

# TOXICOLOGY 101

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A QUICK REFERENCE GUIDE

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Affinity offers a range of urine, hair/nails and blood panels.

Chain of custody management and authentication through Specimen Validity Testing (SVT) is performed on all urine drug tests.

Split specimens are obtained on all collections and held at the lab if there is a positive or other irregularity

All positive tests are automatically confirmed.

Test results are available immediately as soon as posted by the laboratory. Both complete and incomplete results may be viewed.



# creatinine

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Creatinine normal: range is 20-300. Creatinine is rarely high but if so may indicate heavy workout without rehydrating. If consistently high (3 or more tests) may indicate substitution with synthetic urine or renal pathology.

Creatinine 17-19.9: may indicate over-hydration. See attached guidelines for avoiding a dilute urine specimen.

Creatinine 10-17: May indicate intentional overhydration. An MRO review and blood PEth and/or hair or nails test may be indicated.

Creatinine 5-9.9: Greater likelihood of intentional overhydration; MRO review definitely indicated in addition to blood PEth and/or hair or nail evaluation.

# Creatinine (con't)

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Creatinine 2-5.0: Very suspicious for substitution or adulteration. Observed specimen follow up, including PEth, is indicated.

Creatinine < 2.0: physiologically impossible to be human urine; essentially a positive screen.

# DILUTE

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When the creatinine is  $< 20$ , the lab automatically runs a specific gravity test as another measure of concentration.

Specific gravity  $> 1.003$  with creatinine  $< 20$  is reported as ABNORMAL.

Specific gravity between 1.001 and 1.003 with creatinine  $< 20$  is considered DILUTE.

Specific gravity  $< 1.001$  is physiologically not possible in humans.

Both abnormal and dilute tests are significant and further testing is indicated.

**NOTE:** An abnormal/dilute test that does not indicate the presence of a substance may not be a true negative because of the concentration.

# HAIR AND NAIL TESTING

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Accurate hair and nail testing requires chronicity of use and relatively high levels. Hair treatment such as dyeing and bleaching may invalidate a test as will acrylic nails and baked on gels.

A positive hair/nail test looks back on a 3-6 month window and is significant. **A negative hair/nail test is not significant and does NOT prove anything.** It does not disprove a positive urine drug screen.

Hair and nails are not effected by dilution.

# ALCOHOL TESTING

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Urine alcohol: The presence of alcohol (EtOH, ethanol) in urine is not a certain indicator that the donor has been drinking. Alcohol can be produced in the specimen cup as a result of fermentation and/or a urinary tract infection. It is necessary to test for the metabolites of alcohol, the presence of which is an indicator the donor has ingested alcohol.

These metabolites, ethyl **glucuronide (EtG)** and **ethyl sulfate (EtS)**, can be found in urine up to several days after drinking. The issue is somewhat confused by fact that alcohol is common in so many products such as hand sanitizers. The latest SAMSHA (Substance Abuse and Mental Health Administration) advisory says that a positive test value for EtG > 1000 is NOT LIKELY due to incidental exposure.

Blood Alcohol: Another metabolite of alcohol, **phosphatidylethanol (PEth)** can be found in the blood of a person who has ingested a minimum of 7 ounces of alcohol in a single sitting or over multiple times in 14 to 17 days prior to the blood draw. This test has a positive value of >20. It may take 7 to 10 days to receive test results.

Blood Alcohol (not the metabolites) will be positive for only 8 to 12 hours after significant ingestion of alcohol.

# AMPHETAMINES

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Amphetamine is a metabolite of methamphetamine, therefore positive amphetamine does NOT cause positive methamphetamine unless this was also ingested.

Positive amphetamine can result from 2 common ADD drugs – Adderall and Vyvanse. However, Ritalin, phentermine and Provigil must be specifically ordered to be detected.

Note: There is a non-mood altering legal type of methamphetamine found in some OTC products; usually nasal sprays. If there is a positive methamphetamine, the specimen can be rerun for isomeric differentiation.



# BARBITURATES

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Most barbiturates are excreted as the original drug.

There are 2 common barbiturates seen:

- Butalbital – seen in fiorinal/fiorecet migraine type medications
- Phenobarbital – used for seizures and in some older irritable bowel meds and some “GI cocktails” given in ERs and walk-in clinics.

# BENZODIAZEPINES

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Benzodiazepines break down into different substances:

- Xanax = alprazolam
- Klonopin = clonazepam
- Ativan = lorazepam

Most other benzos (valium, Librium, tranxene, dalmane, restoril, serax) go to nordiazepam and/or temazepam and/oxazepam.

Versed = midazolam. It has a very very short window of detection since it is so short acting. It can be found in urine and blood.

# OPIATES

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Natural opiates are morphine, codeine and heroin. Morphine is excreted as itself and/or codeine.

- 6-MAM (monoaminoacetyl morphine) is diagnostic of heroin use. Heroin will also metabolize to morphine and/or codeine

Synthetic opioids:

- Oxycodone goes to oxycodone and/or oxymorphone
- Hydrocodone goes to hydrocodone and/or hydromorphone
- Poppy seeds can cause positive morphine (usually < 500) and occasionally cause positive codeine. It is not possible to determine where the morphine came from once it is in the urine.
- Demerol goes to meperidine or normeperidine
- Methadone – methadone
- Fentanyl goes to fentanyl or norfentanyl. Fentanyl has a very short half life, especially when used IV. Many clinicians support periodic hair tests for fentanyl in licensees who have a history with it and access. It is a special order on most panels

# CHAIN OF CUSTODY

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**At Collection Site:** Documentation of transfer of specimen from donor to collector to transport courier is recorded on the Custody and Control Form (CCF) by the appropriate signatures of donor, collector and courier on the form. The original hard copy of this form is shipped with the specimen to the testing laboratory.

**At Laboratory:** Individuals responsible for sample receipt, preparation and analysis document their actions on the appropriate worksheets or data reports.

**Physical Sample Control:** Samples pending analysis are kept in a secured, refrigerated area with controlled access. Upon completion of testing the sample is stored in a locked freezer