Welcome!

Supreme Court of Ohio
Specialized Dockets Conference

October 23-24, 2017
Drug Testing: Do you know enough to be dangerous?

Presented by
William L. Parker
President & CEO
American Court & Drug Testing Services

AmericanCourtServices.com
Prescription Drug Abuse (Opiates) in United States

- United States has 4.6% of Total World Population!
- United States Consumes 80% of World Supply of Opiates and Opioids!
- United States Consumes 99% of World Supply of Hydrocodone!
Heroin: Return with a Vengeance

- In 2002: 404,000 Heroin users 12 years and older
- In 2012: 669,000 Heroin users 12 years and older
- 65% increase from 2002 to 2012
- 18-25 year olds account for most of new users
Opiates: The Epidemic

- OPIATES & OPIOIDS

What is the difference between an Opiate and an Opioid?
Opiates: The Epidemic

OPIATES & OPIOIDS

What is the difference between an Opiate and an Opioid? **Opiates** are drugs derived from opium.

Generally, "**opioids**" refers to synthetic **opiates** (drugs created to emulate opium).

Today, the term **Opioid** is often used for the entire family of **opiates** including natural, synthetic and semi-synthetic substances.
Opiates: The Epidemic

- OPIATES
  Name the only naturally occurring Opiates.

  It matters when looking at drug tests results!
Opiates: The Epidemic

OPIATES

Name the only naturally occurring Opiates.

The only TWO naturally occurring Opiates are:

Morphine
Codeine
The “god of Dreams”

Morphine

Greek god Morpheus, the “god of dreams.”

Commercialized in 1827 by Merck

“Gold standard opiate”
Can I just get a Good Night’s Sleep?

The Ultimate “good night’s sleep” was first marketed by the German pharmaceutical company, Merrick.
Opiates: The Epidemic

- OPIOIDS

  How many **Opioids** can you name?

  (Remember! An Opioid is a synthetic or semi-synthetic Opiate.)

  This matters, too, when looking at drug tests results!
Opiates: The Epidemic

Synthetic or semi-synthetic Opioids include:

- Heroin
- Hydrocodone, Hydromorphone
- Oxycodone, Oxymorphone
- Buprenorphine
- Meperidine
- Tramadol
- Methadone
- **Fentanyl - The new “Deadly”**
80% of heroin users inject with a friend. Which is weird, because 80% of overdose victims found by paramedics are all alone.
Opiates: The Epidemic

- Deaths in Central Ohio attributed to Opiate overdoses are up by almost 90 percent compared to the same period last year.

- 2016 Franklin County Deaths: 143
- 2017 Franklin County Deaths: 268
- 56 percent of the 2017 deaths were Fentanyl related.
- 76 percent of the deaths were white (mostly males)
- 23 percent of the deaths were African American (5% increase from 2016)
Opiates: The Epidemic

➢ Ohio led the nation with “Investigative Fentanyl Samples” (2015)
  -- National Forensic Laboratory Information System

➢ ARE YOU ADEQUATELY TESTING FOR FENTANYL?

➢ In 2016 4,149 fatal overdoses
  -- a 36% increase from 2015 (Led the nation)

➢ 70 percent of children in Ohio’s foster care system are children of parents addicted to opiates.
Percent of Overdose Deaths with Fentanyl Mentions
Ohio - 2016

Source: Ohio Department of Health, Bureau of Vital Statistics, Ohio Death Certificate File. These data were provided by the Ohio Department of Health. The Department specifically disclaims responsibility for any analyses, interpretations or conclusions.

Map prepared by Ohio HIDTA
Sources of Morphine

Morphine is produced from the Poppy Plant.

When interpreting a drug test result that is positive for Morphine, what are the possible sources of the Morphine?
Morphine

Sources of Morphine

- Codeine  (Yes?)  (No?)
- Morphine (Yes?)  (No?)
- Hydromorphone (Yes?)  (No?)
- Heroin    (Yes?)  (No?)
- Poppy Seeds (Yes?)  (No?)
  Less than 2,000 ng/mL
Heroin

- Synthesized in 1874 by the new German Company Bayer & Company.

- Marketed as more potent, but less addictive than morphine.
OPIATES: WHAT ARE THEY USING?

A number of different drugs fall under the Opiate drug class. Confirmed laboratory results will provide metabolite information that can help identify exactly what your client is using.

HEROIN USE
MAY BE POSITIVE FOR:
- 6-MONOACETYL-MORPHINE (6-MAM)
- MORPHINE ONLY
- MORPHINE AND MORPHINE
- 6-MONOACETYL-MORPHINE, MORPHINE AND CODEINE

CODEINE USE
MAY BE POSITIVE FOR:
- CODEINE ONLY
- CODEINE AND MORPHINE
- MORPHINE ONLY
- CODEINE AND HYDROCODONE (ONLY IF CODEINE LEVELS ARE VERY HIGH)

MORPHINE USE
MAY BE POSITIVE FOR:
- MORPHINE
- MORPHINE AND HYDROMORPHONE (ONLY IF MORPHINE LEVELS ARE VERY HIGH)

HYDROCODONE USE
MAY BE POSITIVE FOR:
- HYDROCODONE
- HYDROCODONE AND HYDROMORPHONE
- HYDROMORPHONE

OXYPHEDRINE USE
MAY BE POSITIVE FOR:
- OXYPHEDRINE
- OXYPHEDRINE AND OXYMORPHONE
- OXYMORPHONE
- OXYPHEDRINE AND HYDROMORPHONE (ONLY IF OXYPHEDRINE LEVELS ARE VERY HIGH)

BREAK IT DOWN

Opiates typically metabolize within a 72-hour period. Over this time period, different metabolites can be identified in urine depending on how quickly each substance is metabolized as well as the time the sample is collected.

HOW TO DETECT HEROIN USE

- Heroin is converted into 6-Monoacetylmorphine (6-MAM) within a matter of minutes from use. It is extremely rare to ever see “Heroin” on a drug screen result.
- 6-MAM is typically detectable in a specimen within 6 to 10 hours from using heroin. If 6-MAM is detected, it is definitely from heroin use.
- The absence of 6-MAM does not mean that heroin was not used — a positive result for Morphine, Codeine, a combination of the two or presence of all three could also be indicative of heroin use.
How Opiates Metabolize

CASE STUDY #1

<table>
<thead>
<tr>
<th>Substance</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine</td>
<td>2,321 ng/mL</td>
</tr>
<tr>
<td>Morphine</td>
<td>17,439 ng/mL</td>
</tr>
<tr>
<td>6-Acetylmorphine</td>
<td>749 ng/mL</td>
</tr>
<tr>
<td>Creatinine</td>
<td>179.4 mg/dL</td>
</tr>
</tbody>
</table>

Diagnosis?
How Opiates Metabolize

CASE STUDY #1

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<td>Creatinine</td>
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</tr>
</tbody>
</table>

Diagnosis: **Heroin Use**
How Opiates Metabolize

CASE STUDY #2

<table>
<thead>
<tr>
<th>Substance</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine</td>
<td>24,231 ng/mL</td>
</tr>
<tr>
<td>Morphine</td>
<td>4,866 ng/mL</td>
</tr>
<tr>
<td>Creatinine</td>
<td>124.8 mg/dL</td>
</tr>
</tbody>
</table>

Rx: Tylenol 3

Consistent or Not Consistent?
How Opiates Metabolize

CASE STUDY #2

Codeine 24,231 ng/mL
Morphine 4,866 ng/mL
Creatinine 124.8 mg/dL

Rx: Tylenol 3

Consistent or Not Consistent? Consistent
CASE STUDY #3

- Codeine: 1,175 ng/mL
- Morphine: 7,789 ng/mL
- Hydromorphone: 311 ng/mL
- Creatinine: 92.7 mg/dL

Diagnosis?
How Opiates Metabolize

CASE STUDY #3

- Codeine: 1,175 ng/mL
- Morphine: 7,789 ng/mL
- Hydromorphone: 311 ng/mL
- Creatinine: 92.7 mg/dL

Diagnosis: Heroin Use
How Opiates Metabolize

CASE STUDY # 4

Oxycodone 1,352 ng/mL
Oxymorphine 978 ng/mL
Creatinine 152.7 mg/dL

Rx: Percocet

Consistent or Not Consistent?
How Opiates Metabolize

CASE STUDY # 4

Oxycodone 1,352 ng/mL
Oxymorphone 978 ng/mL
Creatinine 152.7 mg/dL

Rx: Percocet

Consistent or Not Consistent? **Consistent**
How Opiates Metabolize

CASE STUDY # 5

Codeine 42,700 ng/mL
Morphine 3,868 ng/mL
Hydrocodone 476 ng/mL
Creatinine 137.3 mg/dL

Diagnosis?
How Opiates Metabolize

CASE STUDY # 5

Codeine          42,700 ng/mL
Morphine         3,868 ng/mL
Hydrocodone      476 ng/mL
Creatinine       137.3 mg/dL

Diagnosis? Codeine use
MY HEAD HURTS
Directly Observed Specimen Collections
Directly Observed Specimen Collections

Why Every Specimen Collected should be Directly observed

INTEGRITY
COMPETENCY
UNIFORMITY
PROFICIENCY

I. C. U. P
The ACS Hall of Shame
The ACS Hall of Shame
Drug Testing: EtG

➢ Testing for Alcohol: Breath Vs. Urine

➢ ETG (Ethyl Glucuronide) Testing:
  ➢ Windows of Detection
  ➢ Biomarkers:
    Ethyl Glucuronide
    Ethyl Sulfate
  ➢ Incidental Exposure limited by cutoff
    EtG: 500 ng/mL
    EtS: 100 ng/mL
Drug Testing: EtG

Testing for Alcohol:

**Breath** Vs. Urine

- **Breath Tests:** “point-in-time.”

- **Breath Tests:** equates approximate blood alcohol content from the deep-lung air absorbed by **Alveoli**.

- **Breath Tests:** Correlates BAC with “level of effect.” (How Intoxicated)
Drug Testing: EtG

Testing for Alcohol: Breath Vs. Urine

- **Urine Tests**: *NOT* a “point-in-time” test, but an expanded window of detection.
- **Urine Tests**: Determines the volume of EtG & EtS in ng/mL of urine.
- **Urine Tests**: *Cannot* correlate level of EtG / EtS with “level of effect” or volume of alcohol.
Drug Testing: EtG

ETG (Ethyl Glucuronide) Testing:

Windows of Detection

- **Urine**: EtG & EtS are detectable in urine for 48 to 72 – 80 hours.

- Window of Detection determined by the volume of alcohol consumed, the donor’s rate of metabolism and the hydration of the donor’s bladder.
Drug Testing: EtG

**ETG (Ethyl Glucuronide) Testing:**

**Biomarkers**
- Ethyl Glucuronide
- Ethyl Sulfate

- Ethyl Glucuronide and Ethyl Sulfate are the two specific biomarkers that are produced in the liver as the body is metabolizing alcoholic beverage manufactured for consumption.

- These biomarkers are not detected at levels below the EtG / EtS cutoff levels of 500 and 100 ng/mL respectively.
Drug Testing: EtG

ETG (Ethyl Glucuronide) Testing:

Cutoff Levels

- Incidental Exposure limited by cutoff
  - EtG: 500 ng/mL
  - EtS: 100 ng/mL

- Cutoff levels are designed to exclude alcohol found in many over-the-counter cold remedies, medications and food products WHEN TAKEN AS DIRECTED.
Drug Testing 101

➢ ETG (Ethyl Glucuronide) Testing:
  - Incidental Exposure limited by cutoff
    - EtG: 500 ng/mL
    - EtS: 100 ng/mL

10%  26.9%  62%  35%
0.2 - 0.8%  14%  0.5%  3 - 6%
Drug Testing: EtG Alcohol by Products

![Effect of Purell on EtG](image)

Subject

<table>
<thead>
<tr>
<th>Subject</th>
<th>EtG ng/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>50</td>
</tr>
<tr>
<td>C</td>
<td>50</td>
</tr>
<tr>
<td>D</td>
<td>55</td>
</tr>
<tr>
<td>E</td>
<td>70</td>
</tr>
<tr>
<td>F</td>
<td>153</td>
</tr>
<tr>
<td>G</td>
<td>176</td>
</tr>
<tr>
<td>H</td>
<td>183</td>
</tr>
<tr>
<td>I</td>
<td>513</td>
</tr>
</tbody>
</table>
Drug Testing: EtG
Alcohol by Products
Drug Testing: EtG

- **ETG (Ethyl Glucuronide) Testing:**
  - Incidental Exposure limited by cutoff
    - EtG: 500 ng/mL
    - EtS: 100 ng/mL
Drug Testing: EtG
Drug Testing: Diluted Specimens

Dilution is the most common method used to avert / mask drug tests.

- Specimens become diluted when the donor consumes excessive amounts of fluids in a short period of time prior to collection.
- Specimens may be diluted by adding fluids “post collection.”
- Average Creatinine levels are 145 – 150 mg/dL
- Creatinine gives urine color and odor.
- Human kidneys cannot produce urine with creatinine less than 5 mg/dL.
# Drug Testing: Diluted Specimens

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Price</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Pure Magnum Force</td>
<td>Designed to remove all toxins. Effective for up to 5-hours for larger persons or persons with high toxin levels. Three flavors: Cherry, Orange, and Tropical fruit. <a href="#">Ingredients</a></td>
<td>39.95</td>
<td><a href="#">Add to cart</a></td>
</tr>
<tr>
<td>Duz’z It</td>
<td>Our Duz’z It one hour carbo drink is the largest on the market today. One full liter designed for heavy toxins. Comes in two flavors, Orange and Tropical Fruit Punch. Effective for up to 6 hours. Taste great! <a href="#">Ingredients</a></td>
<td>49.95</td>
<td><a href="#">Add to cart</a></td>
</tr>
<tr>
<td>Never Fail</td>
<td>We combined two of our best 1 hour products to give you the confidence you need. This is the strongest one hour solution offered today. Effective for up to 6 hours. Designed for all toxins. <a href="#">Ingredients</a></td>
<td>89.95</td>
<td><a href="#">Add to cart</a></td>
</tr>
<tr>
<td>Emergency Capsules</td>
<td>Designed for to remove all toxins in 1 hour with a 99.95% success rate. Effective for up to 6 hours. Completely undetectable. <a href="#">Ingredients</a></td>
<td>39.95</td>
<td><a href="#">Add to cart</a></td>
</tr>
</tbody>
</table>
Drug Testing: Diluted Specimens

<table>
<thead>
<tr>
<th>Vitamin/Bottle</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B1 (Thiamine HCL)</td>
<td>4.40mg</td>
</tr>
<tr>
<td>Vitamin B2 (Riboflavin)</td>
<td>4.40mg</td>
</tr>
<tr>
<td>Vitamin B6 (Pridoxine HCL)</td>
<td>4.40mg</td>
</tr>
<tr>
<td>Vitamin B12 (Cyanocobalamin)</td>
<td>12mg</td>
</tr>
<tr>
<td>Proprietary Blend</td>
<td>1290mg</td>
</tr>
</tbody>
</table>

Uva Ursi Leaf Extract, Cinnamon Bark, Dandelion Root Extract, Gentian Root Extract, Milk Thistle Seed Extract, Barbarry Root Extract, Turmeric Root Extract, Panax Ginseng Extract, Creatine Monohydrate, Grape Skin. Other Ingredients: Magnesium Stearate, Gelatin (capsule)
Drug Testing: Quantitative Levels

- **Quantitative Results:** What do the numbers mean?

  **Prescription Drugs:**
  Is my client over-medicating?

  Quantitative levels in urine may **NOT** be used as therapeutic levels to determine adherence with prescriptions dosages. Quantitative levels mean only that the lab detected a measurable amount of a drug in the urine specimen.
Drug Testing: Quantitative Levels

- **Quantitative Results:** What do the numbers mean?
Drug Testing: THC

Can Creatinine levels be used for more than determining if a specimen is diluted or substituted?

I’m glad you asked that question!  YES!!!!
Drug Testing: THC

- My client smokes Marijuana. Several recent tests have been positive for THC.

- HOW DO I KNOW IF A POSTIVE RESULT IS FROM NEW OR PREVIOUS USE?
Let’s compare two positive THC results.

SPECIMEN 1:
THC level = 698 ng/mL

SPECIMEN 2:
THC level = 535 ng/mL

DOES SPECIMEN 2 REFLECT NEW OR PREVIOUS USE?
Drug Testing: THC

- Determination of New or Previous Use is based upon the “Normalized” level of THC.

- THC is “Normalized” by dividing the “raw” THC level by the Creatinine level and multiplying the result by 100.

- RESULTS MUST BE “CONFIRMED.”

- EXAMPLE: (Specimen # 1)
  
  Raw THC level = 698 ng/mL
  Creatinine level = 114.8 mg/dL
  Normalized THC = 698/114.8 X 100 = 608.01
Drug Testing: THC

Let’s compare two positive THC results.

**SPECIMEN 1:**
- Raw THC level = 698 ng/mL
- Creatinine level = 114.8 mg/dL
- Normalized THC = $\frac{698}{114.8} \times 100 = 608.01$ ng/mL

**SPECIMEN 2:**
- Raw THC level = 535 ng/mL
- Creatinine level = 48.6 mg/dL
- Normalized THC = $\frac{535}{48.6} \times 100 = 1,100.82$ ng/mL
NOW, what do we do?

Divide the later Normalized THC level by the former Normalized THC level

EXAMPLE 1:

Normalized THC level = 608.01 ng/mL
Normalized THC level = 1,100.82 ng/mL

$1,100.82 / 608.01 = 1.81$

IS THIS NEW OR PREVIOUS USE OF THC?
Drug Testing: THC

- New or Previous Use of THC is based upon the “New Use Ratio” established by labs and accepted by NADCP.

- **NEW USE RATIOS:**
  
  Ratio of 0.01 – 0.49 = Previous Use
  
  Ratio of 0.50 – 0.99 = Questionable
  
  Ratio of 1.00 – 1.49 = Indicative of New Use
  
  Ratio of 1.50 and above = Definitively New Use & Legally Defensible with Reasonable & Scientific Certainty.
Drug Testing: THC

WAS THIS NEW OR PREVIOUS USE OF THC?

EXAMPLE:

Normalized THC level = 608.01 ng/mL
Normalized THC level = 1,100.82 ng/mL

1,100.82/608.01 = THC to Creatinine Ratio 1.81

NEW USE
Let’s compare two other positive THC results.

**SPECIMEN 1:**
- Raw THC level = 956 ng/mL
- Creatinine level = 98.4 mg/dL
- Normalized THC =

**SPECIMEN 2:**
- Raw THC level = 1194 ng/mL
- Creatinine level = 256.4 mg/dL
- Normalized THC =
Drug Testing: THC

Let's compare two positive THC results.

**SPECIMEN 1:**
- Raw THC level = 956 ng/mL
- Creatinine level = 98.4 mg/dL
- Normalized THC = **971.54**

**SPECIMEN 2:**
- Raw THC level = 1194 ng/mL
- Creatinine level = 256.4 mg/dL
- Normalized THC = **465.68**

**NEW OR PREVIOUS USE?**
Drug Testing: BZO

Legal benzodiazepines in the United States

- Diazepam (Valium)
  - Nordiazepam *
  - Oxazepam *
  - Temazepam *

- Oxazepam (Serax)
  - Oxazepam *

- Temazepam (Restoril)
  - Temazepam *
  - Oxazepam *
Drug Testing: BZO

- Chlordiazepoxide (Librium)
  - Nordiazepam *
  - Oxazepam *

- Clorazepate (Tranzene)
  - Nordiazepam *
  - Oxazepam *

- Alprazolam (Xanax)
  - Alpha OH Alprazolam *

- Lorazepam (Ativan)
  - Lorazepam *
Drug Testing: “False” Positives

“False” Positives Vs. Cross Reactivity (“Look-a-Likes”)

➢ “False” Positives occur when an “instant” device malfunctions or during a lab-based immunoassay screen when the molecular “footprint” of elements or compounds “look like” known drugs of abuse.

➢ “Cross Reactive” positives may result from prescription-based or over-the-counter medications.

➢ Cross Reactivity with food groups or other substances.

➢ GC/MS or LC/MS/MS will eliminate any question
Drug Testing: Windows of Detection

Opiates

Typically two to four days.
Drug Testing: Windows of Detection

Cocaine

Typically two to four days.
Drug Testing: Windows of Detection

Amphetamines

Benzodiazepines

Typically two to four days.
Drug Testing: Windows of Detection

Medication Assisted Treatment Drugs:

- Methadone
- Buprenorphine

Typically two to four days.
Thank you for your time and attention today!