Marijuana Drug Information

Classification

Marijuana is a preparation derived from the leaves and flowering tops of cannabis plants (Cannabis sativa) that is capable of producing psychoactive effects when ingested. One of the primary classes of compounds found in marijuana is called cannabinoids. There are up to 60 cannabinoids in marijuana with delta-9-tetrahydrocannabinol (THC) being the primary psychoactive constituent.

Metabolism

When marijuana is smoked, THC is rapidly absorbed through the lungs and enters the bloodstream in minutes. Following oral ingestion, THC does not reach the bloodstream for approximately 1.5-3 hours. Once in the blood, THC is bound to blood proteins and carried throughout the body where it is either absorbed into body tissues (including the brain, heart, and fat) or transformed by the liver into the water soluble metabolites 11-hydroxy-THC and carboxy-THC. These water soluble metabolites, are readily excreted into the urine, with the inactive metabolite carboxy-THC being the predominant metabolite detected. Initially, THC is quickly absorbed into the body tissues and then is slowly released back into the blood stream where it is carried to the liver and metabolized. Because THC tends to be stored in fatty tissues, it accumulates faster than it can be eliminated in chronic repetitive smokers. This leads to extended retention of THC which is then eliminated from the body at a relatively constant rate with an average elimination half-life being estimated at 18-30 hours. Urinary concentrations of THC are very difficult to interpret due to variables such as dosage of THC ingested, frequency of use, timing of urine collection relative to last exposure to marijuana, rate of release of stored cannabinoids in adipose tissue, and an individual's hydration state. Therefore, the detection of THC metabolites in the urine is only an indication of past marijuana use and is not related to the degree of intoxication or impairment.

Abuse

The psychological effects of THC include an increased sense of well being or euphoria, relaxation, slowed psycho-motor response, an altered sense of time, short term memory impairment and impairment of multi-tasking performance.

THC Retention Time

- *Infrequent (less than twice/week) Smoking:* When screening assays of 50 ng/mL or greater are used, urine samples will generally be positive for 1-3 days.

- *Regular (several times per week) Smoking:* May result in urine specimens testing positive for 7-21 days.
- *Chronic (daily) Smoking:* An individual who smokes marijuana daily for prolonged periods of time can test positive for 30 days or longer.
- *Oral Ingestion:* Metabolic profiles in urine samples cannot generally differentiate between marijuana ingested orally versus marijuana ingested by smoking. However, oral ingestion requires approximately three times more THC than smoking to produce similar effects or "highs"; therefore, visual detection of the marijuana in the ingested item would seem reasonable, thus ruling out unknown consumption. Retention time of orally ingested marijuana ranges from 1-5 days.
- *Passive Inhalation:* In general, routine passive exposure to marijuana smoke will not result in a positive result for cannabinoids in excess of a 50 ng/mL screening cut-off.

Laboratory drug testing: Methods of Analysis

The most common screening methods used to detect cannabinoids in urine include enzyme immunoassay (EIA). Urine cannabinoid immunoassays are usually optimized for the detection of carboxy-THC, but also react with other cannabinoids present in the urine. Because of this cross-reactivity, immunoassay results are expressed in terms of "total cannabinoids" and not specifically in terms of carboxy-THC concentration as is detected by specific confirmation methods such as gas chromatography/mass spectrometry (GC/MS) or liquid chromatography/tandem mass spectrometry (LC/MS/MS). Therefore, when interpreting THC concentrations, it is important to realize that GC/MS or LC/MS/MS, which measures only carboxy-THC, generally yields quantitative results which may represent only 10-50% of the "total cannabinoid" value as detected by immunoassays. While immunoassay cross-reactivity to non-cannabinoid compounds is extremely rare, most immunoassay manufacturers recommend that positive results be confirmed by alternate specific analytical methods. The chromatographic methods; GC/MS and LC/MS/MS meet this requirement while providing most reliable test results.