

# CLIA-WAIVED One Step Multi-Drug, Multi-Line Screen Test Device

## Instruction Sheet for testing of any combination of the following drugs: AMP/COC/THC/mAMP/OPI/PCP

*A rapid, one step screening test for the simultaneous, qualitative detection of multiple drugs and drug metabolites in human urine.*

*For healthcare professionals including professionals at point of care sites.*

*For in vitro diagnostic use only.*

### INTENDED USE

The **One Step Multi-Drug, Multi-Line 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
Cocaine (COC)	Benzoyllecgonine	300 ng/mL
Marijuana (THC)	11-nor- $\Delta^9$ -THC-9 COOH	50 ng/mL
Methamphetamine (mAMP)	d-Methamphetamine	1,000 ng/mL
Opiates (OPI 2000)	Morphine	2,000 ng/mL
Phencyclidine (PCP)	Phencyclidine	25 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 **One Step Multi-Drug, Multi-Line 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.

The **One Step Multi-Drug, Multi-Line 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).<sup>4</sup>

#### 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>2,3</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 **One Step Multi-Drug, Multi-Line 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).<sup>4</sup>

#### 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 **One Step Multi-Drug, Multi-Line 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).<sup>4</sup>

#### METHAMPHETAMINE (mAMP)

Methamphetamine is an addictive stimulant drug that strongly activates certain systems in the brain. Methamphetamine is closely related chemically to amphetamine, but the central nervous system effects of Methamphetamine are greater. Methamphetamine is made in illegal laboratories and has a high potential for abuse and dependence. The drug can be taken orally, injected, or inhaled. 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 Methamphetamine include increased blood pressure and cardiac arrhythmias. More acute responses produce anxiety, paranoia, hallucinations, psychotic behavior, and eventually, depression and exhaustion.

The effects of Methamphetamine generally last 2-4 hours and the drug has a half-life of 9-24 hours in the body. Methamphetamine is excreted in the urine as amphetamine and oxidized and deaminated derivatives. However, 10-20% of Methamphetamine is excreted unchanged. Thus, the presence of the parent compound in the urine indicates Methamphetamine use. Methamphetamine is generally detectable in the urine for 3-5 days, depending on urine pH level.

The **One Step Multi-Drug, Multi-Line Screen Test Device** yields a positive result when the Methamphetamine in urine exceeds 1,000 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. Morphine is detectable in the urine for several days after an opiate dose.<sup>1</sup>

The **One Step Multi-Drug, Multi-Line Screen Test Device** yields a positive result when the morphine in urine exceeds 2,000 ng/mL. This is the suggested screening cut-off for positive samples set by the Substance Abuse and Mental Health Services Administration (SAMHSA).<sup>4</sup>

#### 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>5</sup>

The **One Step Multi-Drug, Multi-Line 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).<sup>4</sup>

### PRINCIPLE

The **One Step Multi-Drug, Multi-Line 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.

To serve as a procedural control, a colored line will always appear at the control line region, indicating that proper volume of sample has been added and membrane wicking has occurred.

### REAGENTS

The test contains a membrane strip coated with drug-protein conjugates on the test line, goat polyclonal antibody against gold-protein conjugate at the control line and dye pad which contains colloidal gold particles coated with mouse monoclonal antibody specific to Amphetamine, Cocaine, Marijuana, Methamphetamine, Morphine or Phencyclidine.

### PRECAUTIONS

- For healthcare professionals including professionals at point of care sites.
- For 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

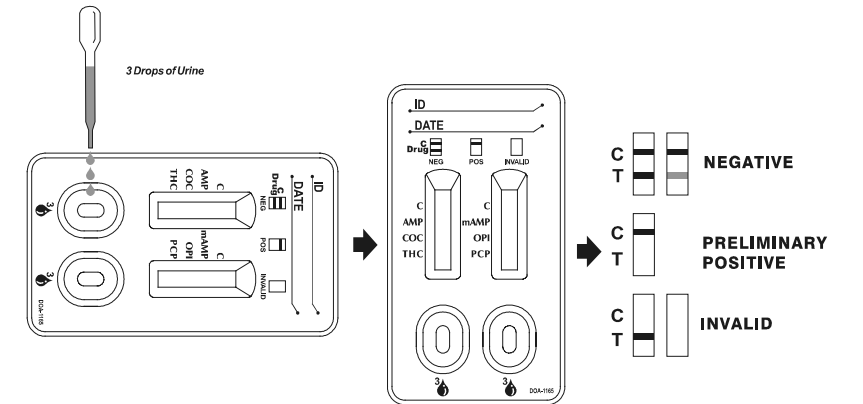
#### Materials Required But Not Provided

- Sample collection container
- External positive and negative controls  
(Please contact the manufacturer for a list of suggested external control suppliers)
- Timer

### DIRECTIONS FOR USE

**Allow the test device, urine sample, and/or controls to equilibrate to room temperature (15-30°C) prior to testing.**

- Bring the pouch to room temperature before opening it. Remove the test device from the sealed pouch. Use test device as soon as possible.
- Place the test device on a clean and level surface. Hold the dropper vertically and transfer 3 full drops of urine (approx. 100 ul total volume) to the sample well (S) of the test device. Start the timer. Avoid trapping air bubbles in the sample well (S). See the illustration below.
- Wait for the colored lines(s) to appear. The results should be read at 5 minutes or up to 4 hours after test initiation.



### RESULT INTERPRETATION

(Please refer to the illustration above)

**POSITIVE:** A colored line appears in the control region (C). **NO line appears in the test region next to the name of a specific drug tested.** The positive result means that the drug concentration in the urine sample is greater than the designated cut-off for a specific drug.

**NEGATIVE:** A colored line appears in the control region (C) and a colored line appears in the test region (T). Up to four colored lines may appear in each result window. One line will be in the control region (C). 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 designated cut-off for a specific drug.

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

**INVALID: No line appears in the control region (C).** If this occurs read the directions again and repeat the test with a new panel. If the result is still invalid stop using the test kit and contact the manufacturer at (858) 535-2030.

### QUALITY CONTROL

A procedural control is included in the test. A colored line appearing in the control region (C) is considered an internal procedural control. It confirms sufficient sample volume, adequate membrane wicking and correct procedural technique.

It is recommended that external positive and negative controls be tested with each new opened kit, new lot or shipment of product, with each change in operator within the test kit, weekly as a check on continued storage conditions, and as otherwise required by your laboratory's internal quality system procedures. Control specimens should be performed the same as patient specimens (refer to Directions for Use and Interpretation of Results). If unexpected results are seen when running the external positive or negative controls, review the Directions for Use, Interpretation of Results and Limitations sections and repeat the test with another device. If the problem persists, discontinue use of the test kit immediately and contact the Manufacturer at (858) 535-2030.

## LIMITATIONS

- The **One Step Multi-Drug, Multi-Line 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>3,4,7</sup>
- There is a possibility that technical or procedural errors, as well as other interfering substances in the urine sample may cause erroneous results.
- 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.
- A Positive result does not indicate level of intoxication, administration route or concentration in urine.
- 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.
- Test does not distinguish between drugs of abuse and certain medications.
- A positive test result might be obtained from certain foods or food supplements.

## PERFORMANCE CHARACTERISTICS

### Accuracy

A side-by-side comparison was conducted using the **One Step Multi-Drug, Multi-Line Screen Test Device** and commercially available drug rapid tests. Testing was performed on approximately 1,000 samples previously collected from subjects presenting for Drug Screen Testing. Some samples in the +/- 25% cut-off levels were prepared by diluting from the more concentrated clinical samples with the neat urine. Presumptive positive results were confirmed by GC/MS. Negative urine samples were screened initially by Predicate test. Approximately 10% negative samples were confirmed by GC/MS. 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
COC	Benzoyllecgonine
THC	11-nor- $\Delta^9$ -tetrahydrocannabinol-9-carboxylic acid
mAMP	Methamphetamine
OPI	Morphine, Codeine
PCP	Phencyclidine

The following results were tabulated:

Method		GC/MS					
Multi-Drug Multi-Line	Neg.*	Neg. (< 25% cutoff)	Near cutoff neg. (-25% cutoff to cutoff)	Near cutoff pos. (cutoff to +25% cutoff)	Pos. (> +25% cutoff)	% agreement with GC/MS	
							AMP
	Negative	150	2	12	8	0	
COC	Positive	0	0	1	13	99	98%
	Negative	150	8	22	4	2	
THC	Positive	0	6	3	12	114	95%
	Negative	150	13	6	2	4	
mAMP	Positive	0	0	0	4	117	96%
	Negative	150	0	12	6	7	
OPI	Positive	0	0	2	18	111	98%
	Negative	150	0	14	2	1	
PCP	Positive	0	0	1	6	64	96%
	Negative	150	0	3	3	5	

### Negative urine samples were screened by predicate tests.

Method		Predicate Test Results		% Agreement with Predicate Test	
		Positive	Negative		
Multi-Drug Multi-Line Test Device	AMP	Positive	129	0	>99%
		Negative	0	172	
	COC	Positive	112	1	>99%
		Negative	0	186	
	THC	Positive	124	1	>99%
		Negative	0	175	
	mAMP	Positive	121	0	>99%
		Negative	1	174	
	OPI	Positive	131	0	99%
		Negative	2	164	
	PCP	Positive	71	0	>99%
		Negative	1	160	

## 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 **One Step Multi-Drug, Multi-Line Screen Test Device** at 5 minutes.

Compound	ng/mL
<b>AMPHETAMINE</b>	
d-Amphetamine	1,000
d,l-Amphetamine sulfate	3,000
l-Amphetamine	50,000
(±)3,4-Methylenedioxyamphetamine	2,000
Phentermine	3,000
<b>COCAINE</b>	
Benzoyllecgonine	300
Cocaine	780
Cocaeethylene	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>METHAMPHETAMINE</b>	
d-Methamphetamine	1,000
p-Hydroxymethamphetamine	30,000
L-Methamphetamine	8,000
(±)-3,4-Methylenedioxyamphetamine	2,000
Mephentermine	50,000
<b>OPIATES</b>	
Morphine	2,000
Codeine	2,000
Ethylmorphine	5,000
Hydrocodone	12,500
Hydromorphone	5,000
Levophanol	75,000
6-Monoacetylmorphine	5,000
Morphine 3- $\beta$ -D-glucuronide	2,000
Norcodeine	12,500
Normorphine	50,000
Oxycodone	25,000
Oxymorphone	25,000
Procaine	150,000
Thebaine	100,000
<b>PCP</b>	
Phencyclidine	25
4-Hydroxyphencyclidine	12,500

## Precision

A study was conducted at three physician offices for Amphetamine, Cocaine, Marijuana, Methamphetamine, Opiate and Phencyclidine 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 +/-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

Fifteen (15) urine samples of normal, high, and low specific gravity ranges (1.000-1.037) were spiked with drugs at 50% below and 50% above cut-off levels respectively. The **One Step Multi-Drug, Multi-Line Screen Test Device** was tested in duplicate using fifteen drug-free urine and spiked urine samples. The results demonstrate that varying ranges of urinary specific gravity does not affect the test results.

## Effect of the Urinary pH

The pH of an aliquoted negative urine pool was adjusted to a pH range of 5 to 9 in 1 pH unit increments and spiked with drugs at 50% below and 50% above cut-off levels. The spiked, pH-adjusted urine was tested with the **One Step Multi-Drug, Multi-Line Screen Test Device**. The results demonstrate that varying ranges of pH does 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 Cocaine, Amphetamine, Methamphetamine, Marijuana, Opiate or Phencyclidine positive urine. The following compounds show no cross-reactivity when tested with the **One Step Multi-Drug, Multi-Line Screen Test Device** at a concentration of 100  $\mu$ g/mL.

## Non Cross-Reacting Compounds

Acetaminophen	Acetophenetidin
N-Acetylprocainamide	Acetylsalicylic acid
Aminopyrine	Amoxicillin
Ampicillin	l-Ascorbic acid
Apomorphine	Aspartame
Atropine	Benzilic acid
Benzoic acid	Benzphetamine*
Bilirubin	d,l-Brompheniramine
Caffeine	Cannabidol
Chloral hydrate	Chloramphenicol
Chlorothiazide	d,l-Chloropheniramine
Chlorpromazine	Chloroquine
Cholesterol	Clonidine
Cortisone	l-Cotinine
Creatinine	Deoxycorticosterone
Dextromethorphan	Diclofenac
Difunisal	Digoxin
Diphenhydramine	Ecgonine methyl ester
l - $\Psi$ -Ephedrine	$\beta$ -Estradiol
Estrone-3-sulfate	Ethyl-p-aminobenzoate
[1R,2S] (-) Ephedrine	l(-)-Epinephrine
Erythromycin	Fenoprofen
Furosemide	Gentisic acid
Hemoglobin	Hydralazine
Hydrochlorothiazide	Hydrocortisone
O-Hydroxyhippuric acid	p-Hydroxyamphetamine
p-Hydroxytyramine	Ibuprofen
Iproniazid	d,l-Isoproterenol
Isoxsuprine	Ketamine
Ketoprofen	Labeltalol
Loperamide	Meperidine
Meprobamate	Methoxyphenamine
Methylphenidate	Nalidixic acid
Naloxone	Naltrexone
Naproxen	Niacinamide
Nifedipine	Norethindrone
d-Norpropoxyphene	Noscapine
d,l-Octopamine	Oxalic acid
Oxolinic acid	Oxymetazoline
Papaverine	Penicillin-G
Pentazocine	Perphenazine
Phenelzine	Trans-2-phenylcyclo-propylamine
l-Phenylephrine	$\beta$ -Phenylethylamine
Phenylpropanolamine	Prednisolone
Prednisone	d,l-Propranolol
d-Propoxyphene	d-Pseudoephedrine
Quinacrine	Quinine
Quinidine	Ranitidine
Salicylic acid	Serotonin
Sulfamethazine	Sulindac
Tetracycline	Tetrahydrocortisone 3-acetate
Tetrahydrocortisone 3 ( $\beta$ -D-glucuronide)	Tetrahydrozoline
Thiamine	Thioridazine
d,l-Tyrosine	Tolbutamide
Triamterene	Trifluoperazine
Trimethoprim	Tryptamine
d,l-Tryptophan	Tyramine
Uric acid	Verapamil
Zomepirac	

\*Parent compound only; metabolizes into amphetamine and methamphetamine in the body.

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