Drug Testing: How to Evaluate Results

Prepared for you by the
West Virginia Drug Testing Laboratory

Drug testing, whether for an individual or a large corporation, consists of two necessary steps - **specimen collection and laboratory analysis**. It is important to understand the breadth of each process in order to best utilize test results.

Also important to note, is the reality that the individuals you are testing will most likely know more about drug testing than you do. Whether their knowledge comes through internet sources, print magazines within the drug community or other individuals that have experienced drug screenings, the tested individuals will often be armed with a plethora of information and tampering tactics.

Therefore, the importance of understanding your topic and drug screening method thoroughly cannot be ignored.

While there are a number of specimen testing options available, this document will educate on the collection and analysis of **urine specimens**.

Common Drug Testing Specimen Options:

- Breath
- Hair Follicle
- Sweat - patch test
- Saliva - oral fluids
- Eye Scanning Devices
- Urine - current specimen of choice

Why do we choose urine collection as our primary specimen of choice?

- Generally readily available - large quantities
- Contains high concentrations of drugs
- Good analytical specimen
- Provides both recent and past usage

Develop A Plan

Imperative to the success of your drug testing method is the presence of a well developed plan.

The following two considerations should be developed within your drug testing plan: *When to test and What to test for*

When To Test

- Effective drug testing ***must be random*** - keep your employees guessing
    - Your drug testing should be unexpected, unannounced and unanticipated
    - Limit the time between notification and actual testing
- Test as often as possible - twice weekly is ideal
- Consider use of multiple specimens (hair, saliva, sweat)
- Design drug-specific testing regimes (i.e. cocaine should be tested more frequently)
- Use progressive testing strategies

What To Test For

- Which Drugs of Abuse Should be Tested? (limited universe testing)
- Amphetamines (speed)
- Barbiturates, benzodiazepines
- Cannabinoids (THC, marijuana)
- Cocaine (crack)
- Opiates (heroin)
- Phencyclidine (PCP)
- Alcohol

Continue to modify this drug list as necessary to reflect changing drug use patterns.

Specimen Collection

As stated earlier, familiarize yourself with your specimen collection of choice in order to know the proper collection practices as well as arm against common tampering practices.

For urine collection, the single most important aspect of an effective drug testing program is the witnessed (monitored) collection practice.

Witnessed collections for Urine Specimens:

- Urine collections not witnessed are of little or no assessment value
- Denial component of substance abuse requires "direct observation" collections of participants

The following practical steps will allow you to develop a cautious and effective collection method:

- Consider your site selection - make sure it is appropriate for monitored collections
- Require hand washing prior to donation
- Inspect sample and look for the following:
    - Temperature (90°-100° F)
    - Color (no color = possible tampering)
    - Odor (bleach, sour apples, aromatics, vinegar, etc.)
    - Solids or other unusual particulates

Two-Step Testing Approach

Laboratories employ two types of tests for detecting substances in urine - **screening tests and confirmatory tests.**

- **Screening tests** - designed to separate negative samples from samples that are presumptively positive
- **Confirmation tests** - follow-up procedure designed to validate positive test results
- Distinctly different analytical technique
- More specific and more sensitive

Step One - Screening

Drug Screenings - Immunoassay Technology

- Screening methods are often based on immunoassay technology.
- Most "on-site" devices (POCT) use immunoassay techniques.
- This method is offered through numerous commercial manufacturers.
- The more drug present, the more binding, or "color" is produced on the instrument detector response.

Drug Screenings - Qualitative not Quantitative

A very important and often overlooked fact about drug screening tests is the inherent inability to determine the actual concentration levels of drugs within the individual. Drug screenings are not designed to provide a comprehensive analysis of the individual's substance abuse amounts and trends.

Drug tests are qualitative, not quantitative. They are designed to determine the presence or absence of drugs, not their concentration levels.

Urine drug concentrations are of little or no interpretative value. The utilization of urine drug test levels by programs in an effort to characterize client's drug use behavior generally produces interpretations that are inappropriate, factually unsupportable and without a scientific foundation. Worst of all, these urine drug level interpretations have no forensic merit.

Therefore, because drug concentrations associated with urine testing are, for the most part, useless, it is recommended that urine drug levels be eliminated from your screening process.

- Purpose of your screening is to determine the presence or absence of drugs - not to measure the quantity of drugs
- Eliminating levels does not make results less useful
- Continuing the use of levels will result in inappropriate consequences for the donor
- Federal drug testing programs prohibit the release of initial screening results

Step Two - Confirmation

Confirmation tests become useful after the initial screening test has indicated positive levels of drugs within the system. These tests are used as a "confirmation" that the individual has indeed been using a foreign substance, and they are able to determine what substance it is.

- Gas chromatography - mass spectrometry (GC/MS)
    - Drug molecules separated by physical characteristics
    - Identified based on chemical "finger-print"
    - Considered the "gold standard" for drug confirmation

There are other chromatographic techniques, however, the GC/MS is the most commonly used method within the drug confirmation process.

Evaluating Results: Negative & Positive

Negative (None Detected) Results Interpretation

If the results of the screening test come back negative, this indicates that no drugs or breakdown products (metabolites) tested for were detected in the urine sample. However, this does not mean that no drugs were present.

There could be a variety of scenarios surrounding this outcome:

- Donor is not using a drug that can be detected by the test
- Donor is not using enough of the drug
- Donor's drug use is too infrequent
- Collection was too long after drug use
- Urine has been tampered
- Test being used is not sensitive enough

When interpreting negative drug test results, assess them in the overall context of your client's program compliance (or non-compliance) as well as their life skills success (or lack thereof).

Positive Results Interpretation

A positive result on a drug screening test indicates that drug(s) or breakdown products (metabolites) tested for were detected in the urine sample. This offers clear indication that the drug presence in the tested individual is above the "cutoff" level, and should then lead to further evaluation through a confirmation test.

Cannabinoids: Results Interpretation

- Drug specific assays
- Cutoff levels: 50 ng/mL
- Positive results indicate presence of cannabinoids - virtually no interferences
- Difficult to separate recent from non-recent use due to lipophilic properties
- Detection time: 49-70 days for heavy chronic use; 23-35 days for occasional use (2-4 times a week); 4-8 days for one time use. Occasionally some chronic users with high toleration may eliminate THC as fast as a one time user.
- No passive inhalation
- Marinol

A question often asked is, "How do programs discriminate between new drug exposure and continued elimination from previous (chronic) use?"

Amphetamines: Results interpretation

- Screening tests - drug class assays
- Interpret positive results with caution
- Some screening assays often have cross-reactivity with structurally similar compounds:
    - Phenylpropanolamine - PPA
    - Ephedrine
- Confirm results whenever possible
- Detection time: up to 4 days

Cocaine: Results Interpretation

- Drug specific assays
- Positive results indicate presence of cocaine metabolites Virtually no interferences
- Positive results almost always associated with illicit drug use Detection time: up to 3 days maximum
- Negative result may not be clear indication of non-use

Opiates: Results Interpretation

- Screening tests - drug class assays
- Positive results indicate presence of opiates
- Most assays not reactive toward synthetic narcotic analgesics; meperidine (Demerol), propoxyphene (Darvon), methadone, pentazocine (Talwin), fentanyl (Sublimaze)
- Poppy seed interference
- Difficult to separate legitimate use from abuse
- Detection time: up to 4 days following therapeutic use of codeine or morphine

Alcohol Testing Information

- Screening tests specific for ethanol, ethyl alcohol
- Urine, saliva, blood or breath
- Positive results indicate the presence alcohol
- Negative results don't necessarily document abstinence because,
- Alcohol is rapidly cleared from the body
- Detection time = hours
- Alternatives: Alcohol can be measured transdermally - SCRAM, WristAS

Dispelling Myths - Seek Accuracy

The landscape of drug and alcohol testing is constantly shifting, presenting a continual stream of difficulties and challenges that must be overcome. With those difficulties, also come many myths and faulty information. Here, we seek to dispel some of the most common myths associated with drug and alcohol testing.

Myth #1- *Passive inhalation of marijuana smoke can cause a "positive" drug test result*

- This is not true if standard cutoffs are used
- THC (cannabinoid) assay uses variable cutoffs (20, 50, 100 ng/mL)
- Passive inhalation research indicates less than 10ng/mL in volunteer urines
- No passive inhalation for "crack"

Myth #2- *Advil (ibuprofen) causes "false-positive" drug tests for marijuana*

- Again, a wrong conclusion based upon a faulty testing method of the past
- Problem with EMIT method corrected 15 years ago
- No medication - prescription/OTC causes "false-positive" drug tests for marijuana

Myth #3- *Consuming poppy seeds causes "false-positive" drug tests for heroin*

- Poppy seeds do not result in a "positive" result for heroin, however they can cause "positive" drug test results for "opiate" class
- Poppy seeds contain trace amounts of both codeine and morphine
- Seek confirmation test when positive opiates are detected

Myth #4- *Drinking vinegar or cranberry juice will produce a "negative" urine drug test.*

- The theory is to cause a "pH shift", making the urine sample acidic - altering the chemistry of immunoassay tests
- In reality - the body detoxifies the acid & dilutes to physiological pH

Myth #5- *Consuming vitamins purges marijuana from the system - quicker clean urine (i.e. niacin B3)*

- The theory is that vitamins increase metabolism, causing quicker elimination of the foreign substance
- In reality - there are no systemic changes in the body
- However, vitamins DO produce urine coloration. If this is the case, always check creatinine

Specimen Tampering

Now that you're aware of the proper collection methods and screening purposes, it's time to consider the different approaches to specimen tampering. This knowledge provides just as much merit for a successful drug screening program as does the actual collection and analysis process.

Basics of Specimen Tampering - The Three Approaches

1. **Dilution**: Adding liquid to the sample to achieve a drug concentration below the cutoff threshold, thus producing a negative result
2. **Adulteration**: Adding a chemical masking agent to the urine to inhibit the testing procedure, thus producing a negative result
3. **Substitution**: Replacing a legitimate urine sample with a "look-a-like" alternative, thus producing a negative result

Tampering Approach #1: Urine Specimen Dilution

Dilution is the most common form of tampering and is performed in one of two ways:

- Pre collection dilution (hydration, water loading, flushing) - consumption of large volumes of liquid before voiding
- Post collection dilution - adding drug-free liquid to the sample after voiding (should not happen for witnessed collections)

Importance of Creatinine Testing for Combating Specimen Dilution:

Creatinine can be measured to determine the strength or concentration of a urine sample. Urine with a creatinine of less than 20 mg/dL is considered "diluted" and may not reflect an accurate picture of recent drug use. Normal human creatinine levels will vary during the day based upon fluid intake; however, healthy individuals will rarely produce urine samples with a creatinine of less than 20 mg/dL.

Rapid (60-90 minutes) ingestion of 2-4 quarts of fluid routinely produces low creatinine levels & negative urine drug tests within one hour.

Tampering Approach #2: Urine Specimen Adulteration

Addition of chemical substances designed to "mask" drug presence or disrupt the testing chemistry is also commonly used for drug test tampering.

This is done as a post-collection tampering:

- "Low-tech" adulterants - common household products (bleach, soap, etc.)
- "High-tech" adulterants - commercially available products designed specifically to interfere with the testing
- Urine Luck ™ - Common Specimen Adulterant
    - Pyridinium chlorochromate - dichromate - hydrochloric acid - hydrofluoric acid - iodine
    - Compromises the confirmation (GC/MS) carboxy - THC and opiates
    - Can also affect screening tests
    - Oxidizes drugs and standards
    - Can be identified by laboratories employing specimen validity tests (SVT's)
    - Effects can not be reversed

Tampering Approach #3: Urine Specimen Substitution

This approach involves the attempt to replace the donor urine sample with another drug-free urine specimen.

- Biological substitution - someone else's "clean" urine
- Non-biological substitution - replacing urine with urine "look-a-like" sample (diet Mountain Dew, water with food coloring)
- Non-biologicals can be detected with creatinine testing

Controlling Specimen Tampering

The best *defense* against specimen tampering exists in a well developed *offense.* The following principles will ensure an effective and efficient drug screening procedure:

- Develop a challenging collection strategy - Make the testing unannounced and random
- Implement directly observed collections
- Inspect samples - train collection staff on proper inspection
- Keep abreast of tampering techniques
- Take temperature measurements (90°-100° F)
- Use specimen validity tests (SVTs) on suspect samples (available from laboratory or use SVT dipsticks with on-site devices)

In Conclusion

While a drug testing program is necessary for a productive and efficient workforce, all benefits can be quickly negated if recommended steps are not followed to properly plan, administer and evaluate tests.

Follow the steps below to achieve a successful drug screening program:

- Educate yourself about drug testing - understand its benefits and limitations
- Train front-line and supervisory staff
- Develop a "challenging" collection strategy - make sure it's random
- Institute appropriate safeguards in collection procedures to control tampering
- Select appropriate testing facility or on-site methods
- Choose the specimen right for your program
- Drug test often
- Confirm positive screening results whenever possible
- Keep abreast of tampering techniques
- Challenge your program with quality assurance
- Develop a relationship with drug testing experts - a testing laboratory or an on-site device vendor
- Understand that drug testing is only one part of the overall supervision process

As always, if you have further questions concerning your company's drug screening program, the West Virginia Drug Testing Laboratory is here to assist you. Please contact our experienced technicians for questions about the testing process, your test results or for more detailed information concerning confirmation testing.

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