

mAMP

One Step Methamphetamine Test Strip Package Insert

A rapid, one step test for the qualitative detection of Methamphetamines in human urine.

For healthcare professionals including professionals at point of care sites.

For professional *in vitro* diagnostic use only.

INTENDED USE

The mAMP One Step Methamphetamine Test Strip is a lateral flow chromatographic immunoassay for the detection of Methamphetamine in human urine.

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 used.

SUMMARY

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 primarily 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 mAMP One Step Methamphetamine Test Strip is a rapid urine screening test that can be performed without the use of an instrument. The test utilizes a monoclonal antibody to selectively detect elevated levels of Methamphetamine in urine. The mAMP One Step Methamphetamine Test Strip yields a positive result when the Methamphetamine in urine exceeds 1,000 ng/mL.

PRINCIPLE

The mAMP One Step Methamphetamine Test Strip is an immunoassay based on the principle of competitive binding. Drugs which may be present in the urine specimen compete against the drug conjugate for binding sites on the antibody.

During testing, a urine specimen migrates upward by capillary action. Methamphetamine, if present in the urine specimen below 1,000 ng/mL, will not saturate the binding sites of antibody-coated particles in the test strip. The antibody-coated particles will then be captured by immobilized Methamphetamine conjugate and a visible colored line will show up in the test line region. The colored line will

not form in the test line region if the Methamphetamine level exceeds 1,000 ng/mL because it will saturate all the binding sites of anti-Methamphetamine antibodies.

A drug-positive urine specimen will not generate a colored line in the test line region because of drug competition, while a drug-negative urine specimen or a specimen containing a drug concentration less than the cut-off will generate a line in the test line region.

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

REAGENTS

The test strip contains mouse monoclonal anti-Methamphetamine antibody-coupled particles and Methamphetamine-protein conjugate. A goat antibody is employed in the control line system.

PRECAUTIONS

- For healthcare professionals including professionals at point of care sites.
- For professional *in vitro* diagnostic use only. Do not use after the expiration date.
- The test strip should remain in the sealed pouch until use.
- All specimens should be considered potentially hazardous and handled in the same manner as an infectious agent.
- The used test strip 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 strip is stable through the expiration date printed on the sealed pouch. The test strip must remain in the sealed pouch until use. **DO NOT FREEZE.** Do not use beyond the expiration date.

SPECIMEN COLLECTION AND PREPARATION

Urine Assay

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

Specimen Storage

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

MATERIALS

Materials Provided

- Test strips
- Package insert

Materials Required But Not Provided

- Specimen collection container
- Timer
- External controls

DIRECTIONS FOR USE

Allow the test strip, urine specimen, and/or controls to reach room temperature (15-30°C) prior to testing.

1. Bring the pouch to room temperature before opening it. Remove the test strip from the sealed pouch and use it as soon as possible.
2. With arrows pointing toward the urine specimen, immerse the test strip vertically in the urine specimen for at least 10 to 15 seconds. Do not pass the maximum line (MAX) on the test strip when immersing the strip. See the illustration below.

3. Place the test strip on a non-absorbent flat surface, start the timer and wait for the colored line(s) to appear. The result should be read at 5 minutes. Do not interpret the result after 10 minutes.

INTERPRETATION OF RESULTS

(Please refer to illustration below)

NEGATIVE: * **Two lines appear.** One colored line should be in the control region (C), and another apparent colored line should be in the test region (T). This negative result indicates that the Methamphetamine concentration is below the detectable level (1,000 ng/mL).

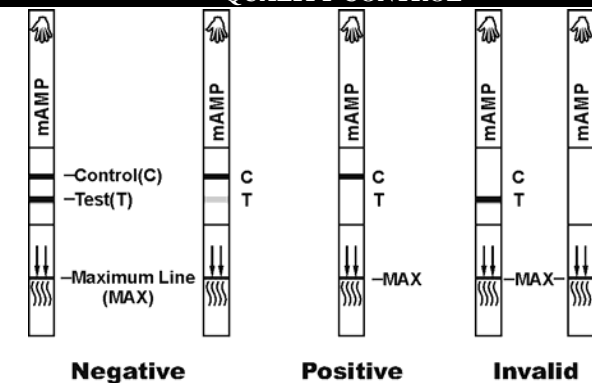
* **NOTE:** The shade of color in the test line region (T) will vary, but it should be considered negative whenever there is even a faint line.

POSITIVE: **One colored line appears in the control region (C).** No line appears in the test region (T). This positive result indicates that the Methamphetamine concentration exceeds the detectable level (1,000 ng/mL).

INVALID: **Control line fails to appear.** Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test using a new test strip. If the problem persists, discontinue using the lot immediately and contact your local distributor.

Test Results

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 specimen volume, adequate membrane wicking and correct procedural technique. Control standards are not supplied with this kit; however it is recommended that positive and negative controls be tested as good laboratory practice to confirm the test procedure and to verify proper test performance.

LIMITATIONS

1. The mAMP One Step Methamphetamine Test Strip 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.^{1,2}
2. It is possible that technical or procedural errors, as well as other interfering substances in the urine specimen may cause erroneous results.
3. Adulterants, such as bleach and/or alum, in urine specimens may produce erroneous results regardless of the analytical method used. If adulteration is suspected, the test should be repeated with another urine specimen.
4. A Positive Result indicates presence of the drug or its metabolites but 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 cutoff level of the test.
- Test does not distinguish between drugs of abuse and certain medications.

PERFORMANCE CHARACTERISTICS

Accuracy

A side-by-side comparison was conducted using the mAMP One Step Methamphetamine Test Strip and a leading commercially available mAMP rapid test. Testing was performed on 300 clinical specimens. Ten percent of the specimens employed were either at -25% or +25% level of the cut-off concentration of 1,000 ng/mL Methamphetamine. Presumptive positive results were confirmed by GC/MS. The following results were tabulated:

Method	Other mAMP Rapid Test		Total Results
	Positive	Negative	
mAMP One Step Test Strip	Positive	0	145
	Negative	152	155
Total Results		148	300
% Agreement with this commercial kit		98%	99%

When compared at 1,000 ng/mL cut-off with GC/MS, the following results were tabulated:

Method	GC/MS		Total Results
	Positive	Negative	
mAMP One Step Test Strip	Positive	10	145
	Negative	154	155
Total Results		164	300
% Agreement with GC/MS Analysis		94%	96%

Eighty (80) of these samples were also run using the mAMP One Step Methamphetamine Test Strip by an untrained operator at a different site. Based on GC/MS data, the operator obtained a statistically similar Positive Agreement, Negative Agreement and Overall Agreement rate as the laboratory personnel.

Analytical Sensitivity

A drug-free urine pool was spiked with Methamphetamine at the following concentrations: 0 ng/mL, 500 ng/mL, 750 ng/mL, 1,000 ng/mL, 1,250 ng/mL and 1,500 ng/mL. The result demonstrates >99% accuracy at 50% above and 50% below the cut-off concentration. The data are summarized below:

Methamphetamine Concentration (ng/mL)	Percent of Cutoff	n	Visual Result	
			Negative	Positive
0	0%	30	30	0
500	-50%	30	30	0
750	-25%	30	30	0
1,000	Cutoff	30	18	12
1,250	+25%	30	1	29
1,500	+50%	30	0	30

Analytical Specificity

The following table lists compounds that are positively detected in urine by the mAMP One Step Methamphetamine Test Strip at 5 minutes.

Compound	Concentration (ng/mL)
ρ-Hydroxymethamphetamine	30,000
d-Methamphetamine	1,000
l-Methamphetamine	8,000
(±)-3,4-Methylenedioxymethamphetamine	2,000
Mephentermine	50,000

Precision

A study was conducted at 3 physician's offices by untrained operators using 3 different lots of product to demonstrate the within run, between run and between operator precision. An identical panel of coded specimens containing no Methamphetamine, 25% Methamphetamine above and below the cut-off and 50% Methamphetamine above and below the 1,000 ng/mL cut-off was provided to each site. The results are given below:

Methamphetamine concentration (ng/mL)	n	Site A		Site B		Site C	
		-	+	-	+	-	+
0	15	15	0	15	0	15	0
500	15	15	0	14	1	13	2
750	15	11	4	10	5	10	5
1,250	15	8	7	4	11	6	9
1,500	15	1	14	1	14	0	15

Effect of Urinary Specific Gravity

Fifteen (15) urine samples of normal, high, and low specific gravity ranges were spiked with 500 ng/mL and 1,500 ng/mL of Methamphetamine respectively. The mAMP One Step Methamphetamine Test Strip was tested in duplicate using the fifteen neat 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 Methamphetamine to 500 ng/mL and 1,500 ng/mL. The spiked, pH-adjusted urine was tested with the mAMP One Step Methamphetamine Test Strip in duplicate. 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 Methamphetamine positive urine. The following compounds show no cross-reactivity when tested with the mAMP One Step Methamphetamine Test Strip at a concentration of 100 µg/mL.

Non Cross-Reacting Compounds

4-Acetamidophenol	Erythromycin	Papaverine
Acetophenetidin	β-Estradiol	Penicillin-G
N-Acetylprocainamide	Estrone-3-sulfate	Pentobarbital
Acetylsalicylic acid	Ethyl-p-aminobenzoate	Perphenazine
Aminopyrine	Fenfluramine	Phencyclidine
Amitypyline	Fenoprofen	Phenelzine
Amobarbital	Furosemide	Phenobarbital
Amoxicillin	Gentisic acid	Phentermine
Ampicillin	Hemoglobin	l-Phenylephrine
Ascorbic acid	Hydralazine	β-Phenylethylamine
d-Amphetamine	Hydrochlorothiazide	Phenylpropanolamine
d,l-Amphetamine	Hydrocodone	Prednisolone
l-Amphetamine	Hydrocortisone	Prednisone
Apomorphine	p-Hydroxyamphetamine	Procaine
Aspartame	O-Hydroxyhippuric acid	Promazine
Atropine	3-Hydroxytyramine	Promethazine
Benzilic acid	Ibuprofen	d,l-Propranolol
Benzoic acid	Imipramine	d-Propoxyphene
Benzoylcegonine	Iproniazid	d-Pseudoephedrine
Benzphetamine	(-) Isoproterenol	Quinacrine

Bilirubin	Isoxsuprine	Quinidine
Brompheniramine	Ketamine	Quinine
Caffeine	Ketoprofen	Ranitidine
Cannabidiol	Labetalol	Salicylic acid
Chloral hydrate	Levorphanol	Secobarbital
Chloramphenicol	Loperamide	Serotonin (5-Maprotiline)
Chlordiazepoxide	Maprotiline	Sulfamethazine
Chlorothiazide	Meperidine	Sulindac
(±) Chlorpheniramine	Meprobamate	Temazepam
Chlorpromazine	Methadone	Tetracycline
Chlorquine	Methoxyphenamine	Tetrahydrocortisone, 3
Cholesterol	(+) 3,4-Methylenedioxy-amphetamine	Acetate
Clomipramine	3,4-Methylenedioxyethyl-amphetamine	Tetrahydrocortisone 3 (β-D glucuronide)
Clonidine	3,4-Methylenedioxyethyl-amphetamine	Tetrahydrozoline
Cocaethylene	Methylphenidate	Thiamine
Cocaine	Morphine-3-β-D-glucuronide	Thioridazine
Codeine	Morphine-3-β-D-glucuronide	d,l-Tyrosine
Cortisone	Naloxone	Tolbutamide
(-) Cotinine	Naltrexone	Trans-2-phenylcyclopropylamine
Creatinine	Naproxen	Triamterene
Deoxycorticosterone	Niacinamide	Trifluoperazine
Dextromethorphan	Nifedipine	Trimethoprim
Diazepam	Norethindrone	Trimipramine
Diclofenac	d-Norpropoxyphene	Tryptamine
Diflunisal	Noscapine	d,l-Tryptophan
Digoxin	d,l-Octopamine	Tyramine
Diphenhydramine	Oxalic acid	Uric acid
Doxylamine	Oxazepam	Verapamil
Egonine hydrochloride	Oxolinic acid	Zomepirac
Egonine methylester	Oxycodone	
(1R,2S)-(-)-Ephedrine	Oxymetazoline	
l-Epinephrine		
(-) Ψ Ephedrine		

BIBLIOGRAPHY

- Baselt RC. *Disposition of Toxic Drugs and Chemicals in Man*. 2nd Ed. Biomedical Publ., Davis, CA. 1982; 488
- Hawks RL, CN Chiang. *Urine Testing for Drugs of Abuse*. National Institute for Drug Abuse (NIDA), Research Monograph 73, 1986

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