

# multi-CLIN™ Drug Screen Test Device

## Instruction Sheet for testing of any combination of the following drugs: AMP/BAR/BZO/COC/THC/MDMA/OPI/ OXY/PCP/PPX/TCA

A rapid, one step screening test for the simultaneous, qualitative detection of multiple drugs and drug metabolites in human urine with on-board procedural controls.

For professional, in vitro diagnostic use only.

### INTENDED USE

The multi-CLIN™ Drug Screen Test Device is a lateral flow chromatographic immunoassay for the qualitative detection of multiple drugs and drug metabolites in urine at the following cut-off concentrations:

Test	Calibrator	Cut-off
Amphetamine (AMP)	d-Amphetamine	1,000 ng/mL
Barbiturates (BAR)	Secobarbital	300 ng/mL
Benzodiazepines (BZO)	Oxazepam	300 ng/mL
Cocaine (COC)	Benzoylcegonine	300 ng/mL
Marijuana (THC)	11-nor- $\Delta^9$ -THC-9 COOH	50 ng/mL
Methylenedioxymethamphetamine (MDMA)	3,4-Methylenedioxy-methamphetamine	500 ng/mL
Opiates (OPI)	Morphine	300 ng/mL
Oxycodone (OXY)	Oxycodone	100 ng/mL
Phencyclidine (PCP)	Phencyclidine	25 ng/mL
Propoxyphene (PPX)	Propoxyphene	300 ng/mL
Tricyclic Anti-depressants (TCA)	Nortriptyline	1,000 ng/mL

This assay provides only a preliminary analytical test result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmatory method. Clinical consideration and professional judgment should be applied to any drug of abuse test result, particularly when preliminary positive results are indicated.

### SUMMARY

The multi-CLIN™ Drug Screen Test Device is a rapid urine screening test that can be performed without the use of an instrument. The test utilizes monoclonal antibodies to selectively detect elevated levels of specific drugs in urine.

#### AMPHETAMINE (AMP)

Amphetamine is a Schedule II controlled substance available by prescription (Dexedrine®) and is also available on the illicit market. Amphetamines are a class of potent sympathomimetic agents with therapeutic applications. They are chemically related to the human body's natural catecholamines: epinephrine and norepinephrine. Acute higher doses lead to enhanced stimulation of the central nervous system and induce euphoria, alertness, reduced appetite, and a sense of increased energy and power. Cardiovascular responses to Amphetamines include

increased blood pressure and cardiac arrhythmias. More acute responses produce anxiety, paranoia, hallucinations, and psychotic behavior. The effects of Amphetamines generally last 2-4 hours following use and the drug has a half-life of 4-24 hours in the body. About 30% of Amphetamines are excreted in the urine in unchanged form, with the remainder as hydroxylated and deaminated derivatives. It is also important to note that Amphetamine is a metabolite of Methamphetamine and will appear in the urine of a person who has taken Methamphetamine. d-Methamphetamine, commonly known as "crystal", "ice" and "speed", metabolizes into d-Amphetamine, which will be detected by the Amphetamine (AMP) assay on this device.

The multi-CLIN™ Drug Screen Test Device yields a positive result when Amphetamines in urine exceed 1,000 ng/mL. This is the suggested screening cut-off for positive samples set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).<sup>1</sup>

#### BARBITURATES (BAR)

Barbiturates are central nervous system depressants. They are used therapeutically as sedatives, hypnotics, and anticonvulsants. Barbiturates are almost always taken orally as capsules or tablets. The effects resemble those of intoxication with alcohol. Chronic use of barbiturates leads to tolerance and physical dependence.

Short acting Barbiturates taken at 400 mg/day for 2-3 months can produce a clinically significant degree of physical dependence. Withdrawal symptoms experienced during periods of drug abstinence can be severe enough to cause death.

Only a small amount (less than 5%) of most Barbiturates are excreted unaltered in the urine. The approximate detection time limits for Barbiturates are:  
Short acting (e.g. Secobarbital) 100 mg PO (oral) 4.5 days  
Long acting (e.g. Phenobarbital) 400 mg PO (oral) 7 days<sup>2</sup>

The multi-CLIN™ Drug Screen Test Device yields a positive result when the Barbiturates in urine exceed 300 ng/mL.

#### BENZODIAZEPINES (BZO)

Benzodiazepines are medications that are frequently prescribed for the symptomatic treatment of anxiety and sleep disorders. They produce their effects via specific receptors involving a neurochemical called gamma aminobutyric acid (GABA). Because they are safer and more effective, Benzodiazepines have replaced barbiturates in the treatment of both anxiety and insomnia. Benzodiazepines are also used as sedatives before some surgical and medical procedures, and for the treatment of seizure disorders and alcohol withdrawal.

Risk of physical dependence increases if Benzodiazepines are taken regularly (e.g., daily) for more than a few months, especially at higher than normal doses. Stopping abruptly can bring on such symptoms as trouble sleeping, gastrointestinal upset, feeling unwell, loss of appetite, sweating, trembling, weakness, anxiety and changes in perception. Only trace amounts (less than 1%) of most

Benzodiazepines are excreted unaltered in the urine; most of the concentration in urine is conjugated drug. The detection period for the Benzodiazepines in the urine is 3-7 days.

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the Benzodiazepines in urine exceed 300 ng/mL.

#### **COCAINE (COC)**

Cocaine is a potent central nervous system (CNS) stimulant and a local anesthetic. Initially, it brings about extreme energy and restlessness while gradually resulting in tremors, over-sensitivity and spasms. In large amounts, cocaine causes fever, unresponsiveness, difficulty in breathing and unconsciousness.

Cocaine is often self-administered by nasal inhalation, intravenous injection and free-base smoking. It is excreted in the urine in a short time primarily as Benzoyllecgonine.<sup>3</sup> Benzoyllecgonine, a major metabolite of cocaine, has a longer biological half-life (5-8 hours) than cocaine (0.5-1.5 hours), and can generally be detected for 24-48 hours after cocaine exposure.<sup>3</sup>

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the cocaine metabolite in urine exceeds 300 ng/mL. This is the suggested screening cut-off for positive samples set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).

#### **MARIJUANA (THC)**

THC ( $\Delta^9$ -tetrahydrocannabinol) is the primary active ingredient in cannabis (marijuana). When smoked or orally administered, THC produces euphoric effects. Users have impaired short term memory and slowed learning. They may also experience transient episodes of confusion and anxiety. Long-term, relatively heavy use may be associated with behavioral disorders. The peak effect of marijuana administered by smoking occurs in 20-30 minutes and the duration is 90-120 minutes after one cigarette. Elevated levels of urinary metabolites are found within hours of exposure and remain detectable for 3-10 days after smoking. The main metabolite excreted in the urine is 11-nor- $\Delta^9$ -tetrahydrocannabinol-9-carboxylic acid ( $\Delta^9$ -THC-COOH).

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the concentration of THC-COOH in urine exceeds 50 ng/mL. This is the suggested screening cut-off for positive samples set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).<sup>1</sup>

#### **METHYLENEDIOXYMETHAMPHETAMINE (MDMA)**

Methylenedioxymethamphetamine (ecstasy) is a designer drug first synthesized 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 virtually all people who took a reasonable dose of the drug, was to produce a clenching of the jaws.<sup>4</sup>

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the Methylenedioxymethamphetamine in urine exceeds 500 ng/mL.

#### **OPIATES (OPI)**

Opiate refers to any drug that is derived from the opium poppy, including the natural products, morphine and codeine, and the semi-synthetic drugs such as heroin. Opioid is more general, referring to any drug that acts on the opioid receptor.

Opioid analgesics comprise a large group of substances which control pain by depressing the central nervous system. Large doses of morphine can produce higher tolerance levels, physiological dependency in users, and may lead to substance abuse. Morphine is excreted unmetabolized, and is also the major metabolic product of codeine and heroin.<sup>3</sup>

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the concentration of opiates exceeds the 300 ng/mL cut-off level.

#### **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<sup>®</sup>, Tylox<sup>®</sup>, Percodan<sup>®</sup> and Percocet<sup>®</sup>. 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, 5mg oral dose is excreted with the primary constituents being unchanged drug (13-19%), conjugated drug (7-29%) and conjugated oxymorphone (13-14%).<sup>3</sup> The window of detection for oxycodone in urine is expected to be similar to that of other opioids such as morphine.

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the oxycodone level in urine exceeds 100 ng/mL. At present, the Substance Abuse and Mental Health Services Administration (SAMHSA) does not have a recommended screening cutoff for oxycodone positive samples.

#### **PHENCYCLIDINE (PCP)**

Phencyclidine, also known as PCP or Angel Dust, is a hallucinogen that was first marketed as a surgical

anesthetic in the 1950's. It was removed from the market because patients receiving it became delirious and experienced hallucinations.

Phencyclidine is used in powder, capsule, and tablet form. The powder is either snorted or smoked after mixing it with marijuana or vegetable matter. Phencyclidine is most commonly administered by inhalation but can be used intravenously, intra-nasally, and orally. After low doses, the user thinks and acts swiftly and experiences mood swings from euphoria to depression. Self-injurious behavior is one of the devastating effects of Phencyclidine.

PCP can be found in urine within 4 to 6 hours after use and will remain in urine for 7 to 14 days, depending on factors such as metabolic rate, user's age, weight, activity, and diet.<sup>5</sup> Phencyclidine is excreted in the urine as an unchanged drug (4% to 19%) and conjugated metabolites (25% to 30%).<sup>6</sup>

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the phencyclidine level in urine exceeds 25 ng/mL. This is the suggested screening cut-off for positive samples set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).

#### **PROPOXYPHENE (PPX)**

Propoxyphene is a narcotic analgesic compound bearing structural similarity to methadone. Darvocet™, one of the most common brand names for the drug, contains 50-100 mg of propoxyphene napsylate and 325-650 mg of acetaminophen. After a typical 100 mg oral dose of propoxyphene napsylate, peak plasma concentrations of 0.05 µg/mL to 0.1 µg/mL are achieved from 2 to 2½ hours post dose. Repeat doses of propoxyphene at 6-hour intervals leads to increasing plasma concentrations, with a plateau after the ninth dose at 48 hours. In the case of overdose, propoxyphene blood concentrations can reach significantly higher levels.

Propoxyphene is metabolized in the liver to yield norpropoxyphene. Norpropoxyphene has a longer half-life (30 to 36 hours) than parent propoxyphene (6 to 12 hours).<sup>5</sup>

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the concentration of Propoxyphene or Norpropoxyphene in urine exceeds 300 ng/mL. At present, the Substance Abuse and Mental Health Services Administration (SAMHSA) does not have a recommended screening cutoff for propoxyphene positive samples.

#### **TRICYCLIC ANTIDEPRESSANTS (TCA)**

TCA (Tricyclic Antidepressants) are commonly used for the treatment of depressive disorders. TCA overdoses can result in profound central nervous system depression, cardiotoxicity and anticholinergic effects. TCA overdose is the most common cause of death from prescription drugs. TCAs are taken orally or sometimes by injection. TCAs are metabolized in the liver. Both TCAs and their metabolites are excreted in urine mostly in the form of metabolites for up to ten days.

The **multi-CLIN™ Drug Screen Test Device** yields a positive result when the concentration of Tricyclic Antidepressants in urine exceeds 1,000 ng/mL.

#### **PRINCIPLE**

The **multi-CLIN™ Drug Screen Test Device** is an immunoassay based on the principle of competitive binding. Drugs which may be present in the urine sample compete against their respective drug conjugate for binding sites on their specific antibody.

During testing, a urine sample migrates upward by capillary action. A drug, if present in the urine sample below its cut-off concentration, will not saturate the binding sites of its specific antibody. The antibody will then react with the drug-protein conjugate and a visible colored line will show up in the test line region of the specific drug strip. The presence of drug above the cut-off concentration will saturate all the binding sites of the antibody. Therefore, the colored line will not form in the test line region.

A drug-positive urine sample will not generate a colored line in the specific test line region of the strip because of drug competition, while a drug-negative urine sample will generate a line in the test line region because of the absence of drug competition.

#### **Internal Procedural Controls**

To serve as an internal procedural control, the test includes both a Positive and Negative Control Region.

##### Positive Control

When the test is manufactured, an antigen-BSA conjugate is striped in the Positive Control Region (POS) with a water-soluble blue dye as a visual marker. The positive control antigen is included in the label pad. When the test is run properly, the migration of the sample will make this blue line disappear. Therefore, the absence of a line in the Positive Control Region (POS) serves as an internal positive procedural control. The presence of a blue line in the Positive Control Region (POS) could indicate that an immunochemical reaction did not occur and the results should be considered invalid.

##### Negative Control

A line in the Negative Control Region (NEG) confirms that proper volume of sample has been added and membrane wicking has occurred. There must be a line present in the Negative Control Region (NEG) for the test results to be valid.

**The absence of a Positive Control line confirms the internal procedural control and, along with the appearance of the Negative Control line, the validity of the test results. If the test is working properly, a line should always appear in the Negative Control Region (NEG) and NO line should appear in the Positive Control Region (POS).**

#### **REAGENTS**

Each test line contains anti-drug mouse monoclonal antibody and corresponding drug-protein conjugates. Control line contains goat anti-rabbit IgG polyclonal antibodies and rabbit IgG.

## PRECAUTIONS

- For professional, *in vitro* diagnostic use only.
- Do not use after the expiration date.
- The test device should remain in the sealed pouch until use.
- All samples should be considered potentially hazardous and handled in the same manner as an infectious agent.
- The used test device should be discarded according to federal, state and local regulations

## STORAGE AND STABILITY

Store as packaged in the sealed pouch at 2-30°C. The test device is stable through the expiration date printed on the sealed pouch. The test device must remain in the sealed pouch until use. DO NOT FREEZE. Do not use beyond the expiration date.

## SAMPLE COLLECTION AND PREPARATION

### Urine Assay

The urine sample must be collected in a clean and dry container. Urine collected at any time of the day may be used. Urine samples exhibiting visible precipitates should be centrifuged, filtered, or allowed to settle to obtain a clear supernatant for testing.

### Sample Storage

Urine samples may be stored at 2-8°C for up to 48 hours prior to testing. For prolonged storage, samples may be frozen and stored below -20°C. Frozen samples should be thawed and mixed well before testing.

## MATERIALS

### Materials Provided

- Test devices
- Disposable droppers
- Package insert
- Procedure card

### Materials Required But Not Provided

- Sample collection container
- Timer
- Positive and Negative Controls

## DIRECTIONS FOR USE

**Allow test device and urine sample to reach room temperature (15-30°C) before testing.**

1. Remove the test device from the sealed pouch. Use it as soon as possible.
2. Place the test device on a clean and level surface. Add 100µL of urine (3 full drops using the included pipette) to each of the sample wells of the test device. **[See image (1).]** Start the timer. Avoid trapping air bubbles in the sample well.
3. Wait for the colored lines(s) to appear. **[See image (2).]** The results should be read at 5 minutes. Test results will be stable for at least 8 hours after test initiation.

## RESULT INTERPRETATION

[Please refer to image (4).]

First, confirm the validity of the results by reviewing the Negative and Positive Control Lines. If there is a line in the Positive Control Region (POS), the result is INVALID. There must be a line in the Negative Control Region (NEG) for the result to be VALID. Before interpreting testing results, make sure that there is no line next to "POS" and a visible line next to "NEG". [See image (3).]

**NEGATIVE RESULT:\*** A colored line appears in the Negative Control region (NEG), no line appears in the Positive Control Region (POS) and a colored line appears in the Test region next to a specific drug tested. Up to four colored lines may appear in each result window. One line will be in the Negative Control region (NEG). Up to three lines will be next to the drug names in the Test region. This negative result means that the drug concentration in the urine sample is below the detectable level for a certain drug tested.

**\*NOTE:** The shade of the colored line(s) in the Test region may vary. The result should be considered negative when there is even a faint color line.

**POSITIVE RESULT:** A colored line appears in the Negative Control region (NEG), no line appears in the Positive Control Region (POS) and NO line appears in the Test region next to the name of a certain drug tested. The positive result means that the drug concentration in the urine sample is greater than the detectable level for a certain drug tested.

**INVALID:** No line appears in the Negative Control region (NEG) and/or a line appears in the Positive Control Region (POS). Not enough sample volume or incorrect procedural techniques are the most likely reasons for an invalid result. Review the directions for use and repeat the test with a new test device. If the problem continues, contact Technical Service.

## QUALITY CONTROL

A procedural control is included in the test. The presence of a red line in the Negative Control region (NEG) and the absence of a line in the Positive Control Region (POS) are considered internal procedural controls. This confirms sufficient sample volume, adequate membrane wicking and correct procedural technique.

The internal procedural controls contained within the device satisfy the daily control testing requirement provided they are used in conjunction with a comprehensive laboratory Quality Assurance program.

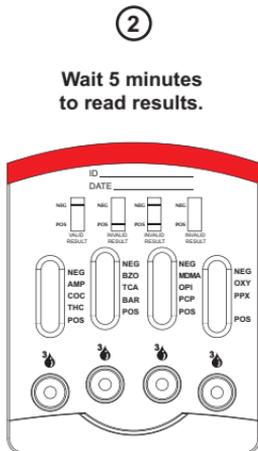
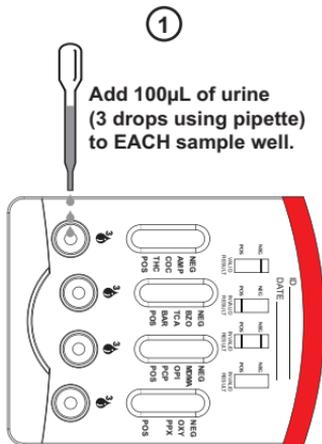
It is recommended that external positive and negative controls be tested when a new kit is opened, after prolonged kit storage and as deemed necessary by your internal laboratory procedures.

External Positive and Negative Controls are available separately. Please contact your distributor for a list of approved controls that have been validated with the **multi-CLIN™ Drug Screen Test Device**. Use of any other control material is not advised and could produce irregular results. User should follow Federal, State and Local guidelines for quality control testing.

### LIMITATIONS

1. The **multi-CLIN™ Drug Screen Test Device** provides only a qualitative, preliminary analytical result. A secondary analytical method must be used to obtain a confirmed result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmatory method.<sup>1</sup>
2. There is a possibility that technical or procedural errors, as well as other interfering substances in the urine sample may cause erroneous results.

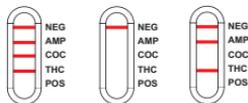
3. Adulterants, such as bleach and/or alum, in urine samples may produce erroneous results regardless of the analytical method used. If adulteration is suspected, the test should be repeated with another urine sample.
4. A Positive result does not indicate level or intoxication, administration route or concentration in urine.
5. A Negative result may not necessarily indicate drug-free urine. Negative results can be obtained when drug is present but below the cut-off level of the test.
6. Test does not distinguish between drugs of abuse and certain medications.
7. A positive test result might be obtained from certain foods or food supplements.



③

**Confirm validity of results by checking NEG and POS Control Regions.**

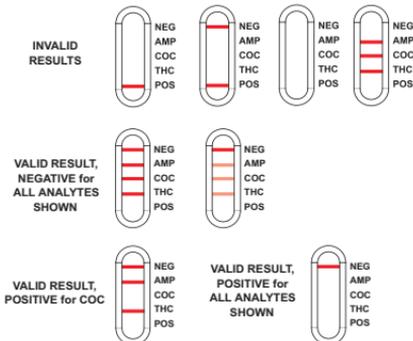
There should be **NO** line in the Positive Control Region (POS) and a visible line in the Negative Control Region (NEG).



**EXAMPLES OF  
VALID RESULTS**

④

**Interpret Results at 5 minutes.**



## PERFORMANCE CHARACTERISTICS

### Accuracy

A side-by-side comparison was conducted using the **multi-CLIN™ Drug Screen Test Device** and commercially available drug rapid tests. Testing was performed on 1,704 samples previously collected from subjects presenting for Drug Screen Testing. Presumptive positive results were confirmed by GC/MS. Negative urine samples were screened initially by Predicate test. The following compounds were quantified by GC/MS and contributed to the total amount of drugs found in presumptive positive urine samples tested in the following clinical studies:

Test	Compounds Contributed to the Totals of GC/MS
AMP	Amphetamine
BAR	Secobarbital, Butalbital, Phenobarbital, Pentobarbital
BZO	Oxazepam, Nordiazepam, Alprazolam, α-OH, Desalkylflurazepam
COC	Benzoyllecgonine
THC	11-nor-Δ <sup>9</sup> -tetrahydrocannabinol-9-carboxylic acid
MDMA	3,4-Methylenedioxyamphetamine, Methylenedioxyamphetamine
OPI	Morphine, Codeine
OXY	Oxycodone
PCP	Phencyclidine
PPX	Propoxyphene
TCA	Nortriptyline

The following results were tabulated:

Method	GC/MS						% agreement with GC/MS
	Negative*	Negative (<-25% cutoff)	Near cutoff Negative (-25% cutoff to cutoff)	Near cutoff Positive (cutoff to +25% cutoff)	Positive (>+25% cutoff)		
AMP	+	0	0	6	20	114	98%
	-	300	2	6	2	0	
BAR	+	0	1	3	3	96	99%
	-	300	0	5	1	1	
BZO	+	0	1	1	3	136	>99%
	-	300	2	6	1	0	
COC	+	0	2	15	14	105	96%
	-	300	3	5	0	0	
THC	+	0	9	7	11	105	95%
	-	300	9	2	3	2	
MDMA	+	0	0	4	6	82	99%
	-	300	0	1	0	0	
OPI	+	0	2	7	10	130	98%
	-	300	0	0	0	0	
OXY	+	0	1	2	2	138	99%
	-	300	2	4	1	0	
PCP	+	0	4	0	11	74	99%
	-	300	0	0	1	0	
PPX	+	0	0	0	2	143	>99%
	-	300	0	4	1	0	
TCA**	+	0	13	9	14	18	94%
	-	300	16	0	0	0	

\* Negative urine samples were screened by predicate tests and approximately 10% were confirmed negative by GC/MS.

\*\*Note: TCA concentration was based on HPLC data.

	Method	Predicate Test Results		% Agreement with Predicate Test	
		Pos.	Neg.		
		multi-CLIN™ Drug Screen Test Device	AMP		Pos.
Neg.	3			307	
BAR	Pos.		103	0	>99%
	Neg.		0	307	
BZO	Pos.		122	1	>99%
	Neg.		0	302	
COC	Pos.		132	4	99%
	Neg.		0	308	
THC	Pos.		132	0	98%
	Neg.		9	307	
MDMA	Pos.		91	1	>99%
	Neg.		0	301	
OPI	Pos.		149	0	>99%
	Neg.		0	300	
OXY	Pos.		141	2	>99%
	Neg.		0	307	
PCP	Pos.		89	0	>99%
	Neg.		0	301	
PPX	Pos.	135	0	>99%	
	Neg.	0	305		
TCA	Pos.	54	0	>99%	
	Neg.	0	316		

### Analytical Sensitivity

A drug-free urine pool was spiked with drugs to various concentrations. >99% agreement with expected results was found at ± 50% cut-off for each drug tested (with a 95% confidence interval).

### Analytical Specificity

The following table lists the concentration of compounds (ng/mL) that are detected positive in urine by the **multi-CLIN™ Drug Screen Test Device** at 5 minutes.

Compound	ng/mL
<b>AMPHETAMINE</b>	
d-Amphetamine	1,000
d,l-Amphetamine	3,000
l-Amphetamine	50,000
p-Hydroxyamphetamine	3,125
3,4-Methylenedioxyamphetamine (MDA)	2,000
Phentermine	3,000
<b>BARBITURATES</b>	
Secobarbital	300
Amobarbital	300
Alphenol	150
Aprobarbital	200
Butobarbital	75
Butalbital	2,500
Butethanol	100
Cyclobarbital	400
Cyclopentobarbital	600
Pentobarbital	300
Phenobarbital	100
<b>BENZODIAZEPINES</b>	
Oxazepam	300
Alprazolam	196
Alprazolam, α-OH	1,262
Bromazepam	1,562
Chlordiazepoxide	1,562

Compound	ng/mL
Clobazam	98
Clonazepam	781
Clorazepate	195
Delorazepam	1,562
Desalkylflurazepam	390
Diazepam	195
Estazolam	2,500
Flunitrazepam	390
(±) Lorazepam	1,562
RS-Lorazepam glucuronide	156
Midazolam	12,500
Nitrazepam	98
Norchlordiazepoxide	195
Nordiazepam	390
Temazepam	98
Triazolam	2,500
<b>COCAINE</b>	
Benzoyllecgonine	300
Cocaine	780
Cocacethylene	12,500
Ecgonine	32,000
<b>MARIJUANA (THC)</b>	
11-nor- $\Delta^9$ -THC-9 COOH	50
Cannabinol	20,000
11-nor- $\Delta^8$ -THC-9 COOH	30
$\Delta^8$ -THC	15,000
$\Delta^9$ -THC	15,000
<b>METHYLENEDIOXYMETHAMPHETAMINE</b>	
3,4-Methylenedioxyamphetamin (MDMA)	500
1-Methamphetamine	100,000
3,4-Methylenedioxyamphetamine (MDA)	3,000
3,4-Methylenedioxyethylamphetamine (MDEA)	300
<b>OPIATE 300 (OPI)</b>	
Morphine	300
Codeine	300
Ethylmorphine	6,250
Hydrocodone	50,000
Hydromorphone	3,125
Levorphanol	1,500
6-Monoacetylmorphine	400
Morphine 3- $\beta$ -d-glucuronide	1,000
Norcodeine	6,250
Normorphine	100,000
Oxycodone	30,000
Oxymorphone	100,000
Thebaine	6,250
<b>OXYCODONE</b>	
Oxycodone	100
6-Acetylcodeine	100,000
Codeine	25,000
Dihydrocodeine	12,500
Ethylmorphine	25,000
Hydrocodone	6,250
Hydromorphone	12,500
Levorphanol	100,000
6-Monoacetylmorphine	100,000
Morphine	100,000
Morphine 3- $\beta$ -d-glucuronide	100,000
Norcodeine	100,000

Compound	ng/mL
Normorphone	100,000
Oxymorphone	780
Procaine	100,000
Thebaine	25,000
<b>PHENCYCLIDINE</b>	
Phencyclidine	25
4-Hydroxyphencyclidine	12,500
<b>PROPOXYPHENE</b>	
d-Propoxyphene	300
Norpropoxyphene	300
<b>TRICYCLIC ANTIDEPRESSANTS</b>	
Nortriptyline	1,000
Amitriptyline	1,500
Clomipramine	12,500
Cyclobenzaprine	6,250
Desipramine	200
Doxepin	2,000
Imipramine	400
Maprotiline	2,000
Nordoxepin	1,000
Perphenazine	50,000
Promazine	1,500
Promethazine	25,000
Trimipramine	3,000

### Precision

A study was conducted at three physician offices for Amphetamine, Barbiturates, Benzodiazepines, Cocaine, Marijuana, Methylenedioxyamphetamine, Opiates, Oxycodone, Phencyclidine, Propoxyphene and Tricyclics by untrained operators using three different lots of product to demonstrate the within run, between run and between operator precision. An identical panel of coded samples, containing drugs at the concentration of  $\pm 50\%$  cut-off level was labeled as a blind and tested at each site. The correlation with expected results was  $>99\%$  across all lots and sites (with a 95% confidence interval).

### Effect of Urinary Specific Gravity

Urine samples of low, normal and high specific gravity (1.004-1.034) were spiked with drugs at  $\pm 50\%$  cut-off levels and analyzed. The results demonstrate that varying ranges of urinary specific gravity do not affect the test results.

### Effect of the Urinary pH

Urine samples with pH ranges from 5-9 in 1 pH unit increments were spiked with drugs at  $\pm 50\%$  cut-off levels and analyzed. The results demonstrate that varying ranges of pH (5-9) do not interfere with the performance of the test.

## Cross-Reactivity

A study was conducted to determine the cross-reactivity of the test with compounds in either drug-free urine or Amphetamine, Barbiturates, Benzodiazepines, Cocaine, Marijuana, Methylenedioxymethamphetamine, Opiates, Oxycodone, Phencyclidine, Propoxyphene and Tricyclic positive urine. The following compounds show no cross-reactivity when tested with the **multi-CLIN™ Drug Screen Test Device** at a concentration of 100 µg/mL.

## Non-Cross Reacting Compounds

Acetaminophen	Acetone
Acetophenetidin	N-Acetylprocainamide
Acetylsalicylic acid	Albumin
Albuterol	Aminopyrine
Amoxapine	Amoxicillin
Ampicillin	Apomorphine
l-Ascorbic acid	Aspartame
Atropine	Baclofen
Benzilic acid	Benzocaine
Benzoic acid	Benzphetamine*
Bilirubin	d/l-Brompheniramine
Buprenorphine	Buprione
Caffeine	Cannabidiol
Carisoprodol	Chloralhydrate
Chloramphenicol	Chloroquine
Chlorothiazide	d/l-Chlorpheniramine
Chlorpromazine	Chlorpropamide
Chlorprothixene	Cholesterol
Cimetidine	Clonidine
Clozapine	Cortisone
l-Cotinine	Creatinine
Deoxycochlorsterone	R(-)Deprenyl
Dextromethorphan	Diclofenac
Dicyclomine	Diflunisal
Digitoxin	Digoxin
(+)-cis-Diltiazem	Dimenhydrinate
4-Dimethylaminoantipyrine	Diphenhydramine
5,5-Diphenylhydantoin	Disopyramide
Dopamine	Doxylamine
Droperidol	Ecgonine methyl ester
EDDP	Efavirenz*
EMDP	Ephedrine
l-Ephedrine	[1R,2S](-)-Ephedrine
l-Epinephrine	(±)Epinephrine
Erythromycin	β-Estradiol
Estrone-3-sulfate	Ethanol (Ethyl alcohol)
Ethyl-p-aminobenzoate	Etodolac
Famprofazone	Fenfluramine
Fenopropfen	Fentanyl
Fluoxetine	Furosemide
Gentamicin	Gentisic acid
d(+)-Glucose	Guaiacol Glyceryl Ether
Haloperidol	Hemoglobin
Hydralazine	Hydrochlorothiazide
Hydrocortisone	o-Hydroxyhippuric acid
p-Hydroxymethamphetamine	p-Hydroxynorephedrine
Hydroxyzine	Ibuprofen
Indomethacin	Insulin
lproniazid	l-Isoproterenol
Isosuxprine	Kanamycin
Ketamine	Ketoprofen
Labetalol	Lidocaine
Lindane	Lithium
Loperamide	Meperidine
Mephentermine	Meprobamate
Methadone	d-Methamphetamine
Methaqualone	Methoxyphenamine
Methylphenidate	Methypylon
Metoprolol	Metronidazole
Nalidixic acid	Nalorphine
Naloxone	Naltrexone
α-Naphthaleneacetic Acid	Naproxen
Niacinamide	Nifedipine
Nimesulide	Norethindrone
Norfloxetine	Noscapine
d/l-Octopamine	Orphenadrine

Oxalic acid	Oxolinic acid
Oxymetazoline	Papaverine
Penolmine	Penicillin-G
Pentazocine	Phenethazine
Pheniramine	Phenothiazine
Trans-2-phenylcyclopropylamine	l-Phenylephrine
β-Phenylethylamine	Phenylpropanolamine
(±)Phenylpropanolamine (d/l-Norephedrine)	Prednisolone
Prednisone	5-β-pregnane-3α, 17α, 21-triol-20-one
Procaine	d/l-Propranolol
d-Pseudoephedrine	Quinacrine
Quinine	Quindine
Rantidine	Riboflavin
Salbutamol	Salicylic acid
Serotonin	Sodium chloride
Spironolactone	Sulfamethazine
Sulfamethoxazole	Sulfisoxazole
Sulindac	Tetracycline
Tetrahydrocortisone 3-acetate	Tetrahydrozoline
Theophylline	Thiamine
Thioridazine	Thiothixene
l-Thyroxine	Tobramycin
Tolbutamide	Tramadol
Trazodone	Trimethobenzamide
Triamterene	Trifluoperazine
Trimethoprim	Tryptamine
d/l-Tryptophan	Tyramine
d/l-Tyrosine	Uric acid
Verapamil	Zomepirac
Zopiclone	

\*Parent compound only

## BIBLIOGRAPHY

1. Procedures for Transportation Workplace Drug and Alcohol Testing Programs, 49 CFR 40. Reprinted by the Department of Transportation, Drug and Alcohol Policy and Compliance Office, 400 7<sup>th</sup> St. SW, Washington, DC 20590, (202) 366-3784.
2. Tietz NW. Textbook of Clinical Chemistry. W.B. Saunders Company. 1986, 1734.
3. Baselt R. Disposition of Toxic Drugs and Chemicals in Man, 6th Ed. Biomedical Publications. 2002.
4. Climko RP. Ecstasy: A Review of MDMA and MDA. *Int'l J Psychiatry in Medicine*. 16(4); 1986-1987, 359-372.
5. Hardman J, Limbird LE (Eds). Goodman & Gilman's The Pharmacological Basis of Therapeutics, 10<sup>th</sup> Ed., McGraw-Hill Publishing. 2001, 598.

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