

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Dutch Diagnostics

Human and animal care

INTENDED USE

The D.D. MultiDip Drug Screen device is an immunochromatographic test for the rapid and qualitative detection of several drugs of abuse, some psychotropics and their major metabolites in human urine.

The test system consists of strips for various drugs which are mounted in a plastics holder. These test cassettes are available with three up to ten strips.

The following drug types can be detected with the test, of course just a section is found in your test cassettes. For some drug types there are several cut-offs available. They are listed below:

Parameter/ Drug of abuse	Drug/metabolite*	Cut-off (ng/ml)
AMP (Amphetamine)	Amphetamine	1000
AMP (Amphetamine)	Amphetamine	300
AMP (Amphetamine)	Amphetamine	500
BAR (Barbiturates)	Secobarbital	300
BZO/ BZD (Benzodiazepines)	Oxazepam	300
BZO/ BZD (Benzodiazepines)	Oxazepam	200
BZO/ BZD (Benzodiazepines)	Oxazepam	100
BUP (Buprenorphine)	Buprenorphine-β3-D-Glucuronide	10
COC (Cocaine)	Benzoylcegonin	300
COC (Cocaine)	Benzoylcegonin	100
COC (Cocaine)	Benzoylcegonin	200
COT (Cotinine)	Cotinine	200
COT (Cotinine)	Cotinine	600
EDDP (Methadone metabolite)	2-Ethylidine-1,5-Dimethyl-3,3-Diphenylpyrrolidine	100
FYL (Fentanyl)	Fentanyl	10
KET (Ketamine)	Ketamine	1000
MDA (Methylene-dioxyamphetamine)	Methylenedioxyamphetamine	500
MDMA (Ecstasy)	3,4-Methylenedioxy-Metamphetamin	1000
MDMA (Ecstasy)	3,4-Methylenedioxy-Metamphetamin	500
MDMA (Ecstasy)	3,4-Methylenedioxy-Metamphetamin	300
MTD (Methadone)	Methadone	300
MET (Methamphetamine)	Methamphetamine	1000
MET (Methamphetamine)	Methamphetamine	300
MET (Methamphetamine)	Methamphetamine	500
MOR 2000 (Morphine/Heroin)	Morphine	2000
MOR 300 (Morphine/Heroin)	Morphine	300
MOR 100 (Morphine/Heroin)	Morphine	100
MOR 200 (Morphine/Heroin)	Morphine	200
MQL (Metaqualone)	Metaqualone	300
OXY (Oxycodone)	Oxycodone	100
PCP (Phencyclidine)	Phencyclidine	25
PCM (Paracetamol)	Paracetamol/Acetaminophene	5000
PPX (Propoxyphene)	Norpropoxyphene	300
TCA (tricyclic antidepressants)	Nortriptyline	1000
THC (Marijuana)	11-nor-Δ9-THC-9-COOH	50
THC (Marijuana)	11-nor-Δ9-THC-9-COOH	25
THC (Marijuana)	11-nor-Δ9-THC-9-COOH	150
THC (Marijuana)	11-nor-Δ9-THC-9-COOH	200
TML (Tramadol)	Tramadol	100

* compound used as calibrator for adjusting cut off

RELEVANT INFORMATION

This assay provides only a preliminary test result. A more specific alternative chemical method (GC or GC/MS) must be used in order to obtain a confirmed analytical result. Clinical consideration and professional judgement should be applied to any drug of abuse test result, particularly when preliminary positive results are indicated. The assay should not be used without proper supervision and is not intended for over the counter sales to lay persons. It is for professional use only.

SUMMARY

The MultiDip D.D. Drug Screen device detects the most frequently abused drugs simultaneously. Urine based screening tests for drugs of abuse or psychotropics range from simple immunoassay tests to complex analytical procedures. The speed and sensitivity of immunoassays have made them the most widely accepted method for screening urine for drugs of abuse. The D.D. MultiDip Drug Screen devices are based on the principle of the highly specific immunochemical reactions of antigens and antibodies which are used to detect drugs and its metabolites respectively in human urine.

BASICS

Cut-off

The "cut-off" describes the sensitivity of the drug test. It describes the drug concentration at which the test result line starts to disappear and is thus the limit to decide whether a drug is regarded as being detected and tested positive. Depending on the application it might be useful to have a high or low detection limit (cut-off) to enable an easier interpretation of the result. This is explained by the following example: If the test is very sensitive it might happen that harmless opioids of poppy-pastries are detected. Common abuse of opium would lead to a much higher concentration in the urine. Thus, the tests could be more insensitive to avoid false positive results.

In this connection, the cut-off values in drug screening devices are basically adjusted to the demands of the American Substance Abuse Mental Health Service Administration (SAMSHA).

INTRODUCTION OF THE DRUGS OF ABUSE AND PSYCHOTROPICS RESPECTIVELY

Amphetamine (AMP)

Amphetamines (AMP) (amphetamine, methamphetamine, and the structurally related "designer" drugs, e.g., "Ecstasy") are sympathomimetic amines whose biological effects include potent central nervous system (CNS) stimulation. They increase the heart rate and blood pressure and suppress the appetite. Some studies indicate that heavy abuse may result in permanent damage to certain essential nerve structures in the brain.

Amphetamines are usually taken orally, intravenously, or by smoking. Amphetamines are readily absorbed from the gastrointestinal tract and are then either deactivated by the liver or excreted unchanged in the urine. Because of the pKa value 9.9 of amphetamine the substance is resorbed back better in the kidney tubules if the urine is alkaline. Thus, in acidic urine 80% free amphetamine is renally eliminated instead of just 2-3% in basic urine.

Barbiturates (BAR)

Barbiturates (BAR) are a class of central nervous system depressants. Phenobarbital is a long acting barbiturate derivative that has been used as a daytime sedative and very extensively as an anticonvulsant. Pentobarbital and Secobarbital are two examples of short acting barbiturate sedatives. Abuse of barbiturates can lead not only to respiratory collapse, coma and even death. Barbiturates are taken orally, rectally, or by intravenous and intramuscular injection. Short acting barbiturates will generally be excreted in urine as metabolites, while the long-acting barbiturates are eliminated primarily unchanged.

Benzodiazepines (BZO)

Benzodiazepines (BZO and BZO) are the most widely used anxiolytic drugs. They are used extensively as anti-anxiety agents, hypnotics, muscle relaxants and anti-convulsants. They are taken orally or sometimes by injection. Benzodiazepines are metabolized in the liver. Some metabolites of benzodiazepines also exhibit pharmacological activities. Benzodiazepines and metabolites are excreted into the urine. Their use can result in drowsiness and confusion. Benzodiazepines potentiate alcohol and other CNS depressants. Psychological and physical dependence on benzodiazepines can develop if high doses of the drug are given over a prolonged period.

Buprenorphine (BUP)

Buprenorphine (BUP) is available under the trade name Subutex® as tablet for the drug substitution. The active agent has already been known for 30 years as pain reliever. In comparison to Methadone, buprenorphine acts less harmful in high doses, but there might appear side effects like perspiration, sleeplessness, depressive disposition, lassitude and aversion of sex.

Benzoylcegonine/ Cocaine (COC)

Derived from leaves of coca plant, cocaine (COC) is a potent central nervous system stimulant and a local anesthetic. Among the psychological effects induced by using cocaine are euphoria, confidence and a sense of increased energy, accompanied by increased heart rate, dilation of the pupils, fever, tremors and sweating. Cocaine is excreted in urine primarily as

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Dutch Diagnostics

Human and animal care

benzoylecgonine in a short period of time. Benzoylecgonine has a biological half-life of 5 to 8 hours, which is much longer than that of cocaine (0.5 to 1.5 hours).

Cotinine (COT)

Worldwide consumption of tobacco products results in immense costs to society. There are approximately 20 nicotine metabolites that can be identified by urine testing. Cotinine is a prominent nicotine metabolite and accumulates in the body as a result of consistent smoking. Nicotine and cotinine are metabolized through the same liver enzyme. It was reported that cotinine is stable in body fluids and has a relatively long half life estimated at 17 hours, which makes timing of the sample less crucial than with tests to detect nicotine or other metabolites.

2-Ethylidino-1,5-Dimethyl-3,3-Diphenylpyrrolidine (EDDP)

EDDP (2-Ethylidino-1,5-Dimethyl-3,3-Diphenylpyrrolidine) is the most important metabolite of methadone. It is excreted into the bile and urine together with the other metabolite EMPD (2-Ethyl-5-methyl-3,3-diphenylpyrrolidine). EMPD is formed by N-demethylation and cyclisation of methadone in liver. The part of the unchanged excreted methadone is variable and depends on the urine's pH value, dose, and the patient's metabolism. Therefore, the detection of the metabolite EDDP instead of methadone itself is useful, because interferences of the patient's metabolism are avoided.

Fentanyl (FYL)

Fentanyl (N-(1-(2-phenylethyl)-4-piperidinyl)-N-phenyl-propanamide) is a synthetic opioid which is used as a potent analgesic in the anesthesia (at narcotics) as well as a transdermal therapeutic system for the therapy of chronic pain-conditions that can be treated sufficiently only with opiate analgesics. In Germany Fentanyl is regulated under the narcotics law, in Austria under the addiction law and in Switzerland under the narcotics law. Because of its strong analgesic effect, Fentanyl is frequently used in pre-surgery situations. It is used as a dermal band-aid analgesic on strong, chronic pains of cancer patients as well as analgesia of chronic non-tumor pains (like for example at musculoskeletal pain conditions). At Emergency Rescue Services (EMS) Fentanyl can be administered by the paramedic in case of acute-pain conditions. Fentanyl works predominantly strongly pain-relieving (analgetic) and soothing (sedative). It is about one hundred times as potent as Morphine (measured at the weight, only one hundredth of the quantity of Fentanyl is necessary in order to achieve the same effect), possesses a higher effectiveness (the effect-maximum is higher), while its drug effect duration is usually considerably shorter. With intravenous dispensation the drug effect duration is already reached after two to three minutes. Fentanyl is excreted mainly within at most 3 days by urine and mainly metabolized into Norfentanyl (4-N-(N-propionylanilino) piperidine). A maximum of 10% of the administered quantity reaches the urine unchanged. (13)

Ketamine (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 dose, ketamine can cause delirium, amnesia, impaired motor function, high blood pressure, depression, and potentially fatal respiratory problems. Ketamine is metabolized in the liver and excreted through the kidney. The half-life of ketamine in the body is around three hours.

Methylenedioxyamphetamine (MDA)

3,4-Methylenedioxyamphetamine (MDA) is a psychotropic amphetamine derivative. Thus, it is related to the other amphetamines (amphetamine, methamphetamine, and the structurally related "designer" drugs, e.g., "Ecstasy"). Its biological effects include potent central nervous system (CNS) stimulation. It increases the heart rate and the blood pressure and suppresses the appetite and thirst. Some studies indicate that heavy abuse may result in permanent damage to certain essential nerve structures in the brain.

MDA is administered both orally and intravenously. It is readily absorbed from the gastrointestinal tract and is then either deactivated by the liver or excreted unchanged in the urine.

MDMA / Ecstasy

(±)-3,4-methylenedioxymethamphetamine (MDMA) is the main component of ecstasy. Ecstasy influences the central nervous system as a stimulant. In addition to psychological addiction, taking ecstasy also causes general unrest, a reduced feeling of hunger and overall feeling of well being. Overdose and extended usage of Ecstasy may lead to substance abuse, which may cause severe and/or permanent damage to the human nervous system. A relatively frequent outcome is physical overexertion resulting in death, due to the elimination of the body's warning signals.

Methadone (MTD)

Methadone (MTD) is a synthetic analgesic drug that is originally used in the treatment of narcotic addicts. Among the psychological effects induced by using methadone are analgesia, sedation and respiratory depression. Overdose of

methadone may cause coma or even death. It is administered orally or intravenously and is metabolized in the liver. The kidneys are a major route of methadone excretion.

Methamphetamine (MET)

Methamphetamine (MET), amphetamine, and metabolites are potent sympathomimetic agents. Acute higher doses lead to enhanced stimulation of the central nervous system and include euphoria, alertness, and a sense of increased energy and power. More acute responses produce anxiety, paranoia, psychotic behavior, and cardiac dysrhythmias. The pattern of psychosis which may appear at high doses may be indistinguishable from schizophrenia.

Methamphetamine is excreted partly in urine as amphetamine and oxidized as deaminated and hydroxylated derivatives. However, 40% of methamphetamine is excreted unchanged. Thus the presence of the parent compound in the urine indicates methamphetamine use.

Opiates/Morphine (MOR)

The opiates (OPI) such as heroin, morphine (MOR/MOP), and codeine are derived from the resin of opium poppy. Heroin is quickly metabolized to morphine. Thus, morphine and morphine glucuronide might both be found in the urine of a person who has taken only heroin. The body also changes codeine to morphine. Thus the presence of morphine (or the metabolite, morphine glucuronide) in the urine indicates heroin, morphine and/or codeine use. 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).

Metaqualone (MQL)

As on the street illegal dealt drug methaqualone are very popular in the USA, because of its aphrodisiac and euphoria making effects. In the 1970s the so called "luding out" was very popular among the college students taking 300 to 450 mg Methaqualone together with wine. Alcohol will intensify the feelings of indelibility and strong euphoria produced by metaqualone. It can be taken in pill form or smoking it. Methaqualone is a sedative / narcotic pharmaceutical lowering the inhibition threshold, leading to an enhancement of ability of sex.

Chronic abuse can lead to polyneuropathy and psychic and physical addiction. Taking small doses methaqualone gives the user an immediate trance-like euphoria instead of sedating, what would be expected from a sleeping pill.

Possible symptoms of a metaqualone overdose: gastro-intestinal diseases, drowsiness, ataxia, prickle, slowly and inarticulate speech, hyperactivity of muscles, internal bleeding, convulsion and coma.

In most cases methaqualone is replaced by benzodiazepines and is not longer common for pharmaceutical treatment. In drug slang methaqualone is known as *seven-one-fours*, *seventeen*, or *lemmon 714*.

Oxycodone (OXY)

Oxycodone is a semi-synthetic opioid with a structural similarity to codeine. The drug is manufactured by modifying thebaine, an alkaloid found in the opium poppy. Oxycodone, like all opiate agonists, provides pain relief by acting on opioid receptors in the spinal cord, brain, and possibly directly in the affected tissues. Oxycodone is prescribed for the relief of moderate to high pain under the well-known pharmaceutical trade names of OxyContin®, Tylox®, Percodan® and Percocet®. While Tylox, Percodan and Percocet contain only small doses of oxycodone hydrochloride combined with other analgesics such as acetaminophen or aspirin, OxyContin consists solely of oxycodone hydrochloride in a time-release form.

Oxycodone is known to metabolize by demethylation into oxymorphone and noroxycodone. In a 24-hour urine, 33-61 % of a single, 5 mg oral dose is excreted with the primary constituents being unchanged drug (13-19 %), conjugated drug (7-29 %) and conjugated oxymorphone (13-14 %). The window of detection for oxycodone in urine is expected to be similar to that of other opioids such as morphine.

Phencyclidine (PCP)

Phencyclidine (PCP) is an arylcyclohexylamine that was originally used as an anesthetic agent and a veterinary tranquilizer. Phencyclidine can produce hallucinations, lethargy, disorientation, loss of coordination, trance-like ecstatic states, a sense of euphoria and visual distortions. It has many street names, such as "angel dust" and "crystal cyclone", etc. Phencyclidine can be administered orally, by nasal ingestion, smoking, or intravenous injection. It is metabolized in the liver and excreted through the kidneys. The half-life of phencyclidine in the body is around three days. Suction and urinary acidification in the treatment of overdose typically reduces its half-life from three days to one day.

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Dutch Diagnostics

Human and animal care

Paracetamol (PCM)

Acetaminophene or paracetamol is a pain reliever and antipyretic, somewhat like aspirin, which is commonly known by the brand name Tylenol. It is the active metabolite of phenacetin, a so-called non opioid analgesic. The rate of absorption of oral paracetamol depends on the rate of gastric emptying and is usually rapid and complete. The mean systemic availability is about 75%. Paracetamol is extensively metabolized and the plasma half-life is 1.5-2.5 hours. About 55% and 30% of a therapeutic dose is excreted in the urine as glucuronide and sulphate conjugates, whereas mercapturic acid and cysteine conjugates (representing conversion to a potentially toxic intermediate metabolite) each account for some 4% of the dose. Paracetamol metabolism is age- and dose-dependent. With hepatotoxic doses, paracetamol metabolism is impaired and the half-life prolonged. Sulphate conjugation is saturated and the proportion excreted as mercapturic acid and cysteine conjugates is increased. The renal clearance of paracetamol depends on urine flow rate by not pH. The renal clearances of the glucuronide and sulphate conjugates often exceed the glomerular filtration rate and are independent of urine flow and pH.

Propoxyphene (PPX)

Propoxyphene is an oral synthetic opiate agonist structurally similar to methadone. It is used alone or together with acetaminophen as analgesic to relieve moderate to severe pain. Frequently it used as an alternative to methadone in detoxification or maintenance of narcotic dependence. One of the common trade names on the US market is Darvon or Darvocet. Propoxyphene is metabolized in the liver to an active metabolite, norpropoxyphene. Norpropoxyphene has less CNS depressant effects than propoxyphene but shows stronger local anaesthetic effects. Both substances are renally eliminated, the part of unchanged drug being around 10%.

Tricyclic Antidepressants (TCA)

Tricyclic antidepressants, (commonly called TCAs) have been prescribed since the 1950s for depression. They are the oldest antidepressants we use today. Until recently TCAs were the clear first choice of physicians for the vast majority of people with major depressive disorder. Examples of TCAs are: imipramine (Tofranil®), amitriptyline (Saroten®) and nortriptyline (Nortrilin®). TCAs work by raising the levels of serotonin and norepinephrine in the brain by slowing the rate of reuptake, or reabsorption, by nerve cells. It may take several weeks to see the desired result. Tricyclic antidepressant (TCA) overdose remains the leading cause of death from intentional drug overdose. Cardiac arrhythmias and hypotension are the major contributors of death in TCA overdose. Much of the cardiotoxicity from TCAs results from quinidine-like actions on the cardiac action potential and a negative inotropic action. Glucagon has been shown to reverse the depression in cardiac contractility, blood pressure and heart rate in quinidine toxicity.

Marijuana (THC)

Marijuana, cannabis or tetra-hydro-cannabinol (THC) is a hallucinogenic agent derived from the flowering portion of the hemp plant. Smoking is the primary method of use of marijuana/cannabis. Higher doses used by abusers produce central nervous system effects, altered mood and sensory perceptions, loss of co-ordination, impaired short-term memory, anxiety, paranoia, depression, confusion, hallucinations and increased heart rate. A tolerance to the cardiac and psychotropic effects can occur, and withdrawal syndrome produces restlessness, insomnia, anorexia and nausea.

When marijuana is ingested, the drug is metabolised by the liver. The primary urinary metabolite of marijuana is 11-nor- Δ^9 -THC-9-carboxylic acid, and its glucuronide. This means that the presence of detected cannabinoids, including the primary carboxyl metabolite, in the urine indicate marijuana/cannabis use.

Tramadol (TML)

Tramadol is a centrally acting synthetic analgesic compound that is not derived from natural sources nor is it chemically related to opiates. Although its mode of action is not completely understood at least two complementary mechanisms appear applicable: a low binding affinity to μ -opioid receptors and an inhibition of reuptake of norepinephrine and serotonin.

Continuous use of large doses of tramadol can result into tolerance and physiological dependency on the drug and lead to its abuse. Tramadol is extensively metabolized 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. The half-life of tramadol in serum is 6-7 hours in healthy individuals. The therapeutic concentration range in serum is normally 0.1-0.3 $\mu\text{g/ml}$ (15). Studies show that tramadol concentration in urine were considerably higher than in serum (14). Therefore urine samples are very suitable for proof of tramadol intake in therapeutic drug monitoring or forensic toxicology.

Half life and times of detection

The length of time following drug use for which a positive result may occur is dependent upon several factors including the frequency and amount of drug, metabolic rate, excretion rate, drug half-life, and the drug user's age, weight, activity and diet. Each drug is detected and cleared by the body at different rates. Please refer to the table below:

drug	Half life	Times of detection
AMP	10-30 h depend on pH or diet respectively	1 to 2 days after use
BAR	20-30 h (Pentobarbital) 48-280 h (Phenobarbital) 22-29 h (Secobarbital)	Up to 5 days (Pentobarbital) Up to 8 days (Phenobarbital) 2-3 weeks for long acting barbiturates
BZO	5-10 h (Oxazepam) 1-30 h (Triazolam) 8-20 h (Bromazepam) 10-30 h (Flunitrazepam) 20-40 h (Diazepam) 40-100 h (Nordiazepam)	3 days for therapeutic doses, up to 4 to 6 weeks for chronic users
BUP	8-15 h	2 to 6 days after use
COC	0.5-1.5 h (cocain) 3.5-8 h (benzoylcegonin) 3.5-6 h (ecgoninmethyl ester)	4-12 h (cocaine), 1-4 days (benzoylcegonine), up to 5 days (benzoylcegonine, long-term consumption)
COT	16-22 h	2 to 3 days after use
EDDP	15-55 h	3 to 4 days after use
FYL	2-4 h 5-15 h Transmucosal 17 h (Transdermal)	1 to 3 days after use
KET	80-190 min (Ketamin) 4 h (Norketamin)	1 day after use
MDA	10-30 h	1 to 2 days after use
MDMA	10-30 h	1 to 2 days after use
MTD	15-20 h (pH<6.0) 33-55 h (pH>7.8)	1.5 to 3 days after use
MET	10-30 h	1 to 2 days after use
MOR	3-20 min (diacetylmorphine), 9-40 min (6- monoacetylmorphine), 1-7 h (Morphine)	Up to 48 h after use (in individual cases up to 72 h)
MQL	20-60 h	3 to 4 days after use
OXY	3-4.5 h	2 days after use
PCP	8-55 hours and average of 18hours	14 days; up to 30 days in chronic users
PCM	2-4 h in case of liver harm up to 12h	0,5 - 1 day after use
drug	Half life	Times of detection
PPX	6-12 h (propoxyphene) depend on pH or diet respectively 30-36 h (Norpropoxyphene) depend on pH or diet respectively	6 h to 2 days after use
TCA	9-24 h (Imipramin) 18-93 h (Nortriptylin)	
THC	20-30 h (THC carboxylic acid)	2 to 3 days (1 to 2 joints) 1 to 5 days at oral ingestion 5-10 days (moderate to heavy smoker) 14 to 18 days at chronic use Retention time for chronic smokers may be 20 days or longer
TML	3-8 h	1 to 3 days after use

TEST PRINCIPAL

The D.D. MultiDip Drug Screen device is a competitive immunoassay in which drug conjugate from the test competes with free drug which may be present in urine for limited antibody binding sites.

The membrane strips are pre-coated with immobilized drug conjugate as antigen in the test result line region (T-region). Red gold-colloid-labelled anti-drug-antibodies are placed in the conjugate pad at the left ending of the membrane. After dipping it into urine the antibodies move upwards by capillary action and get to the T-region. If there is no drug in the urine the antibody attaches to the immobilized drug conjugate and a visible line is formed.

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Dutch Diagnostics

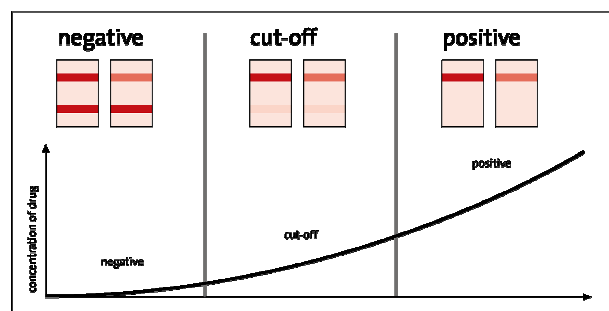
Human and animal care

Therefore, a line in the T-region indicates that no drug is present in the urine or that the drug concentration is below the cut-off.

If drugs are present in the urine, they compete with the immobilized drug conjugate in the T-region for the limited antibody binding sites. With increasing concentrations of drug in the sample the binding of the antibody is more and more inhibited and the color of the test result line becomes weaker. When the amount of drug is equal or more than the cut-off, it will prevent the binding of the antibody to the drug conjugate and the line gradually vanishes. Therefore, the absence of a colored band in the T-region indicates a positive result.

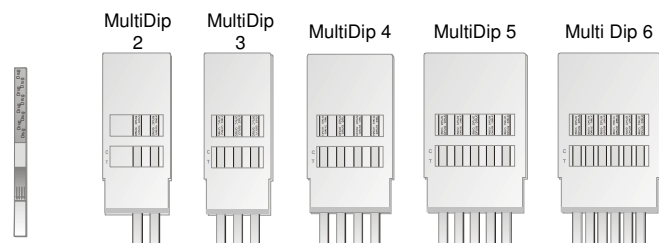
A control line with a different antigen/antibody reaction is also added to the immunochromatographic membrane strip at the control region (C-region) to indicate that the test has been performed properly. The presence of this control lines serves as verification that sufficient volume has been added, and that proper flow was obtained. The control line should always appear, regardless of the presence of the drugs.

This means that negative urine will produce two colored lines (non-consumer), where as positive urine will produce only one colored line in the reaction zone (consumer).

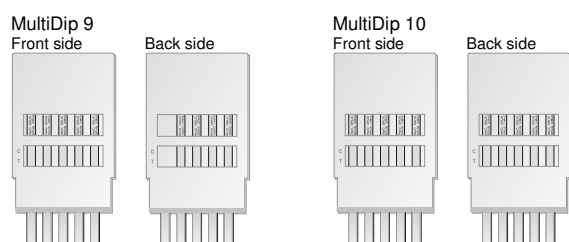
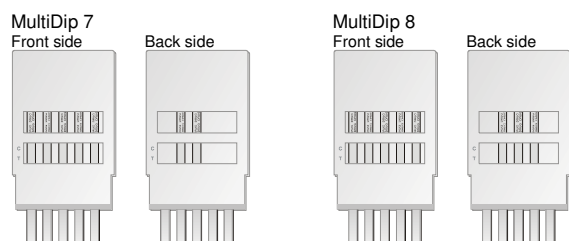


SET-UP OF THE TEST CASSETTE

The plastic case of the test cassette encloses several strips or dipsticks respectively. In the following figures a single strip and MultiDip cassettes with 2, 3, 4, 5 and 6 strips are displayed.

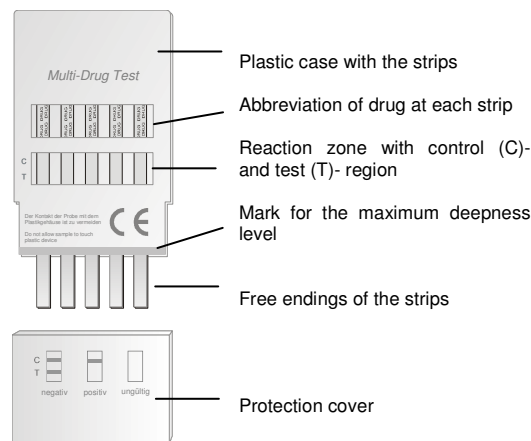


In case more than six drugs are analysed there are strips at front and at back side of the case. Please, turn the cassette to evaluate the strips of the back.



At which position each drug test strip is located can be examined by the abbreviation visible at the upper window of each strip.

In the following text the set-up, the test procedure and its evaluation is described with the MultiDip 5 test cassette, as an example. This test cassette encloses five strips.



The free endings of the strips are protected by a cover to avoid contamination or damage.

STORAGE AND STABILITY

The test kit is to be stored refrigerated or at room temperature (2-30°C) in the sealed pouch for the duration of the shelf life.

PRECAUTIONS

- For IN VITRO use only
- For professional use only
- Use only once
- Do not dip the cassette above the maximum deepness level mark.
- Dip the test into urine until one or two red lines appear at the reaction zone (~15 seconds).
- Avoid cross-contamination of urine samples by using a new specimen collection container for each urine sample.
- Do not touch the free endings of the strips to avoid contamination.
- Do not spill the samples into the reaction zone.
- Use only urine as liquid and no other one instead.
- Urine specimens may be potentially infectious. Proper handling and disposal methods should be established.
- Do not use the MultiDip device after expiration date
- Do not use the test after damage of the packaging foil
- Use test right after unwrapping
- Please be aware of the developing time of the test before evaluation
- Please take the cross reactivity into account for evaluation
- Store and transport the test device always at the temperatures specified above

REAGENTS AND MATERIALS SUPPLIED

- Individually wrapped test devices
- One instruction sheet

MATERIAL REQUIRED BUT NOT PROVIDED

- Specimen collection container
- Timer

SPECIMEN COLLECTION AND HANDLING

The D.D. drug screen MultiDip Device is formulated for use with urine specimens. Fresh urine does not require any special handling or pretreatment. Urine samples should be collected such that testing can be performed as soon as possible after the specimen collection, preferably during the same day. The specimen may be refrigerated at 2-8°C for 2 days, or frozen at -20°C for a longer period of time. Specimens that have been refrigerated must be equilibrated to room temperature prior to testing. Specimens previously frozen must be thawed, equilibrated to room temperature, and mixed thoroughly prior to testing.

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



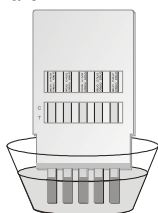
Note:

Urine specimens and all materials coming in contact with them should be handled and disposed of as if capable of transmitting infection. Avoid contact with skin by wearing gloves and proper laboratory attire.

TEST PROCEDURE

Review "Specimen Collection" instructions. Test device (in the sealed pouch), patient's samples, and controls should be brought to room temperature prior to testing. Do not open pouches until ready to perform the assay.

1. Remove the test device from its protective pouch and label the device with patient's identification or control label.
2. Remove the protective cap from the test device and hold the free endings of the strips into the urine sample for at least 10 seconds. Be aware that the urine does not come into contact with the plastic case of the test (mark for the maximum deepness level). If the urine comes into direct contact with the open test window, the test gets invalid.



3. Only remove the test strips out of the urine sample when you can see a control line at every single parameter. At least wait until you can see red color on every test window. This assures that enough urine has been absorbed for the correct performance of the test.
4. Read the results after 5 minutes or at the latest after 15 minutes as follows:

INTERPRETATION OF RESULTS

By displaying the MultiDip 5 test cassette with 5 test strips the evaluation of the assay is explained.

Negative Result:

Two colored lines appear in the viewing window. The line in the test region (T) is the drug probe line; the line on the control region (C) is the control line, which is used to indicate proper performance of the device. **The color intensity of the test line may be weaker or stronger than that of the control line.** In the first three reaction zones of the following figure the test and the control lines are colored with the same intensity. For the fourth reaction zone the test line is brighter than the control line and for the fifth reaction zone the control line is brighter than the test line. All reaction zones show a negative result.

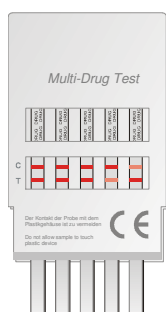


Figure of the MultiDip drug screen device showing negative results for all five reaction zones, because two lines per reaction zone are visible.

Positive Result:

Only one colored line appears in the control region (C). The absence of a test line indicates a positive result.

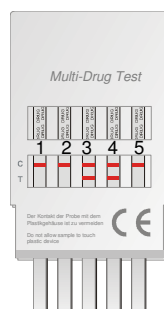


Figure of the MultiDip drug screen device showing positive results for the first, second and fifth reaction zones, because only the control line (C) in respective reaction zones is visible.

Important Note:

Not all parameters have to be positive at the same time in one test. Please look at every parameter individually. The above displayed test shows positives results for the drug of the first, second and fifth strip and negative results for the drugs of the third and fourth strip.

Invalid:

If no line appears in the control region, the test or rather the respective parameter is invalid and should be repeated.

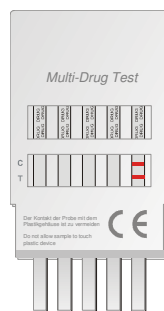


Figure of the MultiDip drug screen device showing invalid results for the first four reaction zones, because no control line (C) in respective reaction zones is visible.

In this case the result for the drugs of stripe 1-4 are invalid.

Note:

A very faint line in the test region indicates that the respective drug in the sample is near the cut-off level of the test. These samples should be re-tested or confirmed with a more specific method (e.g. GC-MS) before a positive determination is made.

If only one parameter (e.g. AMP) does not show a control line, you only have to retest the respective parameter (e.g. AMP) with a single test.

LIMITATIONS OF PROCEDURE

- The assay is designed for use with human urine only.
- A positive result with any of the tests indicates the presence of a drug/metabolite only, and does not indicate or measure intoxication.
- There is a possibility that technical or procedural errors as well as other substances and factors not listed in the chapter "specificity" may interfere with the test and cause false results.
- If it is suspected that the samples have been mislabeled or tampered with, a new specimen should be collected and the test should be repeated.

QUALITY CONTROL

Good laboratory practice recommends the use of control materials to ensure proper kit performance. Quality control specimens are available from commercial sources. When testing the positive and negative controls, use the same assay procedure as with a urine specimen.

PERFORMANCE CHARACTERISTICS

A. Accuracy

The accuracy of the D.D. MultiDip Drug Screen device was compared and checked against a commercially available test. 100 urine samples taken from volunteer test persons who claimed to be non-consumers were examined with both tests. The results were 100% in agreement.

B. Reproducibility

The reproducibility was tested with urine samples to which drugs have been added. This procedure is called spiking. In this connection, all concentrations

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Dutch Diagnostics

Human and animal care

50% below the cut-off concentration led to negative results and all concentrations 50% above the cut-off resulted in positive results.

C. Specificity

The specificity for the D.D. MultiDip drug screen device was tested by adding various drugs, drug metabolites, and other compounds that are likely to be present in urine. The performance of D.D. drug tests at the "cut-off" is not affected, if the pH of the urine specimens range between 3,0 and 8,5 and the specific density between 1,00 and 1,03. All compounds were prepared in drug-free normal human urine.

The following compounds were positive on the D.D. drug screen MultiDip device:

Amphetamine related compounds

For AMP cut-off 1000 ng/ml	concentration (ng/ml)
D-Amphetamine	1000
L-Amphetamine	>50,000
D-Methamphetamine	>20,000
L-Methamphetamine	>20,000
3,4-Methylenedioxyamphetamine (MDA)	2,400
3,4-Methylenedioxy-methamphetamine (MDMA)	>20,000
3,4-Methylenedioxyethylamphetamine (MDEA)	>100,000
Paramethoxyamphetamine (PMA)	1000

For AMP cut-off 300 ng/ml	concentration (ng/ml)
D-Amphetamine	300
3,4-Methylenedioxy-amphetamine (MDA)	500
3,4-Methylenedioxy-methamphetamine (MDMA)	>20,000
L-Amphetamine	>50,000

For AMP cut-off 500 ng/ml	concentration (ng/ml)
D-Amphetamine	500
L-Amphetamine	>50,000
3,4-Methylenedioxy-amphetamine (MDA)	700
3,4-Methylenedioxy-methamphetamine (MDMA)	>20,000

Barbiturate related compounds

For BAR cut-off 300 ng/ml	concentration (ng/ml)
Secobarbital	300
Phenobarbital	300
Butalbital	3000
Allobarbital	5000
Alphenal	625
Amobarbital	600
Aprobarbital	600
Hexobarbital	>100,000
Butabarbital	75
Pentobarbital	300

Benzodiazepine related compounds

For BZO cut-off 300 ng/ml	concentration (ng/ml)
Oxazepam	300
a-Hydroxyalprazolam	2,500
Alprazolam	250
Bromazepam	625
Chlordiazepoxide	3,750
Clobazam	100
Clonazepam	2,500
Clorazepate	5,000
Delorazepam	2,500
Desalkflurazepam	500
Diazepam	300
Estazolam	5,000
Flunitrazepam	375
Lorazepam	1,500
Lormetazepam	2,000
Midazolam	10,000
Nitrazepam	37,500
Norchlordiazepoxide	250
Nordiazepam	750
Temazepam	150
Triazolam	1,875

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Dutch Diagnostics

Human and animal care

For BZO cut-off 200 ng/ml	concentration (ng/ml)
Oxazepam	200
a-Hydroxyalprazolam	1,250
Alprazolam	188
Bromazepam	500
Chlordiazepoxide	2,500
Clobazam	63
Clonazepam	1,250
Clorazepate	3,330
Delorazepam	1,250
Desalkflurazepam	400
Diazepam	250
Estazolam	2,500
Flunitrazepam	250
Lorazepam	1,250
Lormetazepam	1,250
Midazolam	7,500
Nitrazepam	25,000
Norchlordiazepoxide	125
Nordiazepam	500
Temazepam	125
Triazolam	1,250

For BZO cut-off 100 ng/ml	concentration (ng/ml)
Oxazepam	100
a-Hydroxyalprazolam	625
Alprazolam	63
Bromazepam	250
Chlordiazepoxide	1,250
Clobazam	31
Clonazepam	625
Clorazepate	1,670
Delorazepam	625
Desalkflurazepam	125
Diazepam	125
Estazolam	1,250
Flunitrazepam	125
Lorazepam	313
Lormetazepam	750
Midazolam	2,500
Nitrazepam	12,500
Norchlordiazepoxide	63
Nordiazepam	250
Temazepam	63
Triazolam	750

Buprenorphine related compounds

For BUP cut-off 10 ng/ml	concentration (ng/ml)
Buprenorphine	10
Buprenorphine-3-β-d-glucunoride	10
Nor-Buprenorphine	>1000
Nor-Buprenorphine-3-β-d-glucunoride	>1000

Cocain related compounds

For COC cut-off 300 ng/ml	concentration (ng/ml)
Benzoylcegonine	300
Cocain	1,000
Ecgonine	>40,000
Ecgonine Methyl Ester	>100,000

For COC cut-off 100 ng/ml	concentration (ng/ml)
Benzoylcegonine	100
Cocaine	300
Ecgonine [-]	>40,000
Ecgonine Methyl Ester	>100,000

For COC cut-off 200 ng/ml	concentration (ng/ml)
Benzoylcegonine	200
Cocaine	800
Ecgonine [-]	>40,000
Ecgonine Methyl Ester	>100,000

COT related compounds

For COT cut-off 200 ng/ml	concentration (ng/ml)
Cotinine	200
(-)-Nicotine	>50,000

For COT cut-off 600 ng/ml	concentration (ng/ml)
Cotinine	600
(-)-Nicotine	>50,000

EDDP related compounds

For EDDP cut-off 100 ng/ml	concentration (ng/ml)
2-Ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP)	100
Doxylamine	>1,000,000
Methadone	>10,000
Methadol	>10,000

Fentanyl related compounds

For FYL cut-off 10 ng/ml	concentration (ng/ml)
Valid for Fentanyl and Metabolits	10

Ketamine related compounds

For KET cut-off 1000 ng/ml	concentration (ng/ml)
Ketamine	1,000
Norketamine	1,000
Dextromethorphan	500
Dextrorphan tartrate	500
EDDP	800
Phencyclidine	5,000
Promazine	8,000
Meperidine	12,500
D-Methamphetamine	12,500
Mephentermine hemisulfate salt	15,625
MDEA	25,000
Nordoxepin hydrochloride	25,000
Promethazine	25,000
D-Norpropoxyphene	31,250
Methadone	50,000

Methylenedioxyamphetamine related compounds

For MDA cut-off 500 ng/ml	concentration (ng/ml)
(+/-) 3,4-Methylenedioxyamphetamine	500
3,4-Methylenedioxyethylamphetamine	300

Methylenedioxymethamphetamine related compounds

For MDMA cut-off 1000 ng/ml	concentration (ng/ml)
3,4-Methylenedioxy-methamphetamine (MDMA)	1,000
3,4-Methylenedioxyamphetamine (MDA)	2,000
3,4-Methylenedioxyethylamphetamine (MDEA)	600
d-Amphetamine	>100,000
d-Methamphetamine	100,000
l-Methamphetamine	>100,000

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Dutch Diagnostics

Human and animal care

For MDMA cut-off 500 ng/ml	concentration (ng/ml)
3,4-Methylenedioxy-methamphetamine (MDMA)	500
3,4-Methylenedioxyamphetamine (MDA)	1,000
3,4-Methylenedioxyethylamphetamine (MDEA)	300
d-Amphetamine	>100,000
d-Methamphetamine	>100,000
Paramethoxyamphetamine (PMA)	5,000

For MDMA cut-off 300 ng/ml	concentration (ng/ml)
(+/-)3,4-Methylenedioxy-methamphetamine (MDMA)	300
(+/-)3,4-Methylenedioxyamphetamine (MDA)	600
(+/-)3,4-Methylenedioxyethylamphetamine (MDEA)	180
D-Amphetamine	>100,000
D-Methamphetamine	>100,000
Paramethoxyamphetamine (PMA)	5,000

Methadone related compounds

For MTD cut-off 300 ng/ml	concentration (ng/ml)
Methadone	300
Methadol	1,000
2-Ethylidene-1,5-Dimethyl-3,3-Diphenylpyrrolidine (EDDP)	>40,000
Doxylamine	>40,000

Methamphetamine related compounds

For MET cut-off 1000 ng/ml	concentration (ng/ml)
D-Methamphetamine	1,000
D-Amphetamine	>40,000
Chloroquine	10,000
(+/-)-Ephedrine	>100,000
L-Methamphetamine	15,000
3,4-Methylenedioxy-amphetamine (MDA)	>10,000
3,4-Methylenedioxymethamphetamine (MDMA)	2,000
3,4-Methylenedioxyethylamphetamine (MDEA)	20,000
Procaine	100,000

For MET cut-off 300 ng/ml	concentration (ng/ml)
(+)-Methamphetamine	300
D-Amphetamine	>40,000
Chloroquine	5,000
(+/-)-Ephedrine	>100,000
L(-)-Methamphetamine	10,000
Mephentermine	50,000
(+/-)3,4-Methylenedioxymethamphetamine (MDMA)	1,000
(+/-)3,4-Methylenedioxyethylamphetamine (MDEA)	10,000
Procaine	35,000
β-Phenylethylamine	35,000
Ranitidine	35,000

For MET cut-off 500 ng/ml	concentration (ng/ml)
(+)-Methamphetamine	500
D-Amphetamine	>40,000
Chloroquine	8,000
(+/-)-Ephedrine	>100,000
L-Methamphetamine	12,000
Mephentermine	50,000
(+/-)3,4-Methylenedioxymethamphetamine (MDMA)	1,200
(+/-)3,4-Methylenedioxyethylamphetamine (MDEA)	12,000
Procaine	50,000
β-Phenylethylamine	50,000
Ranitidine	50,000

Morphine related compounds

For MOR cut-off 2000 ng/ml	concentration (ng/ml)
Morphine	2,000
Codeine	2,000
Diacetyl Morphine (Heroine)	2,000
Ethylmorphine	600
Hydromorphone	15,000
Hydrocodone	15,000
Meperidine	>100,000
6-Monoacetylmorphine	5,000
Morphine-3-β-d-glucuronide	10,000
Oxycodone	>20,000
Oxymorphone	>20,000
Rifampicine	>50,000
Thebaine	20,000

For MOR cut-off 300 ng/ml	concentration (ng/ml)
Morphine	300
Codeine	300
Diacetyl morphine (Heroine)	300
Ethylmorphine	300
Hydromorphone	1,500
Hydrocodone	1,500
Meperidine	>100,000
6-Monoacetylmorphine	300
Morphine-3-β-d-glucuronide	6,000
Oxycodone	>20,000
Oxymorphone	>20,000
Promethazine	>250,000
Rifampicine	25,000
Thebaine	2,500
Trimipramine	>20,000

For MOR cut-off 100 ng/ml	concentration (ng/ml)
Morphine	100
Codeine	100
Diacetyl morphine (Heroine)	100
Ethylmorphine	100
Hydromorphone	500
Hydrocodone	500
Meperidine	>100,000
6-Monoacetylmorphine	100
Morphine-3-β-d-glucuronide	2,000
Oxycodone	>20,000
Oxymorphone	>20,000
Promethazine	>250,000
Rifampicine	8,400
Thebaine	840
Trimipramine	>20,000

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



For MOR cut-off 200 ng/ml	concentration (ng/ml)
Morphine	200
Codeine	200
Diacetyl morphine	200
Ethylmorphine	200
Hydromorphone	1,000
Hydrocodone	1,000
Meperidine	>100,000
6-Monoacetylmorphine	200
Morphine-3-β-d-glucuronide	4,000
Oxycodone	>20,000
Oxymorphone	>20,000
Promethazine	>250,000
Rifampicine	16,600
Thebaine	1,700
Trimipramine	>20,000

Metaqualone related compounds

For MQL cut-off 300 ng/ml	concentration (ng/ml)
Methaqualone	300
Mecloqualone	500
3'-Hydroxy methaqualone	500
4'-Hydroxy methaqualone	500
2'-Hydroxy methaqualone	3,000
Amitriptyline	50,000
Carbamazepine	20,000
Nortriptyline	50,000
Phenytoin	40,000
Primidone	24,000
Theophylline	40,000

Oxycodone related compounds

For OXY cut-off 100 ng/ml	concentration (ng/ml)
Oxycodone	100
Oxymorphone	500
Codeine	>100,000
Diacetyl Morphine (Heroin)	>100,000
Ethylmorphine	10,000
Hydrocodone	10,000
Hydromorphone	10,000
Merperidine	>100,000
6-Monoacetylmorphine	>100,000
Morphine	>250,000
Morphine-3-beta-D-glucuronide	>100,000
Thebaine	>100,000

Phencyclidine related compounds

For PCP cut-off 25 ng/ml	concentration (ng/ml)
Phencyclidine	25
Thienylcyclohexylpiperidine (TCP)	3,000

Paracetamol related compounds

For PCM cut-off 5000 ng/ml	concentration (ng/ml)
Acetaminophene	5,000
Acetophenetidine	7,500

Propoxyphene related compounds

For PPX cut-off 300 ng/ml	concentration (ng/ml)
D-Propoxyphene	300
D-Norpropoxyphene	300

Tricyclic Antidepressants related compounds

For TCA cut-off 1000 ng/ml	concentration (ng/ml)
Nortriptyline	1,000
Amitriptyline	1,000
Chlorpromazine	3,500
Clomipramine	10,000
Cyclobenzaprine	1,500
Desipramine	500
Diphenylramine	20,000
Doxepine	1,000
Imipramine	800
Nordoxepine	1,000
Opipramol	4,000
Protriptyline	3,000
Doxepine	1,000
Perphenazine	25,000
Promazine	200
Promethazin	40,000
Protryptiline	3,000
Trimipramine	2,500

THC (Marihuana) related compounds

For THC cut-off 50 ng/ml	concentration (ng/ml)
11-nor- Δ^8 -THC-9-COOH	50
11-nor- Δ^9 -THC-9-COOH	50
11-hydroxy- Δ^9 -Tetrahydrocannabinol	>100,000
Δ^8 -Tetrahydrocannabinol	15,000
Δ^9 -Tetrahydrocannabinol	15,000
Cannabinol	20,000
Cannabidiol	>100,000

For THC cut-off 25 ng/ml	concentration (ng/ml)
11-Nor- Δ^9 -THC-9-COOH	25
11-Nor- Δ^8 -THC-9-COOH	25
11-Hydroxy- Δ^9 -tetrahydrocannabinole	>100,000
Δ^8 -Tetrahydrocannabinole	10,000
Δ^9 -Tetrahydrocannabinole	10,000
Cannabinole	15,000
Cannabidiol	>100,000

For THC cut-off 150 ng/ml	concentration (ng/ml)
11-Nor- Δ^8 -THC-9-COOH	150
11-Nor- Δ^9 -THC-9-COOH	150
11-Hydroxy- Δ^9 -tetrahydrocannabinole	>100,000
Δ^8 -Tetrahydrocannabinole	80,000
Δ^9 -Tetrahydrocannabinole	80,000
Cannabinole	>20,000
Cannabidiol	>100,000

For THC cut-off 200 ng/ml	concentration (ng/ml)
11-Nor- Δ^8 -THC-9-COOH	200
11-Nor- Δ^9 -THC-9-COOH	200
11-Hydroxy- Δ^9 -tetrahydrocannabinole	>100,000
Δ^8 -Tetrahydrocannabinole	>80,000
Δ^9 -Tetrahydrocannabinole	>80,000
Cannabinole	>20,000
Cannabidiol	>100,000

Tramadol related compounds

For TML cut-off 100 ng/ml	concentration (ng/ml)
Tramadol	100
N-desmethyl-tramadol	250
O-desmethyl-tramadol	10,000

MultiDip-Drug Screen

Rapid test for the detection of drugs of abuse in urine
General Information Sheet



Compounds without crossreactivity

All following listed compounds reacted negative with D.D. MultiDip Drug Screen device up to a concentration of 100 µg/ml:

Acetaminophene	Guaiacol Glyceryl Ether
Acetone	Hemoglobin
Albumine	Ibuprofene
4-Dimethylaminoantipyrine	(+/-)-Isoproterenol
Ampicillin	Lidocaine
Aspartame	L-Phenylephrine
Aspirin	(+)-Naproxene ([S]-6-Methoxy--Methyl-2-Naphthaleneacetic Acid)
Atropine	N-Methyl-Ephedrine
Benzocaine	Oxalic acid
Beta-Phenylethylamine	Penicillin-G (Benzylpenicillin)
Caffein	Pheniramine
Chloroquine	Phenothiazine
Chlorpheniramine	Procaine
Creatin	Quinidine
Dopamin (3-Hydroxytyramine)	Ranitidine
(-)-Ephedrine	Sulindac
(+/-)-Ephedrin	Tyramine
Ethanol	Vitamin C (ascorbic acid)
Furosemide	

NOTE

You can read an abstract on the most important information in the short manual. It includes the product number, which drugs can be detected by your individual test device, and the assay procedure.

LITERATUR

1. Aniline O., Pittes, F. N., Phencyclidine (PCP): A review and perspectives. CRC Crit. Rev. Toxicol. 1982, 10, 145-177.
2. Baselt, R.C. Disposition of Toxic Drugs and Chemicals in Man, Bio-medical Publications, 8.Edition, 2008.
3. Thomas L. eds., Labor und Diagnose, 6. ed., TH-Books Verlagsgesellschaft, Frankfurt, 2005
4. Urine Testing for Drugs of Abuse, National Institute on Drug Abuse (NIDA), Research Monograph 73, 1986.
5. Ellenhorn, M.J. and Barceloux, D.G. Medical Toxicology. Elsevier Science Publishing Company, Inc., New York, 1988.
6. Fed. Register, Department of Health and Human Services, Mandatory Guidelines for Federal Workplace Drug Testing Programs, 53, 69, 11970-11979, 1988.
7. Gilman, A. G., and Goodman, L. S. The Pharmacological Basis of Therapeutics, eds. MacMillan Publishing, New York NY, 1980.
8. Gorodetzky, C. W., Detection of Drugs of Abuse in Biological Fluids, in Martin WR(ed): Drug Addiction I, New York, Spring - Verlag, 1977.
9. Greenblatt, D.J., Shader, R.I. Benzodiazepines in Clinical Practice. New York: Raven Press, 1974.
10. Harvey, R.A., Champe, P.C. Lippincotts Illustrated Reviews. Pharmacology. 91-95, 1992.
11. Hofmann F.E., A Handbook on Drug and Alcohol Abuse: The Biomedical Aspects, New York, Oxford University Press, 1983.
12. McBay, A. J., Clin. Chem. 33, 33B-40B, 1987.
13. T Goromaru, et al. Identification of fentanyl metabolites in rat urine by gas chromatography-mass spectrometry with stable-isotope tracers Volume 10, Issue 5, pp. 542-546, 09/01/1982
14. Congress: Ethnic factors: Implications for Drug Therapy and Global Drug Development AGAH Annual Meeting '99, Heidelberg, ALLEMAGNE (07/02/1999) 1999, vol. 37, n° 4, pp. 193-206 (27 ref.), pp. 175-183
15. Musshoff F. and Madea B. Fatality due to ingestion of tramadol alone, Forensic Science Int Vol 116:197-199 (2001)

SYMBOLS



For *in-vitro* diagnostic use only



Content



Lot number



Manufacturer



For single use only



Expiry date



Storage temperature



Carefully read package insert

Rev1.8 – (EN) – 18/12/2009 (HEH)