6-MAM Rapid Test Dipstick (Urine)
Package Insert

A rapid test for the qualitative detection of 6-mono-aceto-Morphine in human urine.
For professional in vitro diagnostic use only.

【INTENDED USE】

The 6-mono-aceto-morphine (6-MAM) Rapid Test Dipstick is a rapid chromatographic immunoassay for the detection of 6-mono-aceto-morphine in human urine at the cut-off concentration of 10ng/ml. This test will detect other compounds, please refer to Analytical Specificity table in this package insert.

This assay provides only a qualitative, 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】

6-Monoacetylmorphine (6-MAM) or 6-acetylmorphine (6-AM) is one of three active metabolites of heroin (diacetylmorphine), the others being morphine and the much less active 3-monoacetylmorphine (3-MAM). 6-MAM is rapidly created from heroin in the body, and then is either metabolized into morphine or excreted in the urine. 6-MAM remains in the urine for no more than 24 hours. So a urine specimen must be collected soon after the last heroin use, but the presence of 6-MAM guarantees that heroin was in fact used as recently as within the last day. 6-MAM is naturally found in the brain, but in such small quantities that detection of this compound in urine virtually guarantees that heroin has recently been consumed.

The 6-MAM Rapid Test Dipstick 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 6-MAM in urine. The 6-MAM Rapid Test Dipstick yields a positive result when Morphine in urine reaches 10ng/mL. This is the suggested screening cut-off for positive specimens set by the Substance Abuse and Mental Health Services Administration (SAMHSA, USA).

【PRINCIPLE】

The 6-MAM Rapid Test Dipstick 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. 6-MAM, if present in the urine specimen below 10ng/ml, will not saturate the binding sites of the antibody coated particles in the test device. The antibody coated particles will then be captured by immobilized 6-MAM 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 6-MAM level is at or above 10ng/mL because it will saturate all the binding sites of anti-Morphine 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 contains mouse monoclonal anti-Morphine antibody-coupled particles and Morphine-protein conjugate. A rabbit antibody is employed in the control line system.

【PRECAUTIONS】

- For medical and other professional *in vitro* diagnostic use only. Do not use after the expiration date.
- The test 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 should be discarded according to local regulations.

【STORAGE AND STABILITY】

Store as packaged at room temperature or refrigerated (2-30°C). The test is stable through the expiration date printed on the sealed pouch or label of the closed canister. The test must remain in the sealed pouch or closed canister until use. **DO NOT FREEZE**. Do not use beyond the expiration date.
NOTE: Once the canister has been opened, the remaining test(s) are stable for 50 days only.

【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 to obtain clear specimen for testing.

Specimen Storage

Urine specimens may be stored at 2-8°C for up to 48 hours prior to testing. 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 Dipsticks
- Package insert

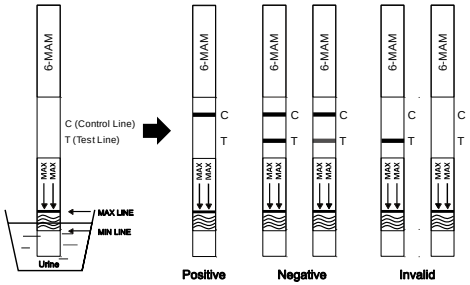
Materials Required But Not Provided

- Specimen collection container
- Timer

【DIRECTIONS FOR USE】

Allow the test, 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 Dipstick from the sealed pouch and use it within one hour.
2. With arrows pointing toward the urine specimen, **immerse the Test Dipstick vertically in the urine specimen for at least 10-15 seconds**. Do not pass the maximum line (MAX) on the Test Dipstick when immersing the strip. See the illustration below.
3. Place the Test Dipstick on a non-absorbent flat surface, start the timer and wait for the colored line(s) to appear. **Read results at 5 minutes.** Do not interpret the result after 10 minutes.



【INTERPRETATION OF RESULTS】

(Please refer to the illustration above)

NEGATIVE:* Two lines appear. One color line should be in the control region (C), and another apparent color line should be in the test region (T). This negative result indicates that the 6-MAM concentration is below the detectable cutoff level.

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

POSITIVE: One color line appears in the control region (C). No line appears in the test region (T). This positive result indicates that the 6-MAM concentration is above the detectable cutoff level.

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 with a new Test Dipstick. If the problem persists, discontinue using the Test Dipstick immediately and contact your local distributor.

【QUALITY CONTROL】

A procedural control is included in the test. A color line appearing in the control region (C) is considered an internal procedural control. It confirms sufficient specimen volume and correct procedural technique.

Control standards are not supplied with this Test Dipstick; however it is recommended that positive and negative controls be tested as good laboratory testing practices to confirm the test procedure and to verify proper test performance.

【LIMITATIONS】

1. The 6-MAM Rapid Test Dipstick provides only a qualitative, preliminary analytical result. A secondary analytical method must be used to obtain a confirmed result. Gas chromatography/mass spectrophotometry (GC/MS) is the preferred confirmatory method[2,3].
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.
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.

【EXPECTED VALUES】

This negative result indicates that the 6-MAM concentration is below the detectable level of 10ng/ml. Positive result means the concentration of 6-MAM is above the level of 10ng/ml. The 6-MAM Rapid Test Dipstick has a sensitivity of 10ng/ml

【PERFORMANCE CHARACTERISTICS】

Accuracy

A side-by-side comparison was conducted using the 6-MAM Rapid Test Dipstick and GC/MS at the cut-off of 10ng/ml. Testing was performed on 250 clinical specimens previously collected from subjects present for Drug Screen Testing. The following results were tabulated:

Method		GC/MS		Total Results
	Results	Positive	Negative	
The 6-MAM Rapid Test Dipstick	Positive	93	2	95
	Negative	1	154	155
Total Results		94	157	250
% Agreement with this Rapid Test		98.9%	98.7%	98.8%

Analytical Sensitivity

A drug-free urine pool was spiked with 6-MAM at the following concentrations: 0ng/ml, 5ng/ml, 7.5 ng/ml,10ng/ml,12.5ng/ml,15ng/ml,30ng/ml,The result demonstrates >99% accuracy at 50% above and 50% below the cut-off concentration. The data are summarized below:

6-MAM Concentration (ng/mL)	Percent of Cut-off	n	Visual Result	
			Negative	Positive
0	0	30	30	0
5	-50%	30	30	0
7.5	-25%	30	27	3
10	Cut-off	30	15	15
12.5	+25%	30	4	26
15	+50%	30	0	30
30	3×	30	0	30

Analytical Specificity

The following table lists compounds that are positively detected in urine byThe 6-MAM Rapid Test Dipstick at 5 minutes.

Compound	Concentration (ng/mL)	Compound	Concentration (ng/mL)
Codeine	10	Morphine	10
Ethylmorphine	200	Norcodeine	200
Hydrocodone	2,000	Normorphone	2,000
Hydromorphone	100	Oxycodone	1,000
Levorphanol	50	Oxymorphone	2,000
6-Monoacethylmorphine	10	Procaine	500
Morphine 3-β-D-glucuronide	30	Thebaine	200

Precision

A study was conducted at three hospitals by laypersons using three different lots of product to demonstrate the within run, between run and between operator precision. An identical panel of coded specimens containing, according to GC/MS, no Morphine, 25% 6-MAM above and below the cut-off and 50% 6-MAM above and below the 10ng/ml cut-off was provided to each site. The results are given below:

Morphine Concentration (ng/mL)	n per Site	Site A		Site B		Site C	
		-	+	-	+	-	+
0	10	10	0	10	0	10	0
5	10	10	0	10	0	10	0
7.5	10	9	1	9	1	9	1
12.5	10	1	9	1	9	1	9
15	10	0	10	0	10	0	10

Effect of Urinary Specific Gravity

Fifteen urine specimens of normal, high, and low specific gravity ranges were spiked with 5ng/ml and 15ng/ml of Morphine. The 6-MAM Rapid Test Dipstick was tested in duplicate using the fifteen neat and spiked urine specimens. The results demonstrate that varying ranges of urinary specific gravity do not affect the test results.

Effect of 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 6-MAM to 5ng/m and15ng/ml. The spiked, pH-adjusted urine was tested with the 6-MAM Rapid Test Dipstick in duplicate. The results demonstrate that varying ranges of pH 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 6-MAM positive urine. The following compounds show no cross-reactivity when tested with the 6-MAM Rapid Test Dipstick at a concentration of 100μg/ml.

Non Cross-Reacting Compounds

4-Acetamidophenol	Creatinine	Loperamide	β-Phenylethylamine
Acetophenetidin	Deoxycorticosterone	Maprotiline	Phenylpropanolamine
N-Acetylprocainamide	Dextromethorphan	Meperidine	Prednisone
Acetylsalicylic acid	Diazepam	Meprobamate	D,L-Propanolol
Aminopyrine	Diclofenac	Methadone	D-Propoxyphene
Amitryptyline	Diflunisal	Methoxyphenamine	D-Pseudoephedrine
Amobarbital	Digoxin	(+) 3,4-Methylenedioxy-amphetamine	Quinidine
Amoxicillin	Diphenhydramine		Quinine
Ampicillin	Doxylamine	(+) 3,4-Methylenedioxy-methamphetamine	Ranitidine
L-Ascorbic acid	Ecgonine hydrochloride		Salicylic acid
D,L-Amphetamine	Ecgonine methylester	Nalidixic acid	Secobarbital
Apomorphine	(-)-ψ-Ephedrine	Nalorphine	Serotonin
Aspartame	Erythromycin	Naloxone	(5-Hydroxytyramine)
Atropine	β-Estradiol	Naltrexone	Sulfamethazine
Benzilic acid	Estrone-3-sulfate	Naproxen	Sulindac
Benzoic acid	Ethyl-p-aminobenzoate	Niacinamide	Temazepam
Benzoylecgonine	Fenoprofen	Nifedipine	Tetracycline
Benzphetamine	Furosemide	Norethindrone	Tetrahydrocortisone,
Bilirubin	Gentisic acid	D-Norpropoxyphene	3-Acetate
(±) - Brompheniramine	Hemoglobin	Noscapine	Tetrahydrocortisone
Caffeine	Hydralazine	D,L-Octopamine	3-(β-D glucuronide)
Cannabidiol	Hydrochlorothiazide	Oxalic acid	Tetrahydrozoline
Chloralhydrate	Hydrocortisone	Oxazepam	Thiamine
Chloramphenicol	O-Hydroxyhippuric acid	Oxolinic acid	Thioridazine
Chlordiazepoxide	p-Hydroxy-methamphetamine	Oxymetazoline	D, L-Tyrosine
Chlorothiazide		Papaverine	Tolbutamide
(±) Chlorpheniramine	3-Hydroxytyramine	Penicillin-G	Triamterene
Chlorpromazine	Ibuprofen	Pentazocine	Trifluoperazine
Chlorquine	Imipramine	Pentobarbital	Trimethoprim
Cholesterol	Iproniazid	Perphenazine	Trimipramine
Clomipramine	(±) Isoproterenol	Phencyclidine	Tryptamine
Clonidine	Isoxsuprine	Phenelzine	D, L-Tryptophan
Cocaine hydrochloride	Ketamine	Phenobarbital	Tyramine
Cortisone	Ketoprofen	Phentermine	Uric acid
(-) Cotinine	Labetalol	L-Phenylephrine	Verapamil
			Zomepirac

【BIBLIOGRAPHY】

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Number: 145001800
Effective date: 2014-10-21