: ID, Tube/Container, Volume/Mass, Collection Date/Time, Matrix Source, Labeled As. Rows 001-008 detailing specimen collection details.



All sample volumes/weights are approximations.
Specimens received on 01/12/2023.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Caffeine	Presump Pos	mcg/mL	0.40	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Naloxone	Presump Pos	ng/mL	2.0	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Lorazepam	28	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Levetiracetam	8.6	mcg/mL	1.0	001 - Hospital Blood	LC-MS/MS
Delta-9 Carboxy THC	47	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Delta-9 THC	3.5	ng/mL	0.50	001 - Hospital Blood	LC-MS/MS
Ethanol	60	mg/dL	10	006 - Hospital Urine	Headspace GC
Nicotine	Presump Pos	ng/mL	1000	006 - Hospital Urine	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Delta-9 Carboxy THC - Total	90	ng/mL	5.0	006 - Hospital Urine	LC-MS/MS
Ethanol	Confirmed	mg/dL	10	006 - Hospital Urine	Headspace GC

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:

- Delta-9 Carboxy THC (Inactive Metabolite) - Hospital Blood:
Delta-9 THC is the principle psychoactive ingredient of marijuana/hashish. Delta-9 carboxy THC (THCC) is the inactive metabolite of THC. The usual peak concentrations in serum for 1.75% or 3.55% THC marijuana cigarettes are 10-101 ng/mL attained 32 to 240 minutes after beginning smoking, with a slow decline thereafter. The ratio of whole blood concentration to plasma concentration is unknown for this analyte. THCC 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. THCC is usually not detectable after passive inhalation.
- Delta-9 Carboxy THC - Total (Inactive Metabolite) - Hospital Urine:
Marijuana is a DEA Schedule I hallucinogen. Collectively, the chemical analytes that comprise marijuana are known as Cannabinoids.

Delta-9-THC is the principle psychoactive ingredient of marijuana/hashish. Delta-9-carboxy-THC (THCC) is the inactive metabolite of THC.
- Delta-9 THC (Active Ingredient of Marijuana) - Hospital Blood:
Delta-9 THC is the principle psychoactive ingredient of marijuana (cannabis, hashish). It is also the active component of the prescription medication Marinol®. Marijuana use causes relaxation, distorted perception, euphoria and feelings of well being, along with confusion, dizziness, somnolence, ataxia, speech difficulties, lethargy and muscular weakness.

After smoking a user-preferred 300 mcg/kg dose average plasma THC concentrations at 35 minutes were reported at 16.1 (range 4.7-30.9) ng/mL, and had declined to 1.5 (range 0.4-3.2) ng/mL after 190 minutes. 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. Whole blood THC concentrations are typically half those in a corresponding plasma sample.



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Workorder
Chain
Patient ID

23014788
NMSCP229603
MEC#2023-0074

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Reference Comments:

4. Ethanol (Ethyl Alcohol) - Hospital Urine:

Ethyl alcohol (ethanol, drinking alcohol) is a central nervous system depressant and can cause effects such as impaired judgment, reduced alertness and impaired muscular coordination. Ethanol can also be a product of decomposition or degradation of biological samples.

5. Levetiracetam (Keppra®) - Hospital Blood:

Levetiracetam is an antiepileptic drug that is chemically unrelated to other antiepileptic compounds available for clinical use. The drug is indicated for adjunct therapy in children and adults with epilepsy. Levetiracetam is marketed in normal release tablets of 250 to 1000 mg. A commonly used initial dosage is 500 mg given twice daily; additional dosing increments may be given after a 2-week stabilization period. Oral absorption of levetiracetam is rapid and complete with peak plasma concentrations occurring in about 1 hour. Steady-state plasma concentrations are achieved after 2 days of twice daily dosing. The plasma half-life of levetiracetam is about 7 hours.

Steady-state trough plasma concentrations following doses of 500 to 3000 mg/day: 1.1 to 33 mcg/mL. A fatal overdose reported postmortem blood concentrations of approximately 200 mcg/mL. The most frequent adverse effects associated with the drug are somnolence, dizziness, asthenia, and infection. The blood to plasma ratio is approximately 0.9. This test is not chiral specific. Levetiracetam cannot be distinguished from its inactive isomer etiracetam.

6. Lorazepam (Ativan®) - Hospital Blood:

Lorazepam is a benzodiazepine used for sedation and for short-term relief of anxiety associated with depressive symptoms. It shares the actions and adverse reactions of other CNS-depressants. Lorazepam can be administered by oral, IV and IM routes. Daily divided oral doses of up to 10 mg are generally prescribed for anxiety. Its adverse effects can include sedation, dizziness, weakness, unsteadiness and disorientation.

Fatalities with lorazepam are relatively rare and generally have postmortem blood concentrations exceeding 300 ng/mL; however, such concentrations are not necessarily fatal.

Sample Comments:

- 001 Physician/Pathologist Name: BAGWELL, L
- 001 County: SHELBY
- 001 Autopsy ID: MEC#2023-0074
- 006 * Specimen Source modified 01/30/23. Previous value: Not Given

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded one (1) year from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed.

Workorder 23014788 was electronically signed on 02/10/2023 22:53 by:

Daniel T. Anderson, M.S., D-ABFT-FT, ABC-GKE
Forensic Toxicologist

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.

Test 50012B - Benzodiazepines Confirmation, Blood - Hospital Blood

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



Analysis Summary and Reporting Limits:

<u>Analyte</u>	<u>Rpt. Limit</u>	<u>Analyte</u>	<u>Rpt. Limit</u>
7-Amino Clonazepam	5.0 ng/mL	Flurazepam	2.0 ng/mL
Alpha-Hydroxyalprazolam	5.0 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Alprazolam	5.0 ng/mL	Hydroxytriazolam	5.0 ng/mL
Chlordiazepoxide	20 ng/mL	Lorazepam	5.0 ng/mL
Clobazam	20 ng/mL	Midazolam	5.0 ng/mL
Clonazepam	2.0 ng/mL	Nordiazepam	20 ng/mL
Desalkylflurazepam	5.0 ng/mL	Oxazepam	20 ng/mL
Diazepam	20 ng/mL	Temazepam	20 ng/mL
Estazolam	5.0 ng/mL	Triazolam	2.0 ng/mL

Test 50013U - Cannabinoids Confirmation, Urine - Hospital Urine

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

<u>Analyte</u>	<u>Rpt. Limit</u>	<u>Analyte</u>	<u>Rpt. Limit</u>
Delta-9 Carboxy THC - Total	5.0 ng/mL		

Test 52060B - Levetiracetam Confirmation, Blood - Hospital Blood

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

<u>Analyte</u>	<u>Rpt. Limit</u>	<u>Analyte</u>	<u>Rpt. Limit</u>
Levetiracetam	1.0 mcg/mL		

Test 52198B - Cannabinoids Confirmation, Blood - Hospital Blood

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

<u>Analyte</u>	<u>Rpt. Limit</u>	<u>Analyte</u>	<u>Rpt. Limit</u>
11-Hydroxy Delta-9 THC	2.0 ng/mL	Delta-9 THC	0.50 ng/mL
Delta-9 Carboxy THC	5.0 ng/mL		

Test 52250U - Alcohols and Acetone Confirmation, Urine - Hospital Urine

-Analysis by Headspace Gas Chromatography (GC) for:

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

Test 8042B - Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood (Forensic) - Hospital Blood

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

<u>Analyte</u>	<u>Rpt. Limit</u>	<u>Analyte</u>	<u>Rpt. Limit</u>
Barbiturates	0.040 mcg/mL	Gabapentin	5.0 mcg/mL
Cannabinoids	10 ng/mL	Salicylates	120 mcg/mL

-Analysis by Headspace Gas Chromatography (GC) for:

<u>Analyte</u>	<u>Rpt. Limit</u>	<u>Analyte</u>	<u>Rpt. Limit</u>
Acetone	5.0 mg/dL	Ethanol	10 mg/dL



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Analysis Summary and Reporting Limits:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Isopropanol	5.0 mg/dL	Methanol	10 mg/dL

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of analyte classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified analyte class are included. Some specific analytes outside of these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs. Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotics, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnotics, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.

Test 8052U - Postmortem, Expanded, Urine (Forensic) - Hospital Urine

-Analysis by Enzyme Immunoassay (EIA) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Barbiturates	0.30 mcg/mL	Cannabinoids	50 ng/mL

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Gabapentin	5.0 mcg/mL	Salicylates	120 mcg/mL

-Analysis by Headspace Gas Chromatography (GC) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	10 mg/dL

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of analyte classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified analyte class are included. Some specific analytes outside of these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs. Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotics, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnotics, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.



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200 Welsh Road, Horsham, PA 19044-2208
Phone: (215) 657-4900 Fax: (215) 657-2972
e-mail: nms@nmslabs.com

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

Toxicology Report

Report Issued 01/26/2023 07:00

Patient Name NICHOLS, TYRE
Patient ID MEC#2023-0074
Chain NMSCP229603
DOB
Sex Male
Workorder 23014788

To: 10505
University of Tennessee Forensic Center
Attn: Marco Ross
637 Poplar Avenue
Memphis, TN 38105

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RECEIVED
JAN 26
BY: [Signature]

Positive Findings:

Table with 4 columns: Analyte, Result, Units, Matrix Source. Rows include Caffeine, Naloxone, Lorazepam, Levetiracetam, Delta-9 Carboxy THC, and Delta-9 THC.

See Detailed Findings section for additional information

Testing Requested:

Table with 2 columns: Test, Test Name. Row: 8042B Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood (Forensic)

Specimens Received:

Table with 6 columns: ID, Tube/Container, Volume/Mass, Collection Date/Time, Matrix Source, Labeled As. Lists 8 specimens with details on container type, volume, collection date, and source.

All sample volumes/weights are approximations.
Specimens received on 01/12/2023.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Caffeine	Presump Pos	mcg/mL	0.40	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Naloxone	Presump Pos	ng/mL	2.0	001 - Hospital Blood	LC/TOF-MS
This test is an unconfirmed screen. Confirmation by a more definitive technique such as GC/MS is recommended.					
Lorazepam	28	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Levetiracetam	8.6	mcg/mL	1.0	001 - Hospital Blood	LC-MS/MS
Delta-9 Carboxy THC	47	ng/mL	5.0	001 - Hospital Blood	LC-MS/MS
Delta-9 THC	3.5	ng/mL	0.50	001 - Hospital 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 Carboxy THC (Inactive Metabolite) - Hospital Blood:

Delta-9 THC is the principle psychoactive ingredient of marijuana/hashish. Delta-9 carboxy THC (THCC) is the inactive metabolite of THC. The usual peak concentrations in serum for 1.75% or 3.55% THC marijuana cigarettes are 10-101 ng/mL attained 32 to 240 minutes after beginning smoking, with a slow decline thereafter. The ratio of whole blood concentration to plasma concentration is unknown for this analyte. THCC 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. THCC is usually not detectable after passive inhalation.

2. Delta-9 THC (Active Ingredient of Marijuana) - Hospital Blood:

Delta-9 THC is the principle psychoactive ingredient of marijuana (cannabis, hashish). It is also the active component of the prescription medication Marinol®. Marijuana use causes relaxation, distorted perception, euphoria and feelings of well being, along with confusion, dizziness, somnolence, ataxia, speech difficulties, lethargy and muscular weakness.

After smoking a user-preferred 300 mcg/kg dose average plasma THC concentrations at 35 minutes were reported at 16.1 (range 4.7-30.9) ng/mL, and had declined to 1.5 (range 0.4-3.2) ng/mL after 190 minutes. 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. Whole blood THC concentrations are typically half those in a corresponding plasma sample.

3. Levetiracetam (Keppra®) - Hospital Blood:

Levetiracetam is an antiepileptic drug that is chemically unrelated to other antiepileptic compounds available for clinical use. The drug is indicated for adjunct therapy in children and adults with epilepsy. Levetiracetam is marketed in normal release tablets of 250 to 1000 mg. A commonly used initial dosage is 500 mg given twice daily; additional dosing increments may be given after a 2-week stabilization period. Oral absorption of levetiracetam is rapid and complete with peak plasma concentrations occurring in about 1 hour. Steady-state plasma concentrations are achieved after 2 days of twice daily dosing. The plasma half-life of levetiracetam is about 7 hours.

Steady-state trough plasma concentrations following doses of 500 to 3000 mg/day: 1.1 to 33 mcg/mL. A fatal overdose reported postmortem blood concentrations of approximately 200 mcg/mL. The most frequent adverse effects associated with the drug are somnolence, dizziness, asthenia, and infection. The blood to plasma ratio is approximately 0.9. This test is not chiral specific. Levetiracetam cannot be distinguished from its inactive isomer etiracetam.



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Reference Comments:

4. Lorazepam (Ativan®) - Hospital Blood:

Lorazepam is a benzodiazepine used for sedation and for short-term relief of anxiety associated with depressive symptoms. It shares the actions and adverse reactions of other CNS-depressants. Lorazepam can be administered by oral, IV and IM routes. Daily divided oral doses of up to 10 mg are generally prescribed for anxiety. Its adverse effects can include sedation, dizziness, weakness, unsteadiness and disorientation.

Fatalities with lorazepam are relatively rare and generally have postmortem blood concentrations exceeding 300 ng/mL; however, such concentrations are not necessarily fatal.

Sample Comments:

- 001 Physician/Pathologist Name: BAGWELL, L
- 001 County: SHELBY
- 001 Autopsy ID: MEC#2023-0074

Unless alternate arrangements are made by you, the remainder of the submitted specimens will be discarded one (1) year from the date of this report; and generated data will be discarded five (5) years from the date the analyses were performed.

Workorder 23014788 was electronically signed on 01/26/2023 06:27 by:

Daniel T. Anderson, M.S., D-ABFT-FT, ABC-GKE
Forensic Toxicologist

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.

Test 50012B - Benzodiazepines Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
7-Amino Clonazepam	5.0 ng/mL	Flurazepam	2.0 ng/mL
Alpha-Hydroxyalprazolam	5.0 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Alprazolam	5.0 ng/mL	Hydroxytriazolam	5.0 ng/mL
Chlordiazepoxide	20 ng/mL	Lorazepam	5.0 ng/mL
Clobazam	20 ng/mL	Midazolam	5.0 ng/mL
Clonazepam	2.0 ng/mL	Nordiazepam	20 ng/mL
Desalkylflurazepam	5.0 ng/mL	Oxazepam	20 ng/mL
Diazepam	20 ng/mL	Temazepam	20 ng/mL
Estazolam	5.0 ng/mL	Triazolam	2.0 ng/mL

Test 52060B - Levetiracetam Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Levetiracetam	1.0 mcg/mL		



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Workorder
Chain
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230108
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Analysis Summary and Reporting Limits:

Test 52198B - Cannabinoids Confirmation, Blood - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
11-Hydroxy Delta-9 THC	2.0 ng/mL	Delta-9 THC	0.50 ng/mL
Delta-9 Carboxy THC	5.0 ng/mL		

Test 8042B - Postmortem, Expanded w/Vitreous Alcohol Confirmation, Blood (Forensic) - Hospital Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Barbiturates	0.040 mcg/mL	Gabapentin	5.0 mcg/mL
Cannabinoids	10 ng/mL	Salicylates	120 mcg/mL

-Analysis by Headspace Gas Chromatography (GC) for:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Acetone	5.0 mg/dL	Isopropanol	5.0 mg/dL
Ethanol	10 mg/dL	Methanol	10 mg/dL

-Analysis by High Performance Liquid Chromatography/Time of Flight-Mass Spectrometry (LC/TOF-MS) for: The following is a general list of analyte classes included in this screen. The detection of any specific analyte is concentration-dependent. Note, not all known analytes in each specified analyte class are included. Some specific analytes outside of these classes are also included. For a detailed list of all analytes and reporting limits, please contact NMS Labs. Amphetamines, Anticonvulsants, Antidepressants, Antihistamines, Antipsychotics, Benzodiazepines, CNS Stimulants, Cocaine and Metabolites, Hallucinogens, Hypnosedatives, Muscle Relaxants, Non-Steroidal Anti-Inflammatory Agents, Opiates and Opioids.