

## URINE DRUG TEST INFORMATION SHEET

# METHAMPHETAMINE AND AMPHETAMINE

**Classification:** CNS Stimulant, Sympathomimetic Amines

**Background:** Methamphetamine and amphetamine belong to a group of structurally related drugs called sympathomimetic amines (SMAs) that are central nervous system stimulants. Amphetamine was first synthesized in 1887 and has been used clinically since 1935. Currently the only approved uses are for the treatment of narcolepsy and attention deficit hyperactivity disorder (ADHD). Methamphetamine was first synthesized in 1919 and has been used clinically since 1930. Currently the only approved uses for methamphetamine are for the treatment of ADHD, morbid obesity and narcolepsy. Both amphetamine and methamphetamine exist as two enantiomeric forms (optical isomers) each: d and l. The d-enantiomer has considerably more CNS stimulant activity compared to the l-enantiomer. The l-enantiomer has decongestant properties and is a component of Vick's Inhaler. Both methamphetamine and amphetamine have high abuse, dependence and addiction potential.

**Legally Obtained With Prescription As:**

Methamphetamine: Schedule II  
Desoxyephedrine, Desoxyn, Methedrine.

Amphetamine: Schedule II  
Dexedrine, Benzedrine, Adderall, Vyvanse,  
Amphetamine Salts, Dextroamphetamine

**Legally Obtained Without Prescription As:** Vicks  
Inhaler (l-methamphetamine)

**Street Names:**

Methamphetamine: Meth, Crank, Crystal, Crystal  
Meth, Glass, Ice, Speed

Amphetamine: Black Beauties, Bennies, Crosses,  
Hearts, Uppers, Speed

**Mode of Use:** Can be taken orally, snorted, smoked  
or injected

**Appearance:**

Methamphetamine: White (or slightly yellow) powder  
or crystals, waxy rock

Amphetamine: pills (most commonly)

**Detection in Urine:** Methamphetamine is  
metabolized to amphetamine and both are eliminated  
in the urine. Typically, the detection time following the  
last dose is 2–3 days. The elimination of  
amphetamine and methamphetamine is pH  
dependent; alkaline urine  
(increased pH) results in reduced excretion rate and  
acidic urine (decreased pH) increases elimination  
rate.

**Physiological Effects:** Increased metabolism, heart  
rate, energy, nervousness, alertness and reduced  
appetite.

**Psychological Effects:** Meth has a long list of  
potentially disastrous side effects, including paranoia,  
hallucinations and repetitive behavior patterns, heart  
attacks and strokes. High dosages and long-term  
use can bring on full-blown psychosis with violent  
aggressive behavior and can lead to symptoms that  
resemble schizophrenia.

**Metabolism:** Methamphetamine is metabolized  
to amphetamine and both are excreted in the  
urine. Amphetamine is NOT metabolized to  
methamphetamine.

**Cutoff Levels:**

Screen Test: Methamphetamine plus Amphetamine 1000 ng/mL

Confirmation Test: Methamphetamine 500 ng/mL

Amphetamine 500 ng/mL

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**Screen Test:** Performed by enzyme immunoassay (EIA) testing. EIA is sensitive to drug groups, rather than to specific drugs. False positive results can occur due to the presence of other SMAs, most commonly ephedrine and pseudoephedrine, but there are other cross-reactants. (See the table under False Positive Results below.)

**Confirmation Test:** Performed by LC-MS/MS (liquid chromatography/mass spectrometry). This test is very sensitive and specific. A positive result indicates the use of a drug containing methamphetamine and/or amphetamine.

**Specific Issues:** Methamphetamine is present in two enantiomeric forms; d and l. Street and prescription methamphetamine is predominantly d-methamphetamine. The over-the-counter medication Vick's Inhaler (and the Walgreens equivalent) contains exclusively the "l" form of methamphetamine (the listed active ingredient is l-desoxyephedrine, another name for l-methamphetamine). Although uncommon, heavy use of Vick's Inhaler can cause a positive screen and confirmation urine test result for methamphetamine and amphetamine. Enantiomeric testing for d versus l forms by chiral analysis by either GC-MS or LC-MS/MS is possible and always necessary for differentiation between the two forms. Greater than 20% d-enantiomer rules out use of OTC decongestants containing l-methamphetamine.

A number of prescription drugs, including benzphetamine and selegiline, metabolize into amphetamine and/or methamphetamine. Benzphetamine is approved for treatment of obesity, and selegiline is used in the treatment of Parkinson's disease. Selegiline is the l-enantiomeric form so it metabolizes exclusively into l-amphetamine and l-methamphetamine.

**False Positive Results:** The following is a list of prescription and over-the-counter drugs that can cause false positives for methamphetamine on an EIA screen test (the list is not comprehensive, and the following drugs are found in a large variety of medications). These drugs will NOT test positive for methamphetamine or amphetamine by LC-MS/MS.

- Ephedrine
- Pseudoephedrine (Sudafed)
- Phentermine
- Fenfluramine
- Phenylpropanolamine (PPA)
- Propranolol
- Phenmetrazine
- Thorazine (Chlorpromazine)
- MDMA (ecstasy)
- Bupropion
- Methylphenidate (Ritalin)
- Mephentermine
- Ma huang Tea (or tea made from plants belonging to the ephedra family)

**Summary:** Methamphetamine is now widely used in all parts of the country. Some methamphetamine users can go without sleep for 3 to 15 days. With a four-day high costing about \$25, meth has become a cheap, longer-lasting alternative to cocaine. Meth also suppresses the appetite, making it popular with young women trying to lose weight.