

# Amphetamine & Methamphetamine

## Classification

Amphetamine and methamphetamine are Schedule II drugs included in a group of chemicals called sympathomimetic amines, which contain a phenethylamine chemical nucleus. Sympathomimetic amines mimic the effects of the endogenous neurotransmitters such as epinephrine (adrenaline), norepinephrine (noradrenaline) and dopamine. Also included in this group are various over-the-counter drugs such as phenylpropanolamine, pseudoephedrine, ephedrine as well as the Schedule I drug methylenedioxymethamphetamine (MDMA or Ecstasy). The amphetamines are powerful central nervous system stimulants and can be taken orally, intravenously, snorted or smoked. Methamphetamine is one of the most commonly abused drugs in the Western United States. It is readily synthesized, with ephedrine being used as the primary precursor.

## Metabolism

Amphetamines are rapidly absorbed from the gastrointestinal tract and are either deactivated by the liver or excreted unchanged into the urine. Methamphetamine is excreted primarily unchanged (44%) and some of the drug (6%) is metabolized and excreted as amphetamine. Amphetamine is also excreted largely unchanged (30%) with 20-25% being metabolized to deaminated (hippuric and benzoic acids) and hydroxylated metabolites. The elimination rate of amphetamines varies with the pH of the urine, as at low pH the excretion of unchanged drug increases, while at high pH the excretion of unchanged drug decreases. Within a few hours after any type of administration, amphetamines appear in the urine and can typically be detected for up to 72-96 hours.

## Abuse

Amphetamines, particularly methamphetamine, are among the most popular drugs of abuse. Common street names include speed, crank, crystal, meth, and ice. Ice and crystal meth are crystals of methamphetamine HCL. Snort and glue are oils formed from methamphetamine free base and baking soda. Methamphetamine is frequently smoked in a glass pipe as it is easily volatilized into a gas that is inhaled. Although the ice form is primarily found in Hawaii, it has gained the most notoriety mainly due to the fact that it is 98-100% pure methamphetamine HCL and its effects are rapid, intense, and of longer duration than other forms of methamphetamine.

The signs and symptoms associated with the abuse of methamphetamine depend upon the amount used and the duration of use. With infrequent or low dose use, a person may experience euphoria, lowered anxiety, talkativeness, decreased appetite, increased sexual

arousal, increased alertness, and decreased fatigue. Physiologically there can be increased heart rate and blood pressure. With increased dose or prolonged abuse (either binge or chronic), an individual may experience a set of secondary effects that can include increased anxiety, irritability, aggressiveness, paranoia and hypersexuality. Physiological effects can include dilated pupils, dry mouth, hippus, increased body temperature and tachycardia. In overdose situations, a person may experience hallucinations, coma or death. Crash symptoms typically follow binge abuse of methamphetamine. This phase is marked by extreme fatigue, depression, mental exhaustion and prolonged periods of sleep.

### Laboratory drug testing: Methods of Analysis

Immunoassays are common methods for detecting amphetamines in urine. Enzyme immunoassay (EIA) is the most commonly used immunoassay that detects both methamphetamine and amphetamine to varying degrees of sensitivity and specificity. However, it will cross-react with several over-the-counter cold and diet preparations which indicates the importance of confirmatory testing for samples screened presumptively positive by immunoassay tests. Gas chromatography/mass spectrometry (GC/MS) and liquid chromatography/tandem mass spectrometry (LC/MS/MS) provides reliably sensitive and specific solution as confirmatory methods.