

# MATRIX Drugs of Abuse Test Strip

# MATRIX Drugs of Abuse Test cassette

FOR THE QUALITATIVE ASSESSMENT OF A DRUG AND/OR ITS METABOLITE(S) IN HUMAN URINE

For in vitro Diagnostic and Forensic Use

## Drugs of Abuse (DOA) Test

### Test Strip



### Test Cassette



### REF

Amphetamine Strip
Barbiturate Strip
Benzodiazepine Strip
Buprenorphine Strip
Cocaine Strip
EDDP Strip
Ketamine Strip
Methadone Strip
Methamphetamine Strip
MDMA Strip
Morphine Strip
Opiates Strip
Oxycodone Strip
Phencyclidine Strip
THC Strip
Propoxyphen Strip
Tramadol Strip
Tricyclic Antidepressants Strip
6-MAM Strip
Zolpidem Strip
MDPHP Strip

### REF

Zopiclone Strip
Hydromorphone Strip
Methylphenidate Strip
LSD Strip
Pregabalin Strip
MDPV Strip
Methcathinone Strip
Mephedrone Strip
Ethyl glucuronide Strip
Gabapentin Strip
Carfentanil Strip
K2-AB Strip
Caffeine Strip
K2 Strip
Fentanyl Strip
Cotinine Strip
Methaqualone Strip
K4 Strip
α -PVP Strip
GHB Strip

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Methylphenidate	150	ng/ml of Methylphenidate
LSD	20/50	ng/ml of Lysergic acid diethylamide
Pregabalin	500/1000	ng/ml of Pregabalin
Methylenedioxypropyvalerone	500/1000	ng/ml of 3,4-Methylenedioxypropyvalerone
Methcathinone	1000/500	ng/ml of Methcathinone
Mephedrone	500	ng/ml of Mephedrone
Ethyl glucuronide	500/1000	ng/ml of Ethyl glucuronide
Gabapentin	2000	ng/ml of Gabapentin
Carfentanil	500	ng/ml of Carfentanil
K2-AB	25	ng/ml of AB-PINACA
Caffeine	8000	ng/ml of Caffeine
Synthetic Cannabinoids (K2)	30/50	ng/ml of JHW-018 and JWH-073
Fentanyl	10/20	ng/ml of Fentanyl
Cotinine	200/300/600/1000	ng/ml of Cotinine
Methaqualone	300	ng/ml of Methaqualone
Synthetic Cannabinoids(K4)	25	ng/ml of K4 Synthetic Cannabinoids
α-PVP	500	ng/ml of α -Pyrrolidinovaleorophen
GHB	10	µg/ml of Gamma-hydroxybutyric acid
MDPHP	500	µg/ml of MDPHP
Oxidants / Specific Gravity / pH /Nitrite / Glutaraldehyde /Creatinine		

This assay provides only a preliminary analytical test result. A more specific alternative chemical method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) has been established as the preferred confirmatory method by the Substance Abuse Mental Health Services Administration (SAMHSA). Clinical consideration and professional judgment should be applied to any drugs of abuse test result, particularly when preliminary positive results are indicated.

\* SAMHSA recommends a cut-off concentration of 2000 ng/ml for Opiates Test

### SUMMARY AND EXPLANATION

**AMP** Amphetamines are a class of potent sympathomimetic agents with therapeutic applications. The most common amphetamines are d-amphetamine and d,l-amphetamine. Amphetamines are central nervous stimulants that cause the neurotransmitters epinephrine, norepinephrine and dopamine to be released into the brain and body giving users feelings of euphoria, alertness, and increased energy. Chronic abuse of amphetamine leads to tolerance and drug reinforcement effect. Cardiovascular responses to amphetamine include increased blood pressure and cardiac arrhythmias. More acute responses produce anxiety, paranoia, hallucinations and psychotic behavior. Amphetamine is metabolised by a number of pathways. In general, acid urine promotes excretion whereas alkaline urine retards it. In 24 hours, approximately 79% of the amphetamine dose is excreted in acid urine and about 45% in alkaline urine. Typically, about 20% is excreted as unchanged amphetamine. Unchanged amphetamine can be detected up to 1–2 days after use.

**BAR** Barbiturates are a group of prescription drugs that are frequently abused. They can depress the central nervous system. Acute higher doses induces exhilaration, sedation and respiratory depression. More acute responses produce respiratory collapse and coma. The effects of short-acting barbiturates, such as secobarbital last 3 to 6 hours. The effects of long-acting barbiturates such as phenobarbital last 10 to 20 hours. Short-acting barbiturates normally remain detectable in urine for 4 to 6 days, while long-acting barbiturates can be detected for up to 30 days. Barbiturates are excreted in the urine in unchanged forms, hydrolyzed derivatives, carboxylated derivatives and glucuronide conjugates.

**BZO** Benzodiazepines are a class of widely prescribed central nervous system depressants which have anxiolytic, hypnotic, anticonvulsant and muscle relaxant effects. Chronic abuse can result in addiction and tardive dyskinesia. Acute higher doses lead to drowsiness, dizziness, muscle relaxation, lethargy, coma and possible death. The effects of benzodiazepines use last 4 – 8 hours. Many of the benzodiazepines share a common metabolic route, and are excreted as oxazepam and its glucuronide in urine. Oxazepam is detectable in the urine for up to 7 days after drug use.

**BUP** A derivative of thebaine, is an opioid that has been marketed in the United States as the Schedule V parenteral analgesic Buprenex. In 2003, based on a re-evaluation of available evidence regarding the potential for abuse, addiction, and side effect, DEA reclassified buprenorphine from a Schedule V to a Schedule III narcotic. Buprenorphine resembles morphine structurally but has a longer duration of action than morphine and can be administered sublingually as an analgesic. In October 2002, FDA approved the use of a buprenorphine monotherapy product, Subutex, and a buprenorphine/naloxone combination product, Suboxone, for the treatment of opioid addiction. Subutex and Suboxone are the first narcotic drugs available under the US Drug Act (DATA) of 2003 for the treatment of opiate dependence that can be prescribed in the US in a physician's work place. It has also been shown that buprenorphine has abuse potential and may itself cause dependency. In addition, a number of deaths have been recorded as a result of overdose with intravenously injected buprenorphine in conjunction with other psychotropic drugs such as benzodiazepines. Buprenorphine is metabolised primarily by n-dealkylation to form glucuronide-buprenorphine and glucuronide-norbuprenorphine.

**COC** Derived from the leaves of cocoa plant, is a potent central nervous system stimulant as well as a local anesthetic. Some of the psychological effects induced by cocaine are: euphoria, confidence and a sense of increased energy, accompanied by increased heart rate, dilation of the pupils, fever, tremors and sweating. Continued ingestion of cocaine could induce tolerances and physiological dependency which leads to its abuse. Cocaine is used by smoking, intravenous, intranasal or oral administration and excreted in the urine primarily as benzoylecgonine in a short period. Benzoylecgonine has a biological half-life of 5 – 8 hours, which is much longer than that of cocaine (0.5 – 1.5 hours), and can be generally detected for 12 – 72 hours after cocaine use or exposure.

**EDDP** 2-Ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine, is the primary metabolite of methadone. Methadone is a controlled substance and is used for detoxification and maintenance of opiate dependant patients. Patients on methadone maintenance may exhibit methadone (parent) levels that account for 5-50% of the dosage and 3-25% of EDDP in urinary excretion during the first 24 hours. The detection of EDDP is more beneficial than traditional methadone screening, because EDDP exists only in urine from individuals that ingested methadone. The tampering of specimens by spiking the urine with methadone can be prevented. Secondly, renal clearance of EDDP is not affected by urinary pH, therefore the EDDP test provides a more accurate result of methadone ingestion than the methadone parent screen.

**MTD** Methadone is a synthetic opioid, clinically available. It is used clinically for the treatment of severe pain and in maintenance programs for morphine and heroine addicts. Methadone acts on the central nervous and cardiovascular systems to produce respiratory and circulatory depression. Methadone also produces miosis and increases the tone of smooth muscle in the lower gastrointestinal tract while decreasing the amplitude of contractions. Acute higher doses induce analgesia, sedation, respiratory depression and coma. After methadone administration, the major urinary excretion products are methadone and its metabolites, EDDP and EMPD. Large individual variations in the urine excretion of methadone are output of methadone from 5-22%. Typically, following a 5 mg oral dose, methadone and EDDP account for 5% of the dose in the 24-hour urine. In those individuals on maintenance therapy, methadone may account for 5 to 50% of the dose in the 24-hour urine and EDDP may account for 3 to 25% of the dose.

**MET** Methamphetamine is the most popular synthetic derivative of the amphetamines. It is a potent sympathomimetic agent with therapeutic applications. Acute large doses lead to enhanced stimulation of the central nervous system and induce euphoria, alertness, reduced appetite, and a sense of increased energy and power. More acute response produces anxiety, paranoia, psychotic behavior, and cardiac dysrhythmias. Methamphetamine is excreted in the urine as amphetamine and oxidized and deaminated derivatives. However, 10-40% of methamphetamine is excreted unchanged. Methamphetamine is generally detectable in the urine for 3 to 5 days after use.

**MDMA** Methylenedioxymethamphetamine (Ecstasy) is a designer drug first synthesised in 1914 by a German drug company for the treatment of obesity. Those who take the drug frequently report adverse effects, such as increased muscle tension and sweating. MDMA is not clearly a stimulant, although it has, in common with amphetamine drugs, a capacity to increase blood pressure and heart rate. MDMA does produce some perceptual changes in the form of increased sensitivity to light, difficulty in focusing, and blurred vision in some users. Its mechanism of action is thought to be via release of the neurotransmitter serotonin. MDMA may also release dopamine, although the general opinion is that this is a secondary effect of the drug. The most pervasive effect of MDMA, occurring in almost all people who have taken a reasonable dose of the drug, is to produce a clenching of the jaws.

**KET** Ketamine is a derivative of phencyclidine. It is used medically as a veterinary and human anaesthetic. Certain doses of ketamine can cause dream-like states and hallucinations. In high doses, ketamine can cause delirium, amnesia, impaired motor function, high blood pressure, depression, and potentially fatal respiratory problems. Ketamine is metabolised in the liver and excreted through the kidney. The half-life of ketamine in the body is around three hours.

**OPI** Opioid analgesics comprised of a large group of substances that control pain by depressing the central nervous system. Acute high dose used by abusers or addicts can cause depressed coordination, disrupted decision, decreased respiration, hypothermia and coma. Morphine is excreted unmetabolised and is the marker metabolic product of opiates. Morphine and morphine glucuronide is detectable in urine for several days after opiates dose.

**OXY** Oxycodone is known as Oxycontin. Roxicodone and is an ingredient of Percodan, Percocet, Roxicet and Tylox. Oxycodone is a semi-synthetic opiates derived from opium. Like other opiates, oxycodone is characterised by its analgesic properties, and the tendency for users to form a physical dependency and develop tolerance with extended use. Oxycodone is usually administered in combination with non-opiate analgesics such as acetaminophen and salicylates for the relief of moderate to severe pain. Oxycodone is a central nervous system depressant that may cause drowsiness, dizziness, lethargy, weakness and confusion. Toxicity in an overdose of oxycodone can lead to stupor, coma, muscle flaccidity, severe respiratory depression, hypotension, and striptic arrest. Oxycodone is metabolised by N- and O-demethylation. One of the metabolites, oxymorphone, is a potent narcotic analgesic, while the other, noroxycodone, is relatively inactive. Between 33 to 61% of a single dose of oxycodone is excreted in a 24 hour urine collection and consists of 13-19% free oxycodone, 7-29% glucuronide conjugated oxycodone, 13-14% glucuronide conjugated oxymorphone and an unknown amount of noroxycodone. The detection time window of oxycodone is 1-3 days following use.

**PCP** Phencyclidine commonly known as PCP, is a hallucinogen which interacts with dopamine, cholinergic and adrenergic systems. It has dose dependent stimulant, depressant, hallucinogenic and psychological effects. PCP is mostly administered by oral or intravenously. Even moderate amount of PCP, from 5 to 100 ng/ml, can result in psychotic, violent and self-destruction. At high doses, from 100 to 500 ng/ml, PCP can cause convulsions, hypertension, prolonged coma, absent peripheral sensation, and even death. PCP is metabolised via hydroxylation, oxidation, and conjugation with glucuronic acid in the liver. About 10% of the does is excreted in urine as unchanged drug. For chronic users, PCP can be detected in the urine for 7 to 8 days after drug administration.

**PPX** Propoxyphene is a prescription drug for the relief of pain. Although slightly less selective than morphine, Propoxyphene binds primarily to  $\mu$  opioid receptors and produces analgesia and other CNS effects that are similar to those seen with morphine-like opioids. It is likely that at equianalgesic doses the incidence of side effects such as nausea, anorexia, constipation, abdominal pain, and drowsiness are similar to those of codeine. After oral administration, concentrations of Propoxyphene in plasma reach their highest values at 1 to 2 hours. There is great variability between subjects in the rate of clearance and the plasma concentrations that are achieved. The percentage of excreted unchanged Propoxyphene in urine is less than 1%. In humans, the major route of metabolism is N-demethylation to yield norpropoxyphene. Norpropoxyphene has a longer half-life (30 to 36 hours) than parent Propoxyphene (6 to 12 hours), and its accumulation with repeated doses may be responsible for some of the observed toxicity.

**THC** The agents of Marijuana that cause various biological effects in humans are called cannabinoid. Cannabinoid is a central nervous stimulant that alters mood and sensory perceptions, produces loss of coordination, impairs short term memory, and produces symptoms of anxiety, paranoia, depression, confusion, hallucination, and increased heart rate. Large doses of cannabinoid could cause the development of tolerances and physiological dependency and lead to abuse. A tolerance to the cardiac and psychotropic effects can occur and withdrawal syndrome produces restlessness, insomnia, anorexia and nausea.  $\Delta^9$ -THC is the primary active ingredient in cannabinoids. The main metabolite excreted in the urine is 11-nor- $\Delta^9$ -THC-9-COOH, which are found within hours of exposure and remain detectable in the urine for 3-10 days after smoking.

**TML** Tramadol is a quasi-narcotic analgesic used in the treatment of moderate to severe pain. It is a synthetic analog of codeine, but has a low binding affinity to the  $\mu$ -opioid receptors. Large doses of tramadol can develop tolerance and physiological dependency and lead to its abuse. Tramadol is extensively metabolised after oral administration. Approximately 30% of the dose is excreted in the urine as unchanged drug, whereas 60% is excreted as metabolites. The major pathways appear to be N- and O- demethylation, glucuronidation or sulfation in the liver.

**TCA** Tricyclic antidepressants, commonly known as TCA, are a group of antidepressant drugs. TCA are mostly administered by oral or intramuscularly. The progressive symptomatology of TCA includes agitation, confusion, hallucinations, hypertonicity, seizures and EKG changes. Nortriptyline, Desipramine (Protopran) and Imipramine (Tofranil) are the most often used TCA. TCA's half life varies from a few hours to a few days. TCA are excreted with less than 1% of the unchanged drug.

**6-MAM** 6-Monoacetylmorphine (6-MAM) or 6-acetylmorphine is one of three active metabolites of heroin (diacetylmorphine), the others being morphine and the much less active 3-monoacetylmorphine (3-MAM).6-MAM is rapidly created from heroin in the body, and then is either metabolized into morphine or excreted in the urine. Since 6-MAM is a unique metabolite to heroin, its presence in the urine confirms that heroin was the opioid used. This is significant because on a urine immunoenassay drug screen, the test typically tests for morphine, which is a metabolite of a number of legal and illegal opiates/opioids such as codeine, morphine sulfate, and heroin. 6-MAM remains in the urine for no more than 24 hours so a urine specimen must be collected soon after the last heroin use, but the presence of 6-MAM guarantees that heroin was in fact used as recently as within the last day. 6-MAM is naturally found in the brain, but in such small quantities that detection of this compound in urine virtually guarantees that heroin has recently been consumed.

**ZOL** Zolpidem is a prescription medication used for the treatment of insomnia and some brain disorders. It is a short-acting nonbenzodiazepine hypnotic of the imidazopyridine class that potentiates GABA, an inhibitory neurotransmitter, by binding to GABA<sub>A</sub> receptors at the same location as benzodiazepines. It works quickly, usually within 15 minutes, and has a short half-life of two to three hours. Zolpidem has not adequately demonstrated effectiveness in maintaining sleep, unless delivered in a controlled-release (CR) form. However, it is effective in initiating sleep. Its hypnotic effects are similar to those of the benzodiazepine class of drugs, but it is molecularly distinct from the classical benzodiazepine molecule and is classified as an imidazopyridine. Flumazenil, a benzodiazepine receptor antagonist, which is used for benzodiazepine overdose, can also reverse zolpidem's sedative/hypnotic and memory-impairing effects.

**ZOP** Zopiclone is a nonbenzodiazepine hypnotic agent used in the treatment of insomnia. It is a cyclopyrrolone, which increases the normal transmission of the neurotransmitter gamma-Aminobutyric acid in the central nervous system, as benzodiazepines do, but in a different way. Zopiclone is extensively metabolised by the human liver into two major metabolites: N-oxidezopiclone, which retains a low pharmacological inactivity; and N-desmethylzopiclone, which is pharmacologically inactive

**HMO** The Hydromorphone (HMO) is a derivative of morphine. It can be said that hydromorphone is to morphine as hydrocodone is to codeine and, therefore, a semi-synthetic drug. Hydromorphone is commonly used in the hospital setting, mostly intravenously (IV) because its bioavailability orally, rectally, and intranasally is very low. But a positive test result does not automatically mean that an abuse of drugs has been taken place since also some fully legally taken medicaments do contain opiates (e.g. codeine)

**MPD** Methylphenidate is a psychostimulant drug approved for treatment of ADHD or attention-deficit hyperactivity disorder, postural orthostatic tachycardia syndrome and narcolepsy. Methylphenidate acts primarily to inhibit the reuptake of dopamine and to a lesser extent norepinephrine thereby retaining these hormones longer which increases the levels of these neurotransmitters in the brain

**LSO** Lysergic acid diethylamide, abbreviated LSD or LSD-25, also known as lysergide and colloquially as acid, is a semisynthetic psychedelic drug of the ergoline family, well known for its psychological effects which can include altered thinking processes, closed and open eye visuals, synaesthesia, an altered sense of time and spiritual experiences, as well as for its key role in 1960s counterculture. It is used mainly as an entheogen, recreational drug, and as an agent in psychedelic therapy. LSD is non-addictive, is not known to cause brain damage, and has extremely low toxicity relative to dose, although in rare cases adverse psychiatric reactions such as anxiety or delusions are possible.

**PGB** Pregabalin is a medication primarily used for epilepsy, neuropathic pain, and fibromyalgia. Its use for epilepsy is as an add-on therapy for partial seizures with or without secondary generalization in adults. It is also considered useful for generalized anxiety disorder.Pregabalin is a lipophilic structural analogue of  $\gamma$ -Aminobutyric acid (GABA) and classified as a depressant by the Drug Enforcement Agency. It is a neurotransmitter modulator that has analgesic, anticonvulsant, anxiolytic, and sleep-modulating properties.Pregabalin is a potent gabapentinoid and a close structural analogue of GABOB ( $\beta$ -hydroxy-GABA), baclofen ( $\beta$ -(4-chlorophenyl)-GABA) and phenibut ( $\beta$ -phenyl-GABA). Common side effects include: sleepiness, confusion, trouble with memory, poor coordination, dry mouth, problem with vision, and weight gain. Potentially serious side effects include angioedema, drug misuse, and an increasedsuicide risk.

**MDPV** Methylenedioxypropyvalerone (MDPV) is a psychoactive drug with stimulant properties which acts as a norepinephrine-dopamine reuptake inhibitor. The primary psychological effects have a duration of roughlyly 3 to 4 hours, with after effects such as tachycardia, hypertension, and mild stimulation lasting from 6 to 8 hours.

**MCAT** Methcathinone, is a monoamine alkaloid and psychoactive stimulant, a substituted cathinone. Methcathinone is a highly addictive drug, primarily psychologically addicting and most of the signs of addiction to the drug are emotional or psychological. It has been popularized and continues to be sold under misleading names such as "bath salts", "plant fertilizers" or "research chemicals", but it is actually a powerful psycho-stimulant used as a recreational drug. Effects of this drug typically last from 4 to 6 hours. It is used as a recreational drug due to its potent stimulant and euphoric effects and is considered to be addictive, with both physical and psychological withdrawal occurring if its use is discontinued after prolonged or high-dosage administration . It is usually snorted, but can be smoked, injected, or taken orally. Methcathinone is listed as a Schedule I controlled substance by the Convention on Psychotropic Substances and the United States' Controlled Substances Act, and as such it is not considered to be safe or effective in the treatment, diagnosis, prevention, or cure of any disease, and has no approved medical use. Methcathinone has very strong affinities for the dopamine transporter and the norepinephrine (noradrenaline) transporter. Its affinity for the serotonin transporter is less than that of methamphetamine.

**MEP** Mephedrone, also known as 4-methylmethcathinone (4-MMC) or 4-methylephedrone is a synthetic stimulant drug of the amphetamine and cathinone classes. Slang names include drone, M-CAT, White Magic and meow meow. It is chemically similar to the cathinone compounds found in the khat plant of eastern Africa. Mephedrone comes in the form of tablets or a powder, which users can swallow, snort or inject, producing similar effects to MDMA, amphetamines and cocaine. In addition to its stimulant effects, Mephedrone produces side effects, of which teeth grinding are the most common. A number of metabolites are possible, however the n-demethyl metabolite of Mephedrone used is 4-Methylcathinone. This metabolite appears to be nearly inactive as a Monoamine Oxylase Inhibitor .On further metabolism of this metabolite one of the possible metabolites is 4-Methylnorephedrine, caused by the reduction of the Keto-A dose of 150mg-250mg is the average, giving a duration of around 2 hours.the duration will lengthen in larger 250mg+ dosages .

**ETG** Ethyl glucuronide (ETG) is a minor non-oxidative metabolite of ethyl alcohol formed by the in vivo conjugation of ethanol with glucuronic acid with UDP glucuronosyl transferase.ETG is a product of metabolic process about of Ingested alcohol (ethanol) rapidly metabolized in the body, which is excreted in the blood, hair and urine. By using The ETG Rapid Test Device (Urine), can detect ETG in urine, confirming the consumption of alcohol. The ETG metabolite remains in the body longer and therefore has a more useful window of detection of 8 to 80 hours. ETG testing is an excellent option for zero-tolerance alcohol consumption or rehabilitation programs

**GAB** Gabapentin (GAB) marketed under the brand name Neurontin among others, is a medication used to treat epilepsy,neuropathic pain, hot flashes, and restless leg syndrome. In epilepsys it may be used for those with partial seizures. It is recommended as one of a number of first line medications for the treatment of neuropathic pain idiopathic neuropathy, post-herpetic neuralgia, and central neuropathic pain. The mechanism of the neuroconvulsant action of gabapentin has not been fully described. Several possible mechanisms for pain improvement have been discussed. Though similar in structure to the endogenous neurotransmitter GABA, gabapentin has not been shown to bind to GABA receptors at concentrations at or below 1 mM. Gabapentin modulates the action of glutamate decarboxylase (GAD) and branched chain aminotransferase (BCAT), two enzymes involved in GABA biosynthesis. In human and rat studies, gabapentin was found to increase GABA biosynthesis, and to increase non-synaptic GABA neurotransmission in vivo.Common side effects include sleepiness and dizziness. Serious side effects may include an increased risk of suicide, aggressive behaviour, and drug reaction with eosinophilia and systemic symptoms. It is unclear if it is safe duringpregnancy or breastfeeding. Lower doses should be used in people with kidney problems. Gabapentin affects the inhibitory neurotransmitter  $\gamma$ -aminobutyric acid (GABA).

**CFYL** Carfentanil is an analog of the synthetic opioid analgesic fentanyl. It is 10,000 times more potent than morphine, making it among the most potent commercially used opioids. Carfentanil was first synthesized in 1974. It is marketed under the trade name Wilnilin as a general anaesthetic agent for large animals. Side effects of carfentanil are similar to those of fentanyl, which include itching, nausea and respiratory depression, which can be life-threatening. Carfentanil is classified as Schedule II under the Controlled Substances Act in the United States with a DEA ACSCN of 9743.

**K2-AB** AB-PINACA is a synthetic cannabinoid usually sold as a herbal smoking mixture designed to mimic THC, the active chemical of cannabis. Synthetic cannabinoids are classed as 'New Psychoactive Substances' (NPS) which are unregulated substances that have become newly available on the market as an alternative to illegal drugs. As a reaction to prohibition, synthetic cannabinoid producers change the compounds found in designer drugs and create new generations of synthetic drugs, such as AB-PINACA. As a result, accidental overdose and severe psychiatric complications may be more likely to occur because the type and amount of active compound may vary considerably from batch to batch. Other effects may include agitation, rapid heart rate, confusion, dizziness and nausea.

**CAF** Caffeine is a central nervous system (CNS) stimulant of the methylxanthine class. It is the world's most widely consumed psychoactive drug. It is found in the seeds, nuts, or leaves of a number of plants native to South America and East Asia and confers on them several survival and reproductive benefits. Caffeine can produce a mild form of drug dependence-associated with withdrawal symptoms such as sleepiness, headache, and irritability – when an individual stops using caffeine after repeated daily intake. After intravenous administration of caffeine the urine level of the drug is approximately the same in each of the first 4 hourly specimens. Blood samples taken 10 and 70 minutes after injection of the drug were analyzed and showed 0.29 and 0.28mg. per 100 cc. respectively. There are to be contrasted with the 1st hour urine which contained 0.73mg.per 100 cc., essentially 3 times that in the blood. After oral administration of caffeine to the horse the concentration of caffeine in the urine rose progressively during the first 3 hours, remained relatively constant through the 8th hours. At 48 hours, a urine specimen contained approximately 0.17mg. per 100 cc. of caffeine. In addition, flu-like symptoms, nausea/vomiting, and muscle pain/stiffness were judged likely to represent valid symptom categories. In experimental studies, the incidence of headache was 50% and the incidence of clinically significant distress or functional impairment was 13%. Typically, onset of symptoms occurred 12–24 h after abstinence, with peak intensity at 20–51 h, and for a duration of 2–9 days. 1% to 3% of caffeine is excreted unchanged in the urine. The rate of caffeine metabolism is variable, with a half-life of 4 to 6h.

**K2** Synthetic cannabis is a psychoactive designer drug derived from natural herbs sprayed with synthetic chemicals that, when consumed, allegedly mimic the effects of cannabis. It is best known by the brand names K2 and Spice, both of which have largely become genericized trademarks used to refer to any synthetic cannabis product. Studies suggest that synthetic cannabinoid intoxication is associated with acute psychosis, worsening of previously stable psychotic disorders, and also may have the ability to trigger a chronic (long-term) psychotic disorder among vulnerable individuals such as those with a family history of mental illness. When synthetic cannabis blends first went on sale in the early 2000s (decade), it was thought that they achieved an effect through a mixture of legal herbs. Laboratory analysis in 2008 showed that this is not the case, and that they in fact contain synthetic cannabinoids that act on the body in a similar way to cannabinoids naturally found in cannabis, such as THC. A large and complex variety of synthetic cannabinoids, most often cannabicyclohexanol, JWH-018, JWH-073, or HU-210, are used in an attempt to avoid the laws that make cannabis illegal, making synthetic cannabis a designer drug. It has been sold under various brand names, online, in head shops, and at some gas stations.

**FYL** Fentanyl is a synthetic opioid related to the phenylpiperidines.Fentanyl is approximately 100 times more potent than morphine. This agent is highly lipid soluble and rapidly cross the blood-brain barrier. This is reflected in the half-life for equilibration between the plasma and cerebrospinal fluid of approximately 5 minutes for fentanyl. The levels in plasma and cerebrospinal fluid decline rapidly owing to redistribution of fentanyl from highly perfused tissue groups to other tissues, such as muscle and fat. As saturation of less well-perfused tissue occurs, the duration of effect of fentanyl and sufentanil approaches the length of their elimination half-lives of between 3 and 4 hours. Fentanyl undergoes hepatic metabolism and renal excretion. Therefore, with the use of higher doses or prolonged infusions, fentanyl becomes longer acting.

**COT** Cotinine is the first-stage metabolite of nicotine, a toxic alkaloid that produces stimulation of the autonomic ganglia and central nervous system when in humans. Nicotine is a drug to which virtually every member of a tobacco-smoking society is exposed whether through direct contact or second-hand inhalation. In addition to tobacco, nicotine is also commercially available as the active ingredient in smoking replacement therapies such as nicotine gum, transdermal patches and nasal sprays. In a 24-hour urine, approximately 5% of a nicotine dose is excreted as unchanged drug with 10% as cotinine and 35% as hydroxycotinine; the concentrations of other metabolites are believed to account for less than 5%. While cotinine is thought to be an inactive metabolite, its elimination profile is more stable than that of nicotine which is largely urine pH dependent. As a result, cotinine is considered a good biological marker for determining nicotine use. The plasma half-life of nicotine is approximately 60 minutes following inhalation or parenteral administration. Nicotine and cotinine are rapidly eliminated by the kidney; the window of detection for cotinine in urine at a cutoff level of 200 ng/mL is expected to be up to 2-3 days after nicotine use.

**MQL** Methaqualone is classified as a sedative/hypnotic. It was originally synthesized in India to combat malaria but found to be ineffective. Methaqualone did prove effective as a sedative and was developed in the hopes of avoiding some of the adverse effects of the barbiturates, particularly their high capacity for addiction. Unfortunately, methaqualone was found to be just as addictive. Physiologically, methaqualone is cumulative, and tolerance occurs rapidly in some individuals. In addition, it is extensively metabolized,at least 12 hydroxylated metabolites having been identified in the urine. The major metabolites are methaqualone-N-oxide, conjugate 4'-hydroxy-methaqualone,conjugated 2-hydroxymethaqualone>About 2% of methaqualone is excreted unchanged within 24 hours.40-50% of the methaqualone is excreted as metabolites within 72 hours, mostly as the glucuronide conjugates. The half-life for methaqualone averages 33 to 36 hours. It can be detected up to four days after administration.Side effects from chronic use of methaqualone are loss of motor coordination,walking into walls,ataxia,slurred speech,drowsiness and nystagmus.Severe acute overdose tends to produce muscle spasms, abnormally rapid reflexes,extreme muscle tension and restlessness.

**K4** Synthetic Cannabinoids are chemical compounds that mimic the effects of THC, the main active ingredient of cannabis. They bind to the cannabinoid receptors in the brain and were developed to avoid the legal issues of cannabis. The two most common synthetic cannabinoids were JWH-018 and JWH-073.11 new versions of these include AM1248, AMK48, UR144 and XLR11. UR144 is the new generation of synthetic cannabinoids and is chemically different to the first generation. New generations of synthetic cannabinoids are continuously emerging to replace the synthetic cannabinoids that have been made illegal. The naphlene ring in JWH-018 is substituted with a tetramethylcyclopropyl group to form UR144.

**α -PVP** α-PVP is the active ingredient in drugs commonly sold as "bath salts", "flakka" or "gravel" which have gained popularity since the mid-2000s due to their potency and low cost. α-PVP is a derivative of MDPV- the only difference being the removal of the 3,4-methylenedioxy group from the MDPV molecule. Bath salt blends such as α-PVP are marketed as alternatives to internationally controlled drugs that are often adulterated with other synthetic cathinones, methamphetamine or clonazepam. Reported effects of α-PVP include euphoria, increased alertness, tachycardia, hypertension, hyperthermia, diaphoresis, seizures and even cardiac arrest.

**GHB** Gamma-hydroxybutyric acid (GHB) is a colorless, odorless chemical and has become one of the most dangerous illicit drugs of abuse today. It has become known as one of the "date rape" drugs and there is an increasing trend that GHB is being used as a recreational drug.

**MDPHP** MDPHP is a psychoactive drug with stimulant properties which acts as a norepinephrine-dopamine reuptake inhibitor. The primary psychological effects have a duration of roughlyly 3 to 4 hours, with after effects such as tachycardia, hypertension, and mild stimulation lasting from 6 to 8 hours. The second largest group of new drugs monitored by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) for synthetic cathinones, Substances that are controlled by the law are immediately replaced by new uncontrolled derivatives that cause constant and dynamic changes on the drug market . The MDPHP is a recent synthetic cathinones that have appear on the "legal highs" market.

**PRINCIPLE** The DOA Test is based on the principle of specific immunochemical reaction between antibodies and antigen to analyse particular compound in human urine specimen. The assay relies on the competition for binding antibody. When drug is present in the urine specimen, it competes with drug conjugate for the limited amount of antibody-dye conjugate. When the amount of drug is equal or more than the cut-off, it will prevent the binding of drug conjugate to the antibody. Therefore, a positive urine specimen will not show a colored band on the test line zone, indicating a positive result, while the presence of a colored band indicates a negative result.

A control line is present in the test window to work as procedural control. This colored band should always appear on the control line zone if the test device is stored in good condition and the test is performed appropriately.

## MATERIAL PROVIDED

1. A DOA Test. The amount of each coated antigen and/or antibody on the strip is less than 1.0 mg for antigen conjugate and is less than 1.0 mg for goat anti-rabbit IgG antibody.  
Test zone: contains drug bovine protein antigen conjugates  
Control zone: contains Goat anti-rabbit IgG antibody  
Conjugate pad: contains anti-drug antibody.
2. Transfer pipette (for the DOA Test Cassette only)
3. Instructions for use.

## MATERIAL REQUIRED BUT NOT PROVIDED

1. Urine collection container.
2. Timer or clock.

## STORAGE AND STABILITY

The DOA Test should be stored at 2 to 30°C and will be effective until the expiration date stated on the package. The product is humidity-sensitive and should be used immediately after being open. Any improperly sealed product should be discarded.

## PRECAUTIONS

1. For in vitro diagnostic and forensic use only.
2. Do not use the product beyond the expiration date.
3. Handle all specimens as potentially infectious.
4. Humidity sensitive product. Do not open foil pouch until it is ready to be tested.
5. Use a new urine specimen cup for each sample to avoid cross contamination.

## SPECIMEN COLLECTION AND PREPARATION

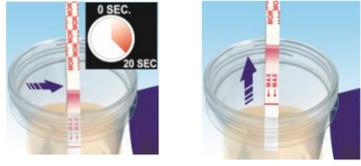
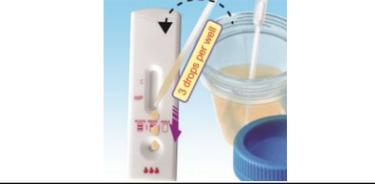
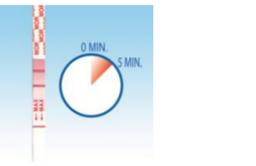
Fresh urine does not require any special handling or pretreatment. Specimen should be collected in a clean, dry, plastic or glass container. If the assay is not performed immediately, urine specimen may be refrigerated at 2-8 °C or frozen up to 7 days. Specimens should be brought to room temperature before testing. Urine specimens exhibiting a large amount of precipitate or turbidity should be centrifuged or allowed to settle before testing. Avoid contact with skin by wearing gloves and proper laboratory attire.

## QUALITY CONTROL

Good Laboratory practice recommends the daily use of control materials to validate the reliability of device. Control materials should be assayed as clinical specimen and challenging to the assay cutoff concentration, e.g., 50% above and below cutoff concentration. If control values do not fall within established range, assay results are invalid. Control materials, which are not provided with this test kit, are commercially available.

The DOA Test provides a built-in process control with a different antigen/antibody reaction at the control region (C). This control line should always appear regardless the presence of drug or metabolite. If the control line does not appear, the test device should be discarded and the obtained result is invalid. The presence of this control band in the control region serve as 1) verification that sufficient volume is added, 2) that proper flow is obtained.

## PROCEDURE

1	
Bring all materials and specimens to room temperature.	
2	
Remove the DOA test from sealed foil pouch.	
3 (For DOA Test Cassette Only)	
Place the DOA Test Cassette on a flat surface and label the device with patient ID.	
4	4
Place the sample pad end into the urine specimen. Take care to hold each pad in the urine without touching the plastic container.	Place the transfer pipette in the specimen and depress the bulb to withdraw a sample.
	
5	5
Hold the device in the urine sample until a reddish color appears in the test area (approximately 20 seconds)*. Remove the strip from the urine sample.	Hold the pipette in a vertical position over the sample well of the test cassette and deliver 2-3 drops (80-120 µl) of sample into each of the sample wells
	
6	
Read the results at 5 minutes after adding the sample.	
	

**Caution: Results after 10 minutes may not be accurate.**

## INTERPRETATION OF RESULTS

### Negative:

Colored bands show on both test line zone (T) and control line zone (C). This is an indication of negative result for the test. The negative result does not indicate the absence of drug in the specimen; it only indicates the level of tested drug in the specimen is less than cut-off level.

### Positive:

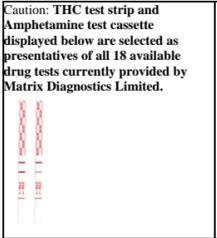
One colored band form. One colored band appears in control line zone. No colored band is found in test line zone (T). This is an indication

the level of tested drug in the specimen is above the cut-off level.

### Invalid:

If there is no colored band in control line zone (C), the test result is invalid. Retest the sample with a new device.

**Note: A borderline(+/-) in test line zone should be considered negative result.**

		
<b>NEGATIVE</b>	<b>POSITIVE</b>	<b>INVALID</b>
		
<b>NEGATIVE</b>	<b>POSITIVE</b>	<b>INVALID</b>

<b>GHB</b>	0		<b>GHB</b> (µg/mL)	Use the color chart on the product pouch to interpret GHB levels at the three indicated semi-quantitative GHB concentrations. The 0µg/mL level indicates that no significant GHB is present, the 10µg/mL level and the 50µg/mL level indicates a presumptive positive.
	10			
	50			

## LIMITATION OF PROCEDURE

The assay is designed for use with human urine only. A positive result with the test indicates only the presence of a drug/metabolite and does not indicate or measure intoxication. There is a possibility that technical or procedural error as well other substances in certain foods and medicines may interfere with the test and cause false results. Please refer to "SPECIFICITY" section for lists of substances that will produce either positive results, or that do not interfere with test performance. If a drug/metabolite is found present in the urine specimen, the assay does not indicate frequency of drug use or distinguish between drug of abuse and certain foods and medicines.

## EXPECTED RESULTS

The DOA Test is a qualitative assay. It identifies the selected drug in human urine at its cut-off concentration or higher. The concentration of the drug cannot be determined by this assay. The test is intended to distinguish negative result from presumptive positive result. All positive results must be confirmed using an alternate method, preferably GC/MS.

## PERFORMANCE CHARACTERISTICS

### A. Accuracy

The accuracy of the DOA Test was evaluated in each individual strip and in comparison to GC/MS method at the following concentration: d-amphetamine 300/500/1000ng/ml (AMP), Secobarbital 200/300 ng/ml (BAR), Oxazepam, 100/200/300 ng/ml (BZO), Buprenorphine-3-β-d-glucuronide 5/10ng/ml (BUP), Benzoylcegonine 100/200/300ng/ml (COC), EDDP 100/300ng/ml (EDDP), Ketamine 300/500/1000ng/ml (KET), methadone 300 ng/ml (MTD), MDMA 300/500/1000ng/ml (MDMA), (+)methamphetamine 300/500/1000 ng/ml (MET), morphine 100/200/300 ng/ml (OPI), morphine 1000/2000 ng/ml (OPI II ), oxycodone 100/300ng/ml (OXY), phencyclidine 25 ng/ml (PCP),11-nor-Δ<sup>9</sup>-THC-9-COOH 25/50/150/200/300/500ng/ml (THC),Norpropoxyphene 300ng/ml(PPX),Tramadol 200/300 ng/ml (TML), Nortriptyline 300/1000 ng/ml (TCA), 6-Acetylmorphine 10 ng/ml (6-MAM), Zolpidem Phenyl-4-carboxylicacid 25/50 ng/ml(ZOL), Zopiclone 50ng/ml(ZOP), Hydromorphone 250ng/ml (HMO), Methyphenidate 150ng/ml(MPD), Lysergic acid diethylamide 20/50 ng/ml (LSD), Pregabalin 500/1000 ng/ml (PGB), 3,4-Methylenedioxypropylveralone 500/1000 ng/ml (MDPV), Methcathinone 100/500 ng/ml (MCAT), Mephedrone 500 ng/ml (MEP), Ethyl Glucuronide 500/1000 ng/ml(ETG), Gabapentin 2000 ng/ml (GAB), Carfentanil 500 ng/ml (CFYL),AB-PINACA 25 ng/ml (K2-AB), Caffeine 8000 ng/ml (CAF), Gamma-hydroxybutyric acid 10 µg/ml (GHB), JHW-018 , JWH-073 30/50 ng/ml(K2), Fentanyl 10 ng/ml(FYL),Cotinine 200ng/ml(COT), Methaqualone 300 ng/ml(MQL), K4 Synthetic Cannabinoids 25ng/ml(K4) , α -PVP 500ng/ml(α -PVP) and MDPHP 500 ng/ml.

1. **Amphetamine** The accuracy of the amphetamine test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 300/500/1000 ng/ml. Three hundred and forty five (345) urine specimens were evaluated in this study. The results are summarised and presented below:  
AMP1000 Positive % agreement:96.1, Negative % agreement: 100  
AMP300 Positive % agreement:95.8, Negative % agreement: 100 AMP500 Positive % agreement:95.9, Negative % agreement: 100

2. **Barbiturate** The accuracy of the barbiturate test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 200/300 ng/ml of secobarbital. One hundred and thirteen (113) urine specimens were evaluated in this study. The results are summarised as below:  
Bar200 Positive % agreement: 97.8, Negative % agreement: 98.1. Bar200 Positive % agreement: 97.8, Negative % agreement: 98.1.

3. **Benzodiazepine** The accuracy of the benzodiazepine test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 100/200/300 ng/ml of oxazepam. Three hundred and forty four (344) urine specimens were evaluated in this study. The results are summarised as below:  
BZO100 Positive % agreement: 95.9, Negative % agreement: 98 BZO200 Positive % agreement: 97.4, Negative % agreement: 98.2  
BZO300 Positive % agreement: 95.3, Negative % agreement: 92.9

4. **Buprenorphine** The accuracy of the buprenorphine test was evaluated in comparison to GC/MS at a cut-off of 5/10 ng/ml of buprenorphine-3-β-d-glucuronide. One hundred and one (101) urine specimens were evaluated in this study. The results are summarised as below:  
BUP5 Positive % agreement: 100, Negative % agreement: 100. BUP10 Positive % agreement: 100, Negative % agreement: 100.

5. **Cocaine** The accuracy of the cocaine test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 100/200/300 ng/ml of benzoylcegonine. Three hundred and forty four (344) urine specimens were evaluated in this study. The results are summarised as below:  
COC100 Positive % agreement: 98.2, Negative % agreement: 98.1 COC200 Positive % agreement: 95.7, Negative % agreement: 98.1  
COC300 Positive % agreement: 98.2, Negative % agreement: 98.1

6. **EDDP** The accuracy of the methadone metabolite (EDDP) test was evaluated in comparison to GC/MS method at a cut-off of 100 ng/ml EDDP. Ninety nine (99) specimens were evaluated in this study. The results are summarised as below:  
EDDP100 Positive % agreement: 95.8, Negative % agreement: 100 EDDP300 Positive % agreement: 98.6, Negative % agreement: 100

7. **Ketamine** The accuracy of the ketamine test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 300/500/1000 ng/ml of ketamine. Three hundred and forty four (344) urine specimens were evaluated in this study. The results are summarised as below:  
KET300 Positive % agreement: 98, Negative % agreement: 98.6 KET500 Positive % agreement: 98, Negative % agreement: 98.6  
KET1000 Positive % agreement: 98, Negative % agreement: 98.6

- 8.**MDMA** The accuracy of the MDMA test was evaluated in comparison to GC/MS at a cut-off of 300/500/1000 ng/ml of (+)methylenedioxyamphetamine. Eighty (80) urine specimens with GC/MS confirmed MDMA concentration were evaluated in this study. The results are summarised and presented below:  
MDMA300 Positive % agreement: 96, Negative % agreement: 95 MDMA500Positive % agreement: 98.5, Negative % agreement: 98.2  
MDMA1000 Positive % agreement: 100, Negative % agreement: 100

9. **Methodone** The accuracy of the methodone test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 300 ng/ml of methodone. Three hundred and forty four (344) urine specimens were evaluated in this study. The results are summarised as below:  
Positive % agreement: 100, Negative % agreement: 100.
10. **Methamphetamine** The accuracy of the methamphetamine test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 300/500/1000 ng/ml of (+)methamphetamine. Three hundred and forty four (344) urine specimens were evaluated in this study. The results are summarised as below:  
MDMA300 Positive % agreement: 96.8, Negative % agreement: 100 MDMA500 Positive % agreement: 96.9, Negative % agreement: 100  
MDMA1000 Positive % agreement: 96.8, Negative % agreement: 100

11. **Opiate** The accuracy of the opiate test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 100/200/300 ng/ml of morphine. Three hundred and forty four (344) urine specimens were evaluated in this study. The results are summarised as below:  
OPI100 Positive % agreement:96.1, Negative % agreement: 100 OPI200 Positive % agreement:96.1, Negative % agreement: 100  
OPI300 Positive % agreement:96.8, Negative % agreement: 97.9

12. **Opiate II** The accuracy of the opiate II test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 1000/2000 ng/ml of morphine. One hundred and eight (108) urine specimens were evaluated in this study. The results are summarised as below:  
OPI1000 Positive % agreement: 97.6, Negative % agreement: 98.4. OPI2000 Positive % agreement: 94, Negative % agreement: 100.0.

13. **Oxycodone** The accuracy of the oxycodone test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 100/300 ng/ml of oxycodone. One hundred and forty four (140) urine specimens were evaluated in this study. The results are summarised as below:  
OXY100 Positive % agreement: 98, Negative % agreement: 97 OXY300 Positive % agreement: 96.1, Negative % agreement: 100

14. **Phencyclidine** The accuracy of the PCP test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 25 ng/ml of phencyclidine. Eighty (80) urine specimens were evaluated in this study. The results are summarised as below:  
PCP25 Positive % agreement: 97.8, Negative % agreement:100

15. **Propoxyphene** The accuracy of the propoxyphene test was evaluated in comparison to GC/MS method at a cut-off of 300 ng/ml of nor-propoxyphene. Ninety one (91) propoxyphene positive specimens with GC/MS confirmed nor-Propoxyphene concentration and forty (40) were evaluated in this study. The results are summarised as below:  
PPX300 Positive % agreement: 97.8, Negative % agreement:100

16. **THC** The accuracy of the THC test was evaluated in comparison to GC/MS method and commercial kits at a cut-off of 25/50/150/200/300/500 ng/ml of 11-nor-Δ<sup>9</sup>-THC-9-COOH. Three hundred and forty four (344) urine specimens were evaluated in this study. The results are summarised as below:  
THC25 Positive % agreement: 96.8, Negative % agreement: 100 THC50 Positive % agreement: 96.8, Negative % agreement: 98.3  
THC150 Positive % agreement: 98.4, Negative % agreement: 98.3 THC200 Positive % agreement: 96.1, Negative % agreement: 100  
THC300Positive % agreement: 100, Negative % agreement: 99 THC500Positive % agreement: 98.2, Negative % agreement: 99

17. **Tramadol** The accuracy of the tramadol test was evaluated in comparison to GC/MS at a cut-off of 100/300 ng/ml of tramadol Eighty one (81) urine specimens with GC/MS confirmed tramadol concentration were evaluated in this study. The results are summarised and presented below:  
TRA100 Positive % agreement: 95, Negative % agreement: 98 TRA300 Positive % agreement: 95, Negative % agreement: 98

18. **TCA** The accuracy of the TCA test was evaluated in comparison to GC/MS at a cut-off of 300/1000 ng/ml of Nortriptyline. One hundred (100) urine specimens with GC/MS confirmed Nortriptyline concentration were evaluated in this study. The results are summarised and presented below:  
TCA300 Positive % agreement: 92.1, Negative % agreement: 100 TCA1000Positive % agreement: 92.1, Negative % agreement: 100

19. **6-MAM** The accuracy of the 6-MAM test was evaluated in comparison to GC/MS at a cut-off of 10 ng/ml of 6-Acetylmorphine. One hundred and twenty one (121) urine specimens with GC/MS confirmed 6-Acetylmorphine concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 97, Negative % agreement: 100

20. **ZOL** The accuracy of the ZOL test was evaluated in comparison to GC/MS at a cut-off of 25/50 ng/ml of Zolpidem Phenyl-4-carboxylic acid. Ninety six (96) urine specimens with GC/MS confirmed Zolpidem Phenyl-4-carboxylic acid concentration were evaluated in this study. The results are summarised and presented below:  
ZOL25 Positive % agreement: 96.3, Negative % agreement: 99 ZOL50 Positive % agreement: 96.3, Negative % agreement: 99

21. **LSD** The accuracy of the LSD test was evaluated in comparison to GC/MS at a cut-off of 20/50 ng/ml of Lysergic acid diethylamide. Ninety five (95) urine specimens with GC/MS confirmed Lysergic acid diethylamide concentration were evaluated in this study. The results are summarised and presented below:  
LSD20 Positive % agreement: 100, Negative % agreement: 100 LSD50 Positive % agreement: 100, Negative % agreement: 100

22. **PGB** The accuracy of the PGB test was evaluated in comparison to GC/MS at a cut-off of 500/1000 ng/ml of Pregabalin. One hundred and thirty two (132) urine specimens with GC/MS confirmed Pregabalin concentration were evaluated in this study. The results are summarised and presented below:  
PGB500 Positive % agreement: 96, Negative % agreement: 98 PGB1000 Positive % agreement: 96, Negative % agreement: 98

- 23.**MDPV** The accuracy of the MDPV test was evaluated in comparison to GC/MS at a cut-off of 500/100 ng/ml of 3,4-Methylenedioxypropylveralone. One hundred and six (106) urine specimens with GC/MS confirmed 3,4-Methylenedioxypropylveralone concentration were evaluated in this study. The results are summarised and presented below:  
MDPV500 Positive % agreement: 99, Negative % agreement: 100 MDPV1000 Positive % agreement: 99, Negative % agreement: 100

24. **MCAT** The accuracy of the MCAT test was evaluated in comparison to GC/MS at a cut-off of 500 ng/ml of Methcathinone. Eighty eight (88) urine specimens with GC/MS confirmed Methcathinone concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 100, Negative % agreement: 97

- 25.**MEP** The accuracy of the MEP test was evaluated in comparison to GC/MS at a cut-off of 500 ng/ml of Mephedrone. Two hundred and three (203) urine specimens with GC/MS confirmed Mephedrone concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 97, Negative % agreement: 99

26. **GAB** The accuracy of the GAB test was evaluated in comparison to GC/MS at a cut-off of 2000 ng/ml of Gabapentin. One hundred and fifty nine (159) urine specimens with GC/MS confirmed Gabapentin concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 97, Negative % agreement: 100

27. **CFYL** The accuracy of the CFYL test was evaluated in comparison to GC/MS at a cut-off of 500 ng/ml of Carfentanil. One hundred and seventy eight (178) urine specimens with GC/MS confirmed Carfentanil concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 98, Negative % agreement: 100

28. **K2-AB** The accuracy of the K2-AB test was evaluated in comparison to GC/MS at a cut-off of 25 ng/ml of AB-PINACA. Two hundred and twenty five (225) urine specimens with GC/MS confirmed AB-PINACA concentration were evaluated in this study. The results are summarised and presented below:

Positive % agreement: 99, Negative % agreement: 98

29. **CAF** The accuracy of the CAF test was evaluated in comparison to GC/MS at a cut-off of 8000 ng/ml of Caffeine. One hundred and ninety four (194) urine specimens with GC/MS confirmed Caffeine concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 95, Negative % agreement: 100

30. **ETG** The accuracy of the ETG test was evaluated in comparison to GC/MS at a cut-off of 500/1000 ng/ml of Ethyl-β-D-glucuronide. One hundred and eighty (180) urine specimens with GC/MS confirmed Ethyl-β-D-glucuronide concentration were evaluated in this study. The results are summarised and presented below:  
ETG 500 Positive % agreement: 97, Negative % agreement: 100 ETG 1000 Positive % agreement: 97, Negative % agreement: 100

31. **K2** The accuracy of the K2 test was evaluated in comparison to GC/MS at a cut-off of 30/50 ng/ml of JWH-018-5 pentanoic. One hundred and fifty-five (155) urine specimens with GC/MS confirmed JWH-018-5 pentanoic concentration were evaluated in this study. The results are summarised and presented below:  
K2 30 Positive % agreement: 98.9, Negative % agreement: 100 K2 50 Positive % agreement: 98.9, Negative % agreement: 100

32. **COT** The accuracy of the COT test was evaluated in comparison to GC/MS at a cut-off of 200/300/600/1000 ng/ml of (-)-Cotinine. One hundred and sixty (160) urine specimens with GC/MS confirmed (-)-Cotinine concentration were evaluated in this study. The results are summarised and presented below:  
COT 200 Positive % agreement: 97.7, Negative % agreement: 97.9 COT 300 Positive % agreement: 97.9, Negative % agreement: 100  
COT 600 Positive % agreement: 96.5, Negative % agreement: 98 COT 1000Positive % agreement: 99, Negative % agreement: 100

33. **FYL** The accuracy of the FYL test was evaluated in comparison to GC/MS at a cut-off of 10/20 ng/ml of Fentanyl. One hundred and seventy-five (175) urine specimens with GC/MS confirmed Fentanyl concentration were evaluated in this study. The results are summarised and presented below:  
FYL10 Positive % agreement: 96.8, Negative % agreement: 100 FYL20 Positive % agreement: 94.4, Negative % agreement: 100

34. **MQL** The accuracy of the MQL test was evaluated in comparison to GC/MS at a cut-off of 300 ng/ml of Methaqualone. Two hundred and five (205) urine specimens with GC/MS confirmed Methaqualone concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 100, Negative % agreement: 98

35. **MPD** The accuracy of the MPD test was evaluated in comparison to GC/MS at a cut-off of 150 ng/ml of Methylphenidate. Eighty (275) urine specimens with GC/MS confirmed MPD concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 98, Negative % agreement: 98.4

36. **HMO** The accuracy of the Hydromorphone test was evaluated in comparison to GC/MS at a cut-off of 250 ng/ml of Hydromorphone. Eighty (120) urine specimens with GC/MS confirmed HMO concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 100, Negative % agreement: 100

37. **ZOP** The accuracy of the Zopiclone test was evaluated in comparison to GC/MS at a cut-off of 300 ng/ml of Zopiclone. Eighty (80) urine specimens with GC/MS confirmed ZOP concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 99.9, Negative % agreement: 99.9

- 38.**K4** The accuracy of the MDMA test was evaluated in comparison to GC/MS at a cut-off of 500 ng/ml of (+)methylenedioxyamphetamine. Eighty (80) urine specimens with GC/MS confirmed MDMA concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 96, Negative % agreement: 95

- 39α -PVP The accuracy of the α -PVP test was evaluated in comparison to GC/MS at a cut-off of 500 ng/ml of α -PVP. Eighty (80) urine specimens with GC/MS confirmed α -PVP concentration were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 96.3, Negative % agreement: 100

40. **MDPHP** The accuracy of MDPHP test was evaluated in comparison to GC/MS at a cut off of 500 ng/ml of MDPHP. specimens were evaluated in this study. The results are summarised and presented below:  
Positive % agreement: 100, Negative % agreement: 100

## B. Sensitivity

The cut-off concentrations (sensitivity level) of the various DOA Tests are determined to be: AMP 300/500/1000 ng/ml, BAR, 200/300 ng/ml, BZO 100/200/300 ng/ml, BUP 5/10 ng/ml, COC 100/200/300 ng/ml, EDDP 100/300 ng/ml, KET 300/500/1000 ng/ml, MTD 300 ng/ml, MET 300/500/1000 ng/ml, MDMA 300/ 500/1000 ng/ml, OPI 100/200/300 ng/ml, OPI II 1000/2000 ng/ml, OXY 100/300 ng/ml, PCP 25 ng/ml , PPX 300 ng/ml, THC25/ 50/150/200/300/500 ng/ml, TML 100/300 ng/ml, TCA 300/1000 ng/ml, 6-MAM 10 ng/ml, ZOL 25/50 ng/ml, ZOP 50 ng/ml, HMO 250 ng/ml MPD 150 ng/ml, LSD 20/50 ng/ml, PGB 500/1000 ng/ml, MDPV 500/1000 ng/ml, MCAT 100/500 ng/ml, MEP 500 ng/ml, GAB 2000 ng/ml, CFYL 500 ng/ml, K2-AB 25 ng/ml, CAF 8000 ng/ml, ETG 500/1000 ng/ml, K2 30/50 ng/ml, COT 200/300/600/1000 ng/ml, FYL 10/20 ng/ml, MQL 300 ng/ml, K4 25 ng/ml, α-PVP 500ng/ml, GHB 10µg/ml and MDPHP 500 ng/ml.

## C. Precision

The precision of the DOA Test was determined by conducting the test with spiked controls and interpreted the results by three individuals to verify the random error of visual interpretation. The results of 40 samples each of 50% above and 50% below cut-off specimens are 100% agreed by three observers. The test results were found to have no significant differences between these three observers.

## D. Specificity

The specificity for the DOA Test was tested by adding various drugs, drug metabolites, and other compounds that are likely to be present in urine. All compounds were prepared in drug-free normal human urine.

### 1. Interference Testing

Performance of the DOA Tests at cut-off level is not affected when pH and Specific Gravity ranges of urine specimen are at 4.5 to 9.0 and 1.005 to 1.035. The following substances were tested and confirmed did not interfere with each of the DOA Tests at the listed concentrations.

Glucose	2000 mg/dl
Human albumin	2000 mg/dl
Human hemoglobin	10 mg/dl
Urea	4000 mg/dl
Uric acid	10 mg/dl

### 2. Specificity

The following table lists compounds that are detected by the selected drug of the DOA Tests which produced positive results when tested at levels equal or greater than the concentrations listed below:

	Compound	Concentration (ng/ml)	Cross reactivity
Amphetamine 1000	D - Amphetamine	1000	100%
	L - Amphetamine	20000	5%
	DL - Amphetamine	3000	33.3%
	Phentermine	30000	3.3%
	Hydroxyamphetamine	8000	12.5%
	Methylenedioxyamphetamine (MDA)	1000	100%
	d-Methamphetamine	>100,000	<1%
	1-Methamphetamine	>100,000	<1%
	Ephedrine	>100,000	<1%
	Methylenedioxyethylamphetamine (MDE)	>100,000	<1%
Amphetamine 500	D - Amphetamine	500	100%

	L - Amphetamine	10000	5%
	DL - Amphetamine	1200	41.7%
	Phentermine	15000	3.3%
	Hydroxyamphetamine	4000	12.5%
	Methylenedioxyamphetamine (MDA)	500	100%
	d-Methamphetamine	>100,000	<0.5%
	l-Methamphetamine	>100,000	<0.5%
	Ephedrine	>100,000	<0.5%
	Methylenedioxyethylamphetamine (MDE)	>100,000	<0.5%
	3,4-methylenedioxy-methamphetamine (MDMA)	>100,000	<0.5%
Amphetamine 300	D - Amphetamine	300	100%
	L - Amphetamine	6000	5%
	DL - Amphetamine	600	50%
	Phentermine	7500	4%
	Hydroxyamphetamine	2000	15%
	Methylenedioxyamphetamine (MDA)	300	100%
	d-Methamphetamine	>100,000	<0.3%
	l-Methamphetamine	>100,000	<0.3%
	Ephedrine	>100,000	<0.3%
	Methylenedioxyethylamphetamine (MDE)	>100,000	<0.3%
3,4-methylenedioxy-methamphetamine (MDMA)	>100,000	<0.3%	
Barbiturates 300	Secobarbital	300	100%
	Amobarbital	1000	30%
	Alphenol	62.5	480%
	Aprobarbital	250	120%
	Butabarbital	100	300%
	Butathal	500	60%
	Butalbital	5000	6%
	Cyclopentobarbital	500	60%
	Pentobarbital	200	150%
	Phenobarbital	300	100%
Barbiturates 200	Secobarbital	200	100%
	Allobarbital	820	24.4%
	Alphenal	500	40%
	Amobarbital	500	40%
	Aprobarbital	130	153.8%
	Butabarbital	70	285.7%
	Butalbital	1,800	11.1%
	Butethal	150	133.3%
	Cyclopentobarbital	300	66.7%
	Pentobarbital	730	27.4%
Phenobarbital	200	100%	
Benzodiazepines 300	Oxazepam	300	100%
	Alprazolam	125	240%
	Bromazepam	625	480%
	Chlordiazepoxide	2500	12%
	Clobazam	63	476.2%
	Clonazepam	2500	12%
	Clorazepate	3330	9%
	Desalkflurazepam	250	120%

	Diazepam	250	120%
	Estazolam	5000	6%
	Fentanyl	>100,000	<0.3%
	Flunitrazepam	375	60%
	Flurazepam	>100,000	<0.3%
	Lorazepam	1250	24%
	Lormetazepam	1250	24%
	Medazepam	>100,000	<0.3%
	Midazolam	>100,000	<0.3%
	Nitrazepam	25000	1.2%
	Norchlordiazepoxide	250	120%
	Nordiazepam	500	60%
	Prazepam	>100,000	<0.3%
	Temazepam	63	476.2%
	Triazolam	5000	6%
Benzodiazepines 200	Oxazepam	200	100%
	Alprazolam	83	241%
	Bromazepam	417	48%
	Chlordiazepoxide	1,667	12%
	Clobazam	42	476.2%
	Clonazepam	1,667	12%
	Clorazepate	2,220	9%
	Desalkflurazepam	167	119.8%
	Diazepam	167	119.8%
	Estazolam	3,333	6.0%
	Fentanyl	>100,000	<0.2%
	Flunitrazepam	250	80.0%
	Flurazepam	>100,000	<0.2%
	Lorazepam	833	24.0%
	Lormetazepam	833	24.0%
	Medazepam	>100,000	<0.2%
	Midazolam	>100,000	<0.2%
	Nitrazepam	16,667	1.2%
	Norchlordiazepoxide	167	119.8%
	Nordiazepam	333	60.1%
Prazepam	>100,000	<0.2%	
Temazepam	42	476.2%	
Triazolam	3,333	6.0%	
Benzodiazepines 100	Oxazepam	100	100%
	Alprazolam	42	238.1%
	Bromazepam	208	48.1%
	Chlordiazepoxide	833	12.0%
	Clobazam	21	476.2%
	Clonazepam	833	12.0%
	Clorazepate	1,110	9.0%
	Desalkflurazepam	83	120.5%
	Diazepam	83	120.5%
	Estazolam	1,667	6.0%
	Fentanyl	>100,000	<0.1%
	Flunitrazepam	125	80.0%

	Flurazepam	>100,000	<0.1%
	Lorazepam	417	24.0%
	Lormetazepam	417	24.0%
	Medazepam	>100,000	<0.1%
	Midazolam	>100,000	<0.1%
	Nitrazepam	8,333	1.2%
	Norchlordiazepoxide	83	120.5%
	Nordiazepam	167	59.9%
	Prazepam	>100,000	<0.1%
	Temazepam	21	476.2%
	Triazolam	1,667	6.0%
Buprenorphine 10	Buprenorphine	10	100%
	Buprenorphine-3-β-D-Glucuronide	10	100%
	Norbuprenorphine	50	20%
	Norbuprenorphine-3-β-D-Glucuronide	100	10%
Buprenorphine 5	Buprenorphine	5	100%
	Buprenorphine-3-β-D-Glucuronide	5	100%
	Norbuprenorphine	25	20%
	Norbuprenorphine-3-β-D-Glucuronide	50	10%
Cocaine 300	Benzoyllecgonine	300	
	Cocaine	1,000	30.0%
	Ecgonine	100,000	0.3%
	Ecgonine Methyl Ester	>100,000	<0.3%
Cocaine 200	Benzoyllecgonine	200	100%
	Cocaine	125	160%
	Ecgonine	5,000	4%
	Ecgonine Methyl Ester	>100,000	<0.2%
Cocaine 100	Benzoyllecgonine	100	100%
EDDP 100	EDDP	100	100%
	Meperidine	>100,000	<0.1%
	Methadone	>100,000	<0.1%
	Norfentanyl	>100,000	<0.1%
	Phencyclidine	>100,000	<0.1%
	Promazine	50,000	0.2%
	Promethazine	25,000	0.4%
	Prothipendyl	50,000	0.2%
	Prozine	12,500	0.8%
EDDP 300	EDDP	300	100%
	Meperidine	>100,000	<0.3%
	Methadone	>100,000	<0.3%
	Norfentanyl	>100,000	<0.3%
	Phencyclidine	>100,000	<0.3%
	Promazine	80,000	0.38%
	Promethazine	75,000	0.4%
	Prothipendyl	80,000	0.38%
	Prozine	37,500	0.8%
Ketamine 1000	Ketamine	1,000	100%
	Norketamine	1,000	100%
	Dextromethorphan	500	200%
Ketamine 300	Ketamine	300	100%

Ketamine 500	Ketamine	500	100%
	Norketamine	500	100%
	Dextromethorphan	250	200%
	Dextropropranolol tartrate	250	200%
	D-Norpropoxyphene	15,000	3.3%
	Meperidine	6,250	8%
	Mephentermine hemisulfate salt	7,500	6.7%
	D-Methamphetamine	6,125	8.2%
	3,4-Methylenedioxyethylamphetamine (MDEA)	12,500	4%
	Nordoxepin hydrochloride	12,500	4%
Methadone 300	Phencyclidine	2,500	20%
	Promazine	4,000	12.5%
	Promethazine	12,500	4%
	Methaqualone	300	100%
	Amiripityline	50,000	0.6%
	Carbamazepine	20,000	1.5%
	Nortriptyline	50,000	0.6%
	Phenytoin	40,000	0.8%
	Theophylline	40,000	0.8%
Methamphetamine 1000	D(+)-Methamphetamine	1000	100%
	(+/-)-3,4-Methylenedioxy-n-ethylamphetamine(MDEA)	10,000	10%
	D/L-Methamphetamine	1000	100%
	p-Hydroxymethamphetamine	10,000	10%
	D-Amphetamine	>100,000	<1%
	L-Amphetamine	>100,000	<1%
	Chloroquine	50,000	2%
	(+/-)-Ephedrine	4000	25%
	L-Methamphetamine	10000	10%
	(+/-)-3,4-Methylenedioxyamphetamine (MDA)	>100,000	<1%
(+/-)-3,4-methylenedioxy-methamphetamine(MDMA)	500	200%	
Methamphetamine 500	β-Phenylethylamine	7500	13.3%
	Trimethobenzamide	20,000	5%
	D(+)-Methamphetamine	500	100%
	(+/-)-3,4-Methylenedioxy-n-ethylamphetamine(MDEA)	5000	10%
	D/L-Methamphetamine	500	100%
	p-Hydroxymethamphetamine	5000	10%
	D-Amphetamine	>100,000	<0.5%
	L-Amphetamine	>100,000	<0.5%
	Chloroquine	40,000	1.3%
	(+/-)-Ephedrine	2000	25%
L-Methamphetamine	5000	10%	
(+/-)-3,4-Methylenedioxyamphetamine (MDA)	>100,000	<0.5%	
(+/-)-3,4-methylenedioxy-methamphetamine(MDMA)	400	125%	
β-Phenylethylamine	4000	12.5%	
Trimethobenzamide	10,000	5%	
Methamphetamine 300	D(+)-Methamphetamine	300	100%
	(+/-)-3,4-Methylenedioxy-n-ethylamphetamine(MDEA)	3000	10%
	D/L-Methamphetamine	300	100%
	p-Hydroxymethamphetamine	3000	10%
	D-Amphetamine	>100,000	<0.3%

	L-Amphetamine	>100,000	<0.3%
	Chloroquine	30,000	1%
	(+/-)-Ephedrine	1500	20%
	L-Methamphetamine	3000	10%
	(+/-)-3,4-Methylenedioxyamphetamine (MDA)	>100,000	<0.3%
	(+/-)-3,4-methylenedioxyamphetamine(MDMA)	250	120%
	β-Phenylethylamine	2500	12%
	Trimethobenzamide	6000	5%
MDMA 1000	3,4-Methylenedioxy-methamphetamine	1000	100%
	d-Amphetamine	>100,000	<1%
	l-Amphetamine	>100,000	<1%
	d-methamphetamine	>100,000	<1%
	l-methamphetamine	>100,000	<1%
	3,4-Methylenedioxyamphetamine	5,000	20%
	3,4-Methylenedioxyethylamphetamine	300	333.3%
	Paramethoxyamphetamine	100,000	1%
	Paramethoxymethamphetamine	>100,000	<1%
MDMA 500	3,4-Methylenedioxy-methamphetamine	500	100%
	d-Amphetamine	>100,000	<0.5%
	l-Amphetamine	>100,000	<0.5%
	d-methamphetamine	>100,000	<0.5%
	l-methamphetamine	>100,000	<0.5%
	3,4-Methylenedioxyamphetamine	2,500	20%
	3,4-Methylenedioxyethylamphetamine	150	333.3%
	Paramethoxyamphetamine	50,000	1%
	Paramethoxymethamphetamine	>100,000	<0.1%
MDMA 300	3,4-Methylenedioxy-methamphetamine (MDMA)	300	100%
	3,4-Methylenedioxyamphetamine (MDA)	2,000	15%
	3,4-Methylenedioxyethylamphetamine	130	231%
	Paramethoxyamphetamine(PMA)	30,000	1%
	Paramethoxymethamphetamine(PMMA)	6,000	5%
Morphine 300	Morphine	300	100%
	Codeine	300	100%
	Ethylmorphine	310	96.8%
	Hydrocodone	25,000	1.2%
	Hydromorphone	10,000	3%
	Levorphanol	>100,000	<0.3%
	β-Acetylmorphine	250	120%
	Morphine 3-β-D-glucuronide	10000	3%
	Normorphine	100000	0.3%
	Oxycodone	>10,000	<0.3%
	Oxymorphone	>10,000	<0.3%
	Procaine	>10,000	<0.3%
	Thebaine	>10,000	<0.3%
	Heroin	500	60%
Morphine 200	Morphine	200	100%
	Codeine	200	100%
	Ethylmorphine	200	100%
	Hydrocodone	12,000	1.7%
	Hydromorphone	6500	3.1%

	Levorphanol	>100,000	<0.1%
	β-Acetylmorphine	170	117.6%
	Morphine 3-β-D-glucuronide	5000	4%
	Normorphine	100,000	0.2%
	Oxycodone	>10,000	<0.1%
	Oxymorphone	>10,000	<0.1%
	Procaine	>10,000	<0.1%
	Thebaine	>10,000	<0.1%
	Heroin	350	57.1%
Morphine 100	Morphine	100	100%
	Codeine	100	100%
	Ethylmorphine	100	100%
	Hydrocodone	6000	1.3%
	Hydromorphone	3000	3.3%
	Levorphanol	>100,000	<0.1%
	β-Acetylmorphine	100	100%
	Morphine 3-β-D-glucuronide	2000	5%
	Normorphine	100,000	0.1%
	Oxycodone	>10000	<0.1%
	Oxymorphone	>10000	<0.1%
	Procaine	>10000	<0.1%
	Thebaine	>10000	<0.1%
	Heroin	160	62.5%
Opiates 2000	Morphine	2,000	100%
	Acetylcodeine	1,563	128%
	Buprenorphine	25,000	8%
	Codeine	2000	100%
	Diacetylmorphine (Heroin)	5,000	40%
	Dihydrocodeine	1,563	128%
	Ethylmorphine	250	800%
	Hydromorphone	25,000	8%
	Hydrocodone	50,000	4%
	Merperidine	>100,000	<2%
	β-Monoacetylmorphine (6-MAM)	4,000	50%
	Morphine-3-β-d-glucuronide	12,500	16%
	Nalorphine Hydrochloride	>100,000	<2%
	Oxycodone	>100,000	<2%
	Oxymorphone	>100,000	<2%
	Rifampicine	>100,000	<2%
	Thebaine	50,000	4%
Opiates 1000	Morphine	1,000	100%
	Acetylcodeine	1,000	100%
	Buprenorphine	> 10000	<1%
	Codeine	1000	100%
	Diacetylmorphine (Heroin)	3,000	33.3%
	Dihydrocodeine	1,000	100%
	Ethylmorphine	200	500%
	Hydromorphone	25,000	4%
	Hydrocodone	50,000	2%
	Merperidine	>100,000	<1%

	6-Monoacetylmorphine (6-MAM)	3,000	33.3%
	Morphine-3-β-d-glucuronide	10000	10%
	Nalorphine Hydrochloride	>100,000	<1%
	Oxycodone	>100,000	<1%
	Oxymorphone	>100,000	<1%
	Rifampicine	>100,000	<1%
	Thebaine	50,000	2%
Oxycodone 300	Oxycodone	300	100%
	Hydrocodone	75,000	0.4%
	Hydromorphone	>100,000	<0.3%
	Naloxone	>100,000	<0.3%
	Oxymorphone	750	40%
Oxycodone 100	Oxycodone	100	100%
	Hydrocodone	6,250	1.6%
	Hydromorphone	50,000	0.2%
	Naloxone	50,000	0.2%
	Oxymorphone	250	40%
Phencyclidine 25	Phencyclidine	25	100%
	Hydrocodone	>100,000	<0.03%
	Hydromorphone	>100,000	<0.03%
	4-hydroxyphencyclidine	75	33.3%
THC 200	11-nor-Δ9-THC-9-COOH	200	100%
THC 150	11-nor-Δ9-THC-9-COOH	150	100%
	11-nor-Δ8-THC-9-COOH	90	166.7%
	Δ8-Tetrahydrocannabinol	45,000	0.33%
	Δ9-Tetrahydrocannabinol	45,000	0.33%
	Cannabinol	60,000	0.25%
THC 50	11-nor-Δ9-THC-9-COOH	50	100%
	11-nor-Δ8-THC-9-COOH	50	100%
	11-hydroxy-Δ9-Tetrahydrocannabinol	50	100%
	Δ8-Tetrahydrocannabinol	15,000	0.33%
	Δ9-Tetrahydrocannabinol	15,000	0.33%
	Cannabinol	20,000	0.25%
	Cannabidiol	>100,000	<0.05%
THC 25	11-nor-Δ9-THC-9-COOH	25	100%
	11-nor-Δ8-THC-9-COOH	15	166.7%
	Δ8-Tetrahydrocannabinol	7,500	0.33%
	Δ9-Tetrahydrocannabinol	7,500	0.33%
	Cannabinol	10,000	0.25%
THC 300	11-nor-Δ9-THC-9-COOH	300	100%
THC 500	11-nor-Δ9-THC-9-COOH	500	100%
	11-nor-Δ8-THC-9-COOH	500	100%
	Δ8-Tetrahydrocannabinol	>50,000	<1%
	Δ9-Tetrahydrocannabinol	>50,000	<1%
	Cannabinol	>100,000	<0.5%
Propoxyphene 300	D-Propoxyphene	300	100%
	D-Norpropoxyphene	5,000	6%
Tramadol 300	Tramadol	300	100%
Tramadol 100	Tramadol	100	100%

	(+/-)Chlorpheniramine	50,000	0.2%
	Dimenhydrinate	50,000	0.2%
	Diphenhydramine	50,000	0.2%
	Phencyclidine	50,000	0.2%
	(+)-Chlorpheniramine	>100,000	<0.1%
Tricyclic Antidepressants 1000	Nortriptyline HCl	1,000	100%
	Amitriptyline	1,500	66.7%
	Clomipramine	>100,000	<1%
	Cyclobenzaprine	12,500	8%
	Desipramine	188	531.9%
	Doxepin	2,000	50%
	Imipramine	2,500	40%
	Maprotiline	750	133.3%
	Nortriptyline	3,125	32%
	Nordoxepin	500	200%
	Opipramol	1,563	64%
	Promazine	1,000	100%
	Promethazine	6,250	16%
	Prothipendyl	25,000	4%
	Protryptiline	6,250	16%
	Prozine	1,250	80%
	Trimipramine	>100,000	<1%
Tricyclic Antidepressants 300	Nortriptyline	300	100%
6-MAM 10	β-Monoacetylmorphine	10	100%
	Acetylcodeine	>10,000	<0.1%
	Buprenorphine	>10,000	<0.1%
	Codeine	>10,000	<0.1%
	Diacetylmorphine	1,000	1%
	Dihydrocodeine	>10,000	<0.1%
	Ethylmorphine	>10,000	<0.1%
	Hydrocodone	>10,000	<0.1%
	Hydromorphone	5,000	0.2%
	Morphine	10,000	0.1%
	Morphine-3-glucuronide	>10,000	<0.1%
	Nalorphine	5,000	0.2%
	Thebaine	>20,000	<0.05%
Zolpidem 50	Zolpidem Phenyl-4-carboxylic	50	100%
	Zolpidem	>10,000	<0.5%
Zolpidem 25	Zolpidem Phenyl-4-carboxylic	25	100%
	Zolpidem	>10,000	<0.25%
Zopiclone 50	N-Desmethylzopiclone	50	100%
	Zopiclone-N-oxide	50	100%
	Zopiclone	300	16.7%
Hydromorphone 250	Hydromorphone	250	100%
	Acetylcodeine	10,000	2.5%
	Thebaine	25,000	1%
	Nalorphine	12,500	2%
	Morphine-3-glucuronid	2,500	10%
	Morphine	5,000	5%
	Hydrocodone	3,100	8.1%

	Ethylmorphine	5,000	5%
	Dihydrocodeine	25,000	1%
	Diacetyl Morphine	10,000	2.5%
	Codeine	50,000	0.5%
	Buprenorphine	10,000	2.5%
	6-Monoacetylmorphine	10,000	2.5%
Methylphenidate 150	Methylphenidate	150	100%
	Ritalinic acid	5000	3%
LSD 50	Lysergic acid diethylamide	50	100%
LSD 20	Lysergic acid diethylamide	20	100%
Pregabalin 500	Pregabalin	500	100%
Pregabalin 1000	Pregabalin	1,000	100%
	Gabapentin	> 20,000	<5%
MDPV 500	MDPV	500	100%
MDPV1000	3,4-Methylenedioxypropylvalerone	1,000	100%
MCAT 500	Methcathinone	500	100%
	4-MMC ( Mephedrone )	500	100%
	3-MMC (3-methylmethcathinone)	500	100%
	4-MEC (4-methylethcathinone)	550	90.9%
MCAT 100	Methcathinone	100	100%
	3-MMC (3-methylmethcathinone)	100	100%
	4-MMC ( Mephedrone )	100	100%
	4-MEC (4-methylethcathinone)	120	83.3%
	Cathinone	>100,000	<0.1%
	MDPV	>10,000	<1
Mephedrone 500	Mephedrone	500	100%
	Methcathinone	500	100%
ETG 500	Ethyl Glucuronide	500	100%
	Ethanol	>100,000	<0.5%
	D-Glucuronic Acid	>100,000	<0.5%
	Morphine-3-b-D-glucuronide	>100,000	<0.5%
ETG 1000	Ethyl Glucuronide	1000	100%
Gabapentin 2000	Gabapentin	2000	50%
	Pregabalin	>100,000	<1%
CarFentanyl 500	CarFentanyl	500	100%
	Fentanyl	100	500%
K2-AB 25	AB- PINACA	25	100%
	AB-PINACA 5-Pentanoic	25	100%
	AB-PINACA 5-hydroxypentyl	25	100%
	AB- FUBINACA	40	62.5%
	AB-PINACA 4-hydroxypentyl	>10,000	<0.25%
	UR-144 5-Pentanoic	5,000	0.5%
	UR-144	>10,000	<0.25%
	UR-144 5-hydroxypentyl	>10,000	<0.25%
	UR-144 4-hydroxypentyl	>10,000	<0.25%
	APINACA	>10,000	<0.25%
	APINACA 5-hydroxypentyl	>10,000	<0.25%
	ADB-PINACA N-(5-hydroxypentyl)	50	50%
	ADB-PINACA Pentanoic Acid	25	100%

	5-fluoro AB-PINACA N-(4-hydroxypentyl)	50	50%
	5-fluoro AB-PINACA	50	50%
Caffeine 8000	Caffeine	8,000	100%
	Theophylline	100,000	6%
K2 50	JWH-018-5-Pentanoic acid	50	100%
	JWH-073-4-Butanoic acid	50	100%
K2 30	JWH-018-5-Pentanoic acid metabolite	30	100%
	JWH-073-4-Butanoic acid	30	100%
Fentanyl 10	Fentanyl and Fentanyl metabolite	10	100%
	Fentanyl	100	10%
	Norfentanyl	>10,000	<0.1%
Fentanyl 20	Fentanyl and Fentanyl metabolite	20	100%
	Fentanyl	200	10%
	Norfentanyl	>10,000	<0.2%
Cotinine 600	(-)-Cotinine	600	100%
Cotinine 300	(-)-Cotinine	300	100%
	(-)-Nicotine	9,375	3.2%
Cotinine 200	(-)-Cotinine	200	100%
	(-)-Nicotine	6,250	3.2%
Methaqualone 300	Methaqualone	300	100%
	Amitriptyline	50,000	0.6%
	Carbamazepine	20,000	1.5%
	Nortriptyline	50,000	0.6%
	Phenytoin	40,000	0.75%
	Theophylline	40,000	0.75%
K4 25	UR-144 5-Pentanoic acid metabolite	25	100%
	UR-144	> 10,000	0.25%
	AKB48	> 10,000	0.25%
	AB-Fubinaca	> 10,000	0.25%
	AB- PINACA	> 10,000	0.25%
α-PVP 500	α-PVP	500	100%
	MDPV	40	1250%
	PVP	>100,000	<0.5%
MDPHP 500	MDPHP	500	100%
	MDPV	500	100%
	α-PVP	10,000	5%

The following compounds show no cross-reactivity at concentration up to 100 ug/mL unless specified in the table above.

#### REFERENCES

1. Urine testing for drugs of abuse, NIDA Research Monograph 73 (1986)
2. Steven B. Karch, Drugs of abuse hand book, CRC Press, 1<sup>st</sup>. Ed. (1998)
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