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CONFIDENTIAL

Demo Report

Report Issued 01/23/2023 06:49

To: **88888**
Forensic Example Report
Attn: Example Reports
200 Welsh Road
Horsham, PA 19044

Patient Name	NA
Patient ID	8052B-POS
Chain	22002206
DOB	Not Given
Sex	Not Given
Workorder	22002206

Positive Findings:

Analyte	Result	Units	Matrix Source
Ethanol	**85**	**mg/dL**	**001 - Blood**
Blood Alcohol Concentration (BAC)	**0.085**	**g/100 mL**	**001 - Blood**
Alprazolam	**10**	**ng/mL**	**001 - Blood**
Morphine - Free	**10**	**ng/mL**	**001 - Blood**
6-Monoacetylmorphine - Free	**10**	**ng/mL**	**001 - Blood**
Gabapentin	**50**	**mcg/mL**	**001 - Blood**
Delta-9 THC	**5.0**	**ng/mL**	**001 - Blood**
Fentanyl	**10**	**ng/mL**	**001 - Blood**
Acetyl Fentanyl	**10**	**ng/mL**	**001 - Blood**

See Detailed Findings section for additional information

Testing Requested:

Test	Test Name
8052B	Postmortem, Expanded, Blood (Forensic)

Specimens Received:

ID	Tube/Container	Volume/ Mass	Collection Date/Time	Matrix Source	Labeled As
001	Black Cap Glass Container	Not Given	Not Given	Blood	Not Applicable

All sample volumes/weights are approximations.

Specimens received on 10/03/2022.

Detailed Findings:

Analysis and Comments	Result	Units	Rpt. Limit	Specimen Source	Analysis By
Ethanol	85	mg/dL	10	001 - Blood	Headspace GC
Blood Alcohol Concentration (BAC)	0.085	g/100 mL	0.010	001 - Blood	Headspace GC
Alprazolam	10	ng/mL	5.0	001 - Blood	LC-MS/MS
Cocaine	20	ng/mL	10	001 - Blood	LC-MS/MS
Morphine - Free	10	ng/mL	5.0	001 - Blood	LC-MS/MS
6-Monoacetylmorphine - Free	10	ng/mL	1.0	001 - Blood	LC-MS/MS
Gabapentin	50	mcg/mL	1.0	001 - Blood	LC-MS/MS
Delta-9 THC	5.0	ng/mL	0.50	001 - Blood	LC-MS/MS
Ethanol	Confirmed	mg/dL	10	001 - Blood	Headspace GC
Fentanyl	10	ng/mL	0.20	001 - Blood	LC-MS/MS
Acetyl Fentanyl	10	ng/mL	0.20	001 - 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. 6-Monoacetylmorphine - Free (6-MAM; Heroin Metabolite) - Blood:

   6-monoacetylmorphine (6-MAM) is the 6-monoacetylated form of morphine, which is pharmacologically active. When present, it is generally indicative of heroin (diacetylmorphine) use. 6-MAM has also been reported to occur as an artifact in samples with unusually high blood morphine concentrations.

   A healthy man administered 12 mg heroin intravenously achieved peak blood concentrations at two minutes post injection of 150 ng/mL of 6-MAM and 44 ng/mL of morphine, which declined with half-lives of 7 minutes and 33 minutes, respectively.

   Eight subjects who died within fifteen minutes of heroin administration had postmortem blood 6-MAM concentrations averaging 19 ng/mL with a range from less than 1.0 to 82 ng/mL.

2. Acetyl Fentanyl - Blood:

   Acetyl fentanyl is a novel non-prescription synthetic opioid that has been implicated in several deaths. This fentanyl analog was previously undocumented in illicit drug use and is estimated to be five times more potent than heroin. Several state agencies have issued public health warnings. The Centers for Disease Control (CDC) has recommended increased vigilance by public health agencies, emergency departments, state laboratories, medical examiners, and coroners for patients with symptoms consistent with opioid overdose. It is also recommended that if a fentanyl immunoassay (e.g., ELISA) produces a positive result additional confirmation testing be performed and that this testing should include fentanyl and its analogs, including acetyl fentanyl.

3. Alprazolam (Xanax®) - Blood:

   Alprazolam is a low-dose benzodiazepine used for the treatment of anxiety disorders and short-term relief of anxiety associated with depressive symptoms. Alpha-hydroxyalprazolam is an active metabolite of alprazolam. They share the actions and adverse reactions of other CNS-depressants. Common adverse effects of alprazolam include drowsiness and fatigue.

   Reported therapeutic plasma concentrations of alprazolam are proportional to dose given: 3 mg/day produced steady-state levels of 30 ng/mL; 6 mg/day, 60 ng/mL; and 9 mg/day, 100 ng/mL.

Reference Comments:

In reported cases involving driving under the influence, alprazolam concentrations ranged from 8 - 640 ng/mL. Alcohol greatly enhances the activity of benzodiazepines.

Reported blood concentrations of alprazolam in alprazolam-related fatalities ranged from 100 - 400 ng/mL (mean, 200 ng/mL). In combination with other central nervous system depressants such as ethyl alcohol, alprazolam can become toxic at low concentrations.

4. Cocaine - :

Cocaine is a DEA Schedule II controlled central nervous stimulant drug. Effects following cocaine use can include euphoria, excitement, restlessness, risk taking, sleep disturbance, and aggression. A period of mental and physical fatigue and somnolence follow the use of cocaine after the excitant-stimulant effects wear off. Cocaine is metabolized to the inactive analytes benzoylecgonine, ecgonine methyl ester, and ecgonine. Benzoylecgonine and ecgonine methyl ester can form from cocaine breakdown after death and even after sample collection. The average blood cocaine concentration in 906 impaired drivers was 87 ng/mL (range 5-2390 ng/mL). Blood cocaine concentrations in patients admitted to an emergency room for cocaine related medical complaints were 260 ng/mL (SD = 500 ng/mL). Cocaine concentrations in plasma following oral administration of 2 g/day over 6 days, averaged 1260 ng/mL. The average blood cocaine concentration in 37 cocaine related fatalities was 4600 ng/mL (range 40-31000 ng/mL).

5. Delta-9 THC (Active Ingredient of Marijuana) - 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.

6. Ethanol (Ethyl Alcohol) - 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.

7. Fentanyl (Duragesic®; Sublimaze®) - Blood:

Fentanyl is a prescription opioid commonly used as an anesthetic/analgesic. It is reported to be 80 to 200 times as potent as morphine and has a rapid onset of action as well as addictive properties. Illicit fentanyl is readily available due to low production cost and its high potency. It is often sold as heroin and is commonly found in combination with other illicit drugs. Signs associated with fentanyl toxicity include severe respiratory depression, muscle rigidity, seizures, seizures, hypotension, coma and death.

When used clinically as a transdermal preparation (25-100 mcg/hour patch), serum fentanyl concentrations up to 3.8 ng/mL have been reported within 24 hours. Following removal of the patch, serum fentanyl concentrations are reported to decrease with a mean elimination half-life of 17 hours (range, 13-22 hours). The mean peak plasma serum fentanyl concentration in adults given an 800 mcg oral transmucosal fentanyl preparation over 15 minutes is reported at 2.1 ng/mL (range, 1.4-3.0 ng/mL) at approximately 0.40 hours.

It is reported that patients lost consciousness at mean plasma levels of fentanyl of 34 ng/mL when infused with 75 mcg/Kg over a 15 min period; peak plasma levels averaged 50 ng/mL. In fatalities from fentanyl, blood concentrations are variable and have been reported as low as 3 ng/mL. Postmortem blood fentanyl concentrations ranged from 0.30-110 ng/mL (median 11 ng/mL) in 301 femoral blood specimens obtained from accidental drug overdose death investigations. These concentrations ranged from 9.7-41.3 ng/mL (median 17.2 ng/mL) in 7 fentanyl only cases in another published case series.

The blood to plasma ratio for fentanyl is approximately 0.80-1.0.

Reference Comments:

8. Gabapentin (Neurontin®) - Blood:

   Gabapentin is an antiepileptic/anticonvulsant drug used in adults and children. Gabapentin is marketed in capsules (100, 200 and 300 mg), tablets (600 and 800 mg) and an oral solution (250 mg/5 mL). The common daily oral dose range for adults is from 900 to 1800 mg per day in divided doses; pediatric doses (3 to 12 years of age) are dependent of the child's body weight and range from 10 to 15 mg/kg per day.

   Mean steady-state plasma levels (+/- SD) following daily regimens of:
   900 mg/day = 1.88 (+/- 0.70) mcg/mL
   1200 mg/day= 2.62 (+/- 0.86) mcg/mL
   Reported threshold for seizure control: Greater than 2 mcg/mL.

   The drug is also used to treat postherpetic neuralgia in adults. The common adult dosage for this indication is 1800 mg per day in divided doses following lower doses during initial treatment.

   The most common adverse effects of gabapentin are related to the central nervous system and include sedation, dizziness, nystagmus, ataxia and fatigue. All of these adverse effects are reversible and subside with reduction of dosage or discontinuation of therapy with the drug.

9. Morphine - Free (Codeine Metabolite) - Blood:

   Morphine (Duramorph, Roxanol, MS-Contin) is a DEA Schedule II opiate narcotic analgesic. It can be a metabolite or breakdown product of codeine and heroin. If found together with 6-monoacetylmorphine (6-MAM), likely source is heroin. A large portion of the morphine may be conjugated; the portion not conjugated is termed 'free morphine', the active biologic agent which is a powerful painkilling drug whose diverse effects that may include analgesia, drowsiness, nausea and respiratory depression. Hydromorphone is a reported metabolite of morphine.
   Morphine peak serum concentrations occur within 10 to 20 minutes of a 10 mg/70 kg intramuscular dose, average 60 ng/mL 30 minutes following administration. IV administration of 10 mg/70 kg, average 80 ng/mL after 30 minutes. Chronic pain patients receiving an average of 90 mg (range 20-1460) daily oral morphine had average serum concentrations of 73 ng/mL (range 13-710) morphine. In 15 cases where cause of death was attributed to opiate toxicity (heroin, morphine or both), free morphine concentrations were 0-3700 ng/mL (average 420 +/- 940). In comparison, in cases where COD was unrelated to opiates (n=20) free morphine was 0-850 ng/mL (average 90 +/- 200). The ratio of whole blood concentration to serum or plasma concentration is approximately one. In a population of 676 drivers arrested for driving under the influence, Morphine concentrations ranged from 1.25-1290 ng/mL, with an average of 52 ng/mL.
   Following excessive opiate use, pupils are typically constricted and unreactive to light. Pulse and blood pressure, and body temperature can be lowered. Psychomotor impairment is generally present, with increased body sway, and poor performance in divided attention tests. Users are sometimes described as 'on the nod', falling asleep in the middle of conversations or at inappropriate times. Tolerance can develop to the effects of opiates, and more experienced users are less susceptible to the impairing effects.

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 - 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	Desalkylflurazepam	5.0 ng/mL
Alpha-Hydroxyalprazolam	5.0 ng/mL	Diazepam	20 ng/mL
Alprazolam	5.0 ng/mL	Estazolam	5.0 ng/mL
Chlordiazepoxide	20 ng/mL	Flurazepam	2.0 ng/mL
Clobazam	20 ng/mL	Hydroxyethylflurazepam	5.0 ng/mL
Clonazepam	2.0 ng/mL	Hydroxytriazolam	5.0 ng/mL

Analysis Summary and Reporting Limits:

Analyte	Rpt. Limit	Analyte	Rpt. Limit
Lorazepam	5.0 ng/mL	Oxazepam	20 ng/mL
Midazolam	5.0 ng/mL	Temazepam	20 ng/mL
Nordiazepam	20 ng/mL	Triazolam	2.0 ng/mL

Test 50016B - Opiates - Free (Unconjugated) Confirmation, Blood - Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
6-Monoacetylmorphine - Free	1.0 ng/mL	Hydromorphone - Free	1.0 ng/mL
Codeine - Free	5.0 ng/mL	Morphine - Free	5.0 ng/mL
Dihydrocodeine / Hydrocodol - Free	5.0 ng/mL	Oxycodone - Free	5.0 ng/mL
Hydrocodone - Free	5.0 ng/mL	Oxymorphone - Free	1.0 ng/mL

Test 52144B - Gabapentin Confirmation, Blood - Blood

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

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

Test 52198B - Cannabinoids Confirmation, Blood - 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	1.0 ng/mL	Delta-9 THC	0.50 ng/mL
Delta-9 Carboxy THC	5.0 ng/mL		

Test 52250B - Alcohols and Acetone Confirmation, Blood - 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 52486B - Fentanyl and 4-ANPP Confirmation, Blood - Blood

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

Analyte	Rpt. Limit	Analyte	Rpt. Limit
4-ANPP	0.20 ng/mL	Fentanyl	0.20 ng/mL
Acetyl Fentanyl	0.20 ng/mL	Norfentanyl	0.40 ng/mL

Test 8052B - Postmortem, Expanded, Blood (Forensic) - 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 Summary and Reporting Limits:

-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.