

Frequently asked questions regarding drug screen results.

This document has been created by staff at Australian Clinical Labs (ACL) to assist with the interpretation of results of Urine Drug Screens. Although we have endeavored to be thorough and discuss different circumstances that may arise, it is still important to note that Child Protection Practitioners may still require to discuss the results of specific screens with ACL directly.

1. What identification does a person need when they attend for a screen?

- Australian Driver's License
- Passport
- Victorian Proof of age card
- Key Pass card (issued by Australia Post)
- Statutory Declaration with photograph - **only valid for 4 weeks from date of issue**
- Department of Health and Human Services letter with photograph – **only valid for 4 weeks from date of issue**

2. Why is urine the most commonly obtained specimen for drug testing?

Drug testing can be completed on various biological specimens including urine, blood, hair, saliva, sweat, and nails. However, urine testing is the preferred method for a number of reasons:

- Urine testing is noninvasive and easily to collected.
- Drug detection times are also longer in urine than in blood and can range from 1 day and up to several weeks.
- Both parent drug and metabolites can be detected in urine samples and are in higher concentrations than in blood samples. Parent drug refers to the broad class of which the specific drug belongs to; metabolite refers to the form of the drug after it has been processed by the body, also referred to as by-product. For example Codeine's metabolite is morphine, therefore Codeine is the parent drug.

3. What is sample check and why has it failed?

A sample check is a system of steps the laboratory undergo before screening the sample, it includes checking creatinine levels, which are reported, checking temperature at time of production, colour of urine and oxidation levels. Sample check detects elevated amounts of oxidants in a urine sample. Oxidizing agents (i.e. a substance that has the ability to combine with other substances causing them to lose electrons) such as hydrogen peroxide, nitrite, glutaraldehyde and bleach are not found in normal human urine. Therefore any urine sample containing elevated levels of oxidants may indicate tampering (known as adulteration) and cause a failed sample check. Adulteration is the action of tampering with the sample or affecting the purity of the specimen. However it is important to note urine specimens from people who take supplements that contain concentrated cranberry extract or Vitamin C may also fail the sample check test, rather than the sample having been deliberately tampered with.

4. What does the creatinine result mean?

Creatinine is a by-product of muscle tissue. Under normal circumstances a consistent amount of creatinine is excreted in the urine per day. If a person is passing only a small amount of urine per day then the concentration of creatinine in the urine will be **high**. Conversely if a person is passing a large volume of urine, the concentration of creatinine will be **low**.

The creatinine level can also be used as a marker to determine whether the sample is true human urine and whether the urine sample is diluted or has potentially tampered with. Diluted urine may occur for a number of reasons, including the following:

- Person may have recently drunk a large volume of fluid.
- Person may have a medical condition which results in the production of large volumes of urine e.g diabetes or other renal diseases.
- Person may be taking a drug such as a diuretic which cause an increase in urine output.
- Water may have been added to the specimen container to try and reduce the concentration of possible illicit substances.

If the laboratory finds a creatinine result, which is lower than expected, then a comment is added to the report indicating this and advising this may result in a negative test results. You will see this on the results via the reviewer.

5. What are the drug detection cut-offs for drug screens and why are they important?

Clinical Labs' secure Toxicology Laboratory is fully accredited to the Australian and New Zealand 4308 standard. The standard and cut-off levels were established to provide consistency of reporting across all accredited labs and to help minimize false-positive results. The cut-off level is the amount of the drug the testing uses to determine whether a drug was detected or not. A drug can still be detected in the urine, but reported as negative as it falls below the cut-off level, if the amount is higher than the cut-off it is reported as detected. This takes into account second hand smoke, medication and other factors that cause small amounts of the drug to be detected.

A false positive result is where passive inhalation of marijuana or crystal meth smoking can show a positive result indicating drug use. Results lower than the established cutoff values are reported as negative.

The Cut off levels for each drug class are:

Amphetamine = 300 ug/L

Methamphetamine = 300 ug/L

Benzodiazepine = 200 ug/L

Opiates = 300 ug/L

Cocaine = 300 ug/L

Cannabis = 50 ug/L

6. How long can a drug be detected in the urine?

The detection time is the amount of time a drug can be detected in the urine and still produce a positive result. Typically the detection time is between 1 – 3 days.

To evaluate detection times of a drug, both drug characteristics and patient factors need to be considered:

- Drug characteristics include drug half-life, drug metabolites, drug interactions, dosing levels, dosing intervals, chronic versus occasional use and time of last ingestion.
- Patient factors include weight, age, other medication or drugs consumed, fluid intake, amount and frequency of use, overall health, metabolic rate, drug tolerance and urine PH.

For further information regarding these characteristics and detection times please refer to our "Drug Detection Times in Urine" document.

7. Why have the results returned a positive confirmation to carboxy-THC which indicates cannabis use and the person insists they have stopped smoking cannabis?

Carboxy-THC is the metabolite which remains in the body after cannabis has been broken down, this is reported on the results as it has a longer detection time than cannabis. Estimating the detection time for cannabis is multifaceted. Factors that influence detection of cannabis include the method of use, dosage and potency, frequency of use, body mass and ones metabolic rate. Cannabis is highly lipophilic (meaning it tends to combine with or dissolve in lipids or fats) and is extensively stored in body tissue. Chronic use of cannabis will result in accumulation of THC in fatty tissues, resulting in slow elimination rates of metabolites into the urine.

For single exposure in non-users, carboxy-THC may be detectable within 3 days whereas in chronic users it may be present up to 3 months after cessation of use. The higher the storage of THC in the fat tissue the longer it takes for the body to fully excrete, causing it to be detectable for months.

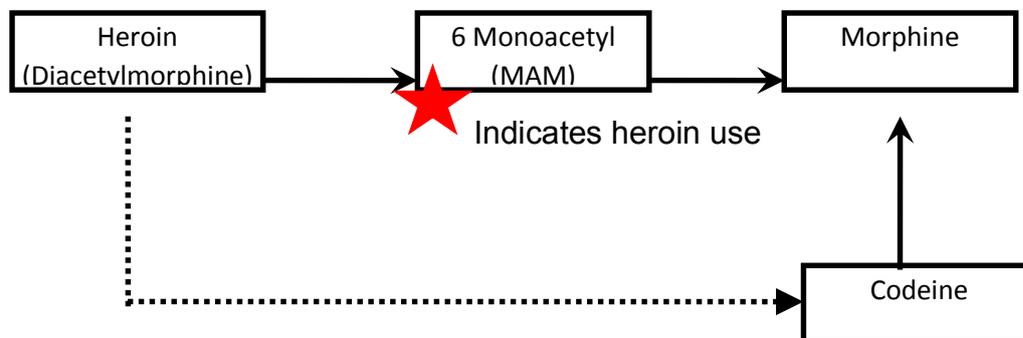
On reports under the quantified amount of carboxy-THC there is also the Carboxy-THC/creatinine ratio reported. This result can be used to determine whether the consumption of cannabis has continued/ceased. The ratio decreasing is consistent with the consumption ceasing. The below example illustrates a doubling of the THC/creatinine ratio is said to indicate cannabis re-use.

Example below:

CARBOXY-THC CONFIRMATION BY GCMS		
Carboxy-THC	272	ug/L
Carboxy-THC/Creat	247.3	ug/mmol

8. How do we interpret opiate results?

To determine conclusively whether Heroin was consumed, Monoacetyl must be detected in urine however this only has a detection time of 30-90minutes. Therefore, it is hard to conclusively determine whether Heroin has in fact been consumed. We can use the presence of by-products morphine and codeine to determine if Heroin may have been consumed.. The below diagram illustrates that when 6 Monoacetyl is detected in a urine screen it can indicate use of heroin, codeine or morphine. Similarly detection of 6 Monoacetyl may indicate codeine use.



Brief notes on opiate metabolism

- Heroin has a short half-life (minutes) and is rarely found in urine tests.
- Monoacetyl morphine also has a relatively short half-life (approximately 30-90 min)
- Heroin may be contaminated with codeine which is formed in the manufacturing process.

- 6 Monoacetyl morphine must be found in the result to confirm heroin use.

Example result on report:

GCMS CONFIRMATION:

CODEINE, MORPHINE and 6-ACETYLMORPHINE confirmed as detected.
Please note: These results are consistent with Heroin use.

GCMS (Gas chromatography-mass spectrometry) is the an analytical method to identify different substances in a test sample. This is the method we use when a sample has a drug class detected in the initial laboratory screening and requires further testing (RFT) to determine exactly which drug caused the positive result. As some medications can cause a false-positive this method is the required to confirm the specific cause of the positive result.

Possible GC-MS Findings for Opiates

Finding	Interpretations
MAM + morphine +/- codeine	Heroin use
Morphine + codeine	Could be Codeine or Heroin
Morphine	Could be Morphine or Codeine or Heroin
Codeine	Codeine use only

1) Monoacetyl morphine + morphine +/- codeine

This is consistent with heroin use.

2) Codeine + morphine

This may occur with codeine containing painkillers. It may also occur with heroin use but unless Monoacetyl morphine is also present it is not possible to conclusively determine this.

3) Morphine only

This may occur with morphine use or as the end by product of codeine use. It may also occur with heroin use but unless Monoacetyl morphine is also present it is not possible to conclusively determine this. It is important to note occasionally low levels of morphine may also be seen after poppy seed ingestion.

4) Codeine only

Usually due to codeine use.

Other Opiates

Other opiates that may be detected by GC-MS confirmatory test include:

Pholcodine

This is a component of a number of anti-cough medicines that can be purchased over the counter.

Hydropmorphone

This is a narcotic analgesic that requires a prescription to obtain. (Trade name Dilaudid)

Oxycodone

This is a narcotic analgesic that requires a prescription to obtain. (Trade name Endone, Proladone, Oxycontin, Oxynorm).

Oxymorphone

This is a by-product of oxycodone.

9. How do we interpret Benzodiazepine results?

Many benzodiazepines (such as Diazepam) undergo extensive breakdown pathways. Diazepam, most commonly taken as Valium for a calming effect has a detection time of 1-3 days. It is also broken down into temazepam, nordiazepam and oxazepam, see below diagram. These may be prescribed or purchased illegally.

GCMS CONFIRMATION:

OXAZEPAM, TEMAZEPAM and NORDIAZEPAM confirmed as detected.

Consistent with valium use.

10. How do we interpret amphetamine results?

The amphetamine drug class include amphetamine/methamphetamine (speed), MDMA (ecstasy) and pseudoephedrine, which is a major component of some "over the counter" cold and hayfever preparations. If a positive result is detected, GCMS testing is required to determine if it is due to a cold tablet or due to amphetamine use or similar substance. Amphetamines and similar agents may remain detectable in the urine for several days after use, see below diagram.

GCMS CONFIRMATION:

Amphetamine Detected
Methamphetamine Detected

Consistent with methamphetamine use.

Some people are prescribed dexamphetamine for ADHD, this will be detected as amphetamine only, therefore if methamphetamine was also detected this is consistent with methamphetamine use.

11. How do we interpret cocaine results?

Cocaine is found less commonly during urine drug screens. The main by-products detected in the body are benzoylecgonine and ecgonine methyl ester, which can be detected by GCMS. It may be detected in urine for several days after use.

For any chain of custody (request form) orders please email:

VICCommercial.Enquiry@clinicallabs.com.au

Include Dr code/team code (located on the upper right side of the form) and how many pads required.

For any additional enquiries:

To ensure the efficiency of our Laboratory we ask that all enquires are directed to the Commercial Department via email or phone call. We can then escalate to the laboratory as required.

Email: VICCommercial.Enquiry@clinicallabs.com.au or Madeline.Colla@clinicallabs.com.au or Nadine.chan@clinicallabs.com.au

Ph: 03 8540 5541 or 13 LABS

Glossary:

Adulteration: An adulterated specimen is one that has been altered in some way. This can be determined by detecting a substance that is not normally found in urine or saliva. ACL also can determine whether a sample has been adulterated by the process of directly witnessing the specimen leaving the body. If anything suspicious happens during collection, an ACL collector will complete a non-compliance form explaining what they saw/heard.

Creatinine: is a by-product of creatine phosphate in muscles, which is usually produced at a constant rate in the body. Creatine phosphate is the molecule responsible for allowing the body to perform high energy movements in the skeletal muscles.

Metabolite: A metabolite is an intermediate end product after a substance has been broken down. An example is Ethanol is the metabolite for Alcohol, as Ethanol is what is left in the body after Alcohol has been consumed and broken down. Every substance we consume is broken down and has a metabolite left in the body until excreted. These metabolites can still effect the body.

Parent Drug: Parent drug is known as the drug class of which specific drug and metabolites are broken down from. For example Codeine's metabolite is morphine, therefore Codeine is the parent drug.