Drugs of Abuse Detection: Parents, Children, and Home

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Objectives of Presentation

- Identify matrices for testing in children
  - Meconium, blood, hair, oral fluid, skin swipes, urine
- Interpretation of test results
- Mechanism involved in collection
- Laboratory processes in testing
Basics in Forensic Drug Testing

• Standard Operating Procedures
  – collection
  – chain of custody
  – transfer to and receipt by lab
  – screening for drugs
  – confirmation for drugs

• Quality Control
Drug and Integrity Tests in Urine

- **Drugs**
  - Amphetamines
  - Cocaine
  - Opiates
  - Marijuana
  - PCP
  - Numerous others depending on the situation

- **Integrity Tests**
  - Creatinine
  - pH (acidity)
  - Oxidants
  - Specific Gravity

- **Follow-up/suspicion tests**
  - Chromium
  - Soap, Bleach
  - Nitrites
  - Glutaraldehyde
  - Iodine, fluoride & others
Initial Screening

- Often called the initial or immunoassay test
- All specimens are subjected to this test. It provides a rapid cost effective system to identify “presumptive positive” specimens
- This process requires 1 mL of urine to complete and will provide results for up to ten tests within 30 seconds
- Adulterants often target this process to change a positive screen to a negative test
Confirmation Testing

- The first step is to separate the drug from other components of the urine (2-4 hours)
- Completed by a technique known as gas chromatography/mass spectrometry (GC/MS)
- The GC further separates the remaining urine components
- The MS identifies each drug through a chemical fingerprint which is unique - the identification is conclusive
Hair Testing

- Drugs are primarily incorporated through the blood supply at the root end and are deposited during the hair shaft growth. Other drug incorporation mechanisms are sweat and scalp oils which soak into the hair shaft.
- Shampooing of the hair removes drug residue from the environment on a daily basis.
- Environmental contamination is also removed at the lab prior to testing for screening and confirmation with a methanol wash.
Drug Tests Available in Hair

- **Amphetamines**
  - Amphetamine & Methamphetamine
  - MDMA, MDA, MDEA
- **Cocaine**
  - Benzoylecgonine
  - Cocaine, Norcocaine, Cocaethylene
- **Opiates**
  - Codeine, Morphine, Heroin, 6-Acetylmorphine
  - Oxycodone, Oxymorphone, Hydrocodone, Hydromorphone
- **Marijuana**
  - 9-Carboxy THC, THC Parent
- **PCP**
Hair Collection Facts

- Workplace testing only involves the first 1.5 inches from the scalp and represents 90 days of exposure.
- Normally takes 7-10 days for incorporated drugs to grow above the scalp.
- Segmental analysis can provide time frames of drug use.
- A full sample requires up to 200 strands of 1.5 inch long hair - shorter hair requires more strands.
Hair Adulteration

- Although the drugs are incorporated into the hair shaft, drugs can be removed through rigorous “cleaning” of the hair with vinegar, bleaching, coloring, chlorine from swimming, or even damaged from excessive sun damage.
- Cannot remove it all and can still be detected. Infrequent use of drugs could be diminished to avoid reporting.
## Hair Cutoffs (pg/mg)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Screen</th>
<th>Confirmation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabinoids</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Opiates</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>6-AM</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Amphetamines*</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>MDA/MDMA</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>*Amphetamine must be $\geq 50$ pg/mg to report methamphetamine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCP</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Cocaine**</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Benzoylcegonine</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Cocaethylene</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Norcocaine</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>**Metabolite must be $\geq 50$ pg/mg present to report cocaine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hair Collection Problems

- Not enough hair to collect!
- Not enough hair cut
- Religious reasons
- Shaving head before test
- Hair is suddenly bleached
- Lice
Scared what your hair might say about you?

NEW Introducing ROOT CLEAN™ - the premier Hair Cleansing System™ from Detoxify. It is the newest addition to the industry's best-selling cleansing brand. Through its two-part process, ROOT CLEAN penetrates the hair shaft, removing all unwanted impurities and toxins. It works immediately and lasts up to 8 hours.

Trust Detoxify® to get you clean all over.

Other Detoxify® products work internally. They clean your system in one hour and keep it clean for up to five hours. So no matter what type of clean you are looking for, Detoxify can get you there.

AQUA CLEAN™
Effervescent Cleansing System™
The first water-soluble, effervescent cleansing tablets in the industry.

FAST FLUSH CAPS®
A revolutionary formula with only 10 capsules and less water to drink.

READY CLEAN™
The #1 Seller. Because it Works.™
The one hour liquid cleansing formula with over one million satisfied customers.

XXTRA CLEAN®
The Ultimate Cleansing Combination™
An exclusive liquid formula for people with higher toxin levels or larger body mass.

Research you can count on. Products you can trust.
PROBLEM:

BOB M. Customer Service

Bob is a customer service representative for a major U.S. company. He has been offered a promotion based on his outstanding productivity. If he passes a drug test, he will receive a generous pay increase & more benefits.

SOLUTION:

Clear Choice

Hair Follicle Shampoo™
One Application for Short Hair

$35

GUARANTEED 200% - DOUBLE YOUR MONEY BACK!

QUESTIONS & ORDERS
TOLL-FREE 24 HOURS A DAY
1-888-TECH 420
www.magicvan.com

Trusted by Thousands Since 1993
SPECIMEN IDENTIFICATION NUMBER

DONOR SSN OR EMPLOYEE ID NO.: 745150

COLLECTION SITE: Jobcare/Selma

INITIALS OF DONOR: XL

By these initials, I certify that I consented to the collection of a hair sample from my body by the collector and that the hair sample was placed in the transfer envelope and sealed in my presence.

HAIR SAMPLE COLLECTOR: 

DATE AND TIME: 7/24/02 3:45 pm

I certify that I collected the hair sample enclosed in this envelope, that it is from the body of the above donor, and that it was collected with the donor’s knowledge and consent. I further certify that the information on this envelope is true and correct.

SOURCE OF SAMPLE: [X] Head [ ] Underarm [ ] Chest [ ] Other

INTEGRITY SEAL
- Cut a minimum of 1cm of sample as close to the scalp as possible
- Align root ends and place in slanted end of foil
- Fold foil tightly around hair
- Wrap any remaining length around outside of foil
- Fold foil in half, lengthwise
- Place foil in envelope, root end to the left
- Seal the envelope with tamper proof seal
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Hair Screening & Oral Fluid Screening

- ELISA screening technology is used for hair testing using 96 well technology
- Concentration is correlated to the color intensity in the well and is compared to calibrators
- All processes are computer controlled robotics - but is much slower and more expensive than urine screening - but multiple times more sensitive than urine methods
Hair & Oral Fluid Confirmation Techniques

• Confirmations for all drugs except marijuana can be completed on standard GC/MS’s
• Marijuana must be confirmed by GC/MS/MS due to the low levels in the hair
• Extractions and confirmatory techniques are highly sophisticated to achieve the sensitivity and selectivity required for successful analysis
Oral Fluid Testing

• No special collection facilities or fees
• Collection can occur anywhere
• Collection device requires only two minutes in the mouth and is witnessed by the collector
• Possibility of adulteration is drastically reduced
• Indicates recent drug usage and correlates with impairment of the donor by looking at parent drug rather than metabolites
• Screening and confirmation processes are similar to hair
Forehead Swipe Collections

- A moistened gauze swab across the forehead can collect amphetamines, cocaine, and other drugs that are sweated through the skin or included in skin oils.
- Drugs can be detected within a few hours up to several days.
- Swab can be placed into a zip-lock bag and sent to the laboratory.
- Patches are available for up to 7-day monitoring.
Meconium and Blood

- Meconium provides for a long term exposure of drugs during the pregnancy and would be the primary sample for the detection of drugs.
- Would not be the specimen of choice once the infant has been released. Urine or oral fluids would provide results of recent events.
- Blood is typically not a specimen of choice since the Lab needs too much blood for testing for drugs of abuse. Require 1-2 mL to provide minimal testing.