

SERATEC® Drug Screen M-AMP REF DSN87

A visual one-step immunoassay for the qualitative detection of metamphetamine in human urine. For professional *In Vitro* diagnostic use only

INTENDED USE

The SERATEC Drug Screen M-AMP is a lateral flow, one-step immunoassay for the qualitative detection of metamphetamine in human urine at a cut-off of 1000 ng/ml. This product is used to obtain a visual, qualitative result and is intended for professional use. The assay should not be used without proper supervision and is not intended for over the counter sale to lay persons.

This assay provides only a preliminary analytical test result. A more specific alternative chemical method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/ MS) has been established as the preferred confirmatory method by the National Institute of Drug Abuse (NIDA). Clinical considerations and professional judgment should be applied to any drug of abuse test result, particularly when preliminary positive results are indicated.

BACKGROUND

Metamphetamine was synthesized in 1919 for the first time. As N-Methyl derivative of amphetamine it is a sympathomimetic compound that prominently stimulates the central nervous system.

D-Metamphetamine is a more powerful stimulant than the L-form. Due to its euphoria inducing effects it is frequently abused. Methamphetamine can be administered orally, intravenously, by nasal ingestion or by smoking. Acute higher doses induce next to euphoria, alertness and a sense of increased energy and power. Furthermore restlessness, irritability, anxiety, hallucinations, and irrational occasionally violent behaviour can be produced. Overdoses of metamphetamine may result in cardiac dysrhythmias, hypertension, hyperpyrexia, shock symptoms, convulsions, and coma. Fatal overdoses have been observed in several cases. A chronic abuse of high doses of metamphetamine can lead to a paranoid psychosis that resembles a schizophrenic reaction.

In the body metamphetamine undergoes some N-demethylation to amphetamine, its major active metabolite. Together with other deaminated and hydroxylated derivatives, both compounds are excreted with the urine. The fraction of unchanged metamphetamine is high (ca. 44% metamphetamine, 6% amphetamine under normal conditions). However, the rate of excretion and the fraction of unchanged drug are influenced by the pH of the urine, increasing in acidic urine and decreasing under alkaline conditions. Thus the presence

of metamphetamine in the urine indicates a previous consumption of metamphetamine.

Urine based screening tests for drugs of abuse 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 SERATEC Drug Screen M-AMP is based on the principle of the highly specific immunochemical reactions of antigens and antibodies which are used for the analysis of specific compounds in biological fluids. This test is a rapid, visual, competitive immunoassay that can be used for the qualitative detection of metamphetamine in human urine at 1000 ng/ml cut-off concentration.

PRINCIPLE

The SERATEC Drug Screen M-AMP is a one-step immunoassay in which a chemically labeled drug (drug conjugate) competes with the drug which may be present in urine for limited antibody binding sites. The test device contains a membrane strip which was pre-coated with drug conjugate on the test band. A colored anti-metamphetamine monoclonal antibody-colloidal gold conjugate pad is placed at the right end of the membrane. In the absence of drug in the urine, the solution of the colored antibody-colloidal gold conjugate and urine moves upward, chromatographically by capillary action, across the membrane. This solution migrates to the immobilized drug conjugate zone on the test band region. The colored antibody-colloidal gold conjugate attaches to the drug conjugate to form a visible line as the antibody complexes with the drug conjugate. Therefore, the formation of a visible precipitant in the test zone occurs, when the test urine is **negative** for the drug. When the drug is present in the urine, the drug/metabolite antigen competes with the drug conjugate on the test band region for limited antibody sites on the anti-metamphetamine monoclonal antibody-colloidal gold conjugate. When a sufficient concentration of drug is present, it will fill the limited antibody binding sites. This will prevent attachment of the colored antibody-colloidal gold conjugate to the drug conjugate zone on the test band region. Therefore, absence of the color band on the test region indicates a **positive** result.

A control band with a different antigen/antibody reaction is also added to the immunochromatographic membrane strip at the control region (C) to indicate that the test has performed properly. This control line should always appear, regardless of the

presence of drug and metabolite. This means that **negative** urine will produce **two** colored bands, and **positive** urine will produce only **one** band. The presence of this colored band in the control region also serves as 1) verification that sufficient volume has been added, and 2) that proper flow was obtained.

STORAGE AND STABILITY

The test kit is to be stored refrigerated or at room temperature +4 – +30 °C (38-86 °F) in the sealed pouch for the duration of the shelf life.

PRECAUTIONS

- For single *in-vitro* diagnostic use.
- For professional use only
- Urine specimens may be potentially infectious. Proper handling and disposal methods should be established.
- Avoid cross-contamination of urine samples by using a new specimen collection container and specimen pipette for each urine sample.
- Do not use test device if the pouch is damaged
- The components of the test of animal origin (e.g. antibodies) do not cause any danger if the test is used according to the instructions.

MATERIALS SUPPLIED IN THE KIT

- Test devices with disposable pipettes
- One instruction sheet

MATERIALS REQUIRED

- Specimen collection container
- Timer

SPECIMEN COLLECTION AND HANDLING

The SERATEC Drug Screen M-AMP is formulated for use with urine specimens. Fresh urine does not require any special handling or pre-treatment. 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.

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.

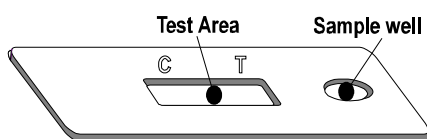
TEST PROCEDURE

Review "Specimen Collection" instructions. Test device, patient's samples, and controls should be brought to room temperature (20-30°C) prior to testing. Do not open pouches until ready to perform the assay.

1. Remove the test device from its protective pouch (bring the device to room temperature before opening the pouch to avoid condensation of moisture on the membrane). Label the device with patient or control identification.

2. Draw the urine sample to the line marked on the pipette (approximately 0.2 ml). Dispense the entire contents into the sample well. Use a separate pipette and device for each sample or control.

3. Read result between **3 to 8 minutes** after the addition of sample. Do not read result after 8 minutes.



INTERPRETATION OF RESULTS

Negative result:

Two colored lines appear in the viewing window. The line in the test region (T) is the drug probe line; the line in the control region (C) is the control line, which indicates proper performance of the device. The color intensity of the test line may be weaker or stronger than that of the control line.

Note: A weak test line indicates that the metamphetamine concentration is close to the cut-off level. In this case the test should be repeated or the urine sample should be tested with a more specific method.

Positive result

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

Invalid:

If no line appears in the control region the test is invalid and should be repeated



LIMITATIONS OF PROCEDURE

- The assay is designed for use with human urine only.
- A positive result with the test 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 (see 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.

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*

*to adjust the concentration of metamphetamine in the non-clinical samples the Sigma Drug Standard M5260 was diluted into drug-free human urine.

A. Accuracy

The accuracy of the SERATEC Drug Screen M-AMP was evaluated in comparison to a commercially available immunoassay at a cut-off of 1000 ng/ml. 120 urine samples, collected from presumed non-user volunteers, were tested by both procedures with 100% agreement in the negative results.

In a separate study, 72 urine samples, obtained from a clinical laboratory, where they had been screened and confirmed as positive by the commercially available immunoassay and GC/MS, were tested with the SERATEC Drug Screen M-AMP. Except for one sample, which contained with 1,177 ng/ml metamphetamine a concentration close to the cut-off and showed a (+/-) test result, all of the samples with metamphetamine concentrations above the cut-off were determined positive with the SERATEC test. All samples with metamphetamine concentrations below the cut-off showed negative test results. With the data obtained from the clinical specimens the performance characteristics of the test were calculated:

Diagnostic sensitivity:	98.4 %
Diagnostic specificity:	100 %
Positive predictive value:	100 %
Negative predictive value:	99.2 %
Reproducibility:	98.9 %

B. Reproducibility

The reproducibility of the SERATEC Drug Screen M-AMP test was evaluated at four different sites using blind controls. 60 of the samples containing 500 ng/ml metamphetamine showed negative results. 60 samples with metamphetamine concentrations of 2000 ng/ml were determined as positive. Of the 60 samples containing metamphetamine at the cut-off level of 1,000 ng/ml 100% were determined as (+/-), showing a very faint test line.

C. Precision

The precision of the test was determined with blind controls of the following metamphetamine concentrations: 500; 750; 1250; 1500 ng/ml, respectively.

Conc. (ng/mL)	# samples	correct results	in %
500	50	50 (-)	100
750	50	50 (-) ¹	100

1250	50	47 (+) ²	94
1500	50	50 (+)	100

1: including 1 (+/-) result 2: the remaining 3 tests showed (+/-) results

D. Specificity

The specificity for the SERATEC Drug Screen M-AMP was tested by adding various drugs, drug metabolites, and other compounds that are likely to be present in urine. All compounds were prepared in drug-free normal human urine.

The following structurally related compounds produced positive results when tested at levels equal to or greater than the concentrations listed below.

compound	concentration (ng/mL)
D-Methamphetamine	>1000*
D-Amphetamine	50,000
Chloroquine	50,000
(+/-)-Ephedrine	50,000
L-Methamphetamine	25,000
(+/-)-3,4-Methyldioxy-methamphetamine	2,000
Procaine	10,000
β-Phenylethylamine	50,000
Ranitidine	50,000

* cut-off

The following compounds were found not to cross-react when tested at concentrations up to 100 µg/ml.

Acetaminophene, Acetone, Albumin, Amitriptyline, L-Amphetamine, Ampicillin, Aspartame, Aspirin, Atropine, Benzocaine, Benzoyl-Ecgonine, Bilirubin, Brompheniramine, Caffeine, (+)-Chlorpheniramin, (+/-)-Chlorpheniramin, Chlorpromazin, Creatine, Dexbrompheniramin, Dextromethorphan, Diazepam, 4-Dimethylaminoantipyrine, Dopamine, Doxylamin, Ecgonin, Ecgonin-Methylester, (+)-Epinephrin, Erythromycin, Ethanol, Furosemide, Glucose, Guaiacol-Glycerylether, Hemoglobin, Hydrocodone, Hydromorphone, Imipramine, (+/-)-Isoproterenol, Lidocain, Meperidine, Methadone, Methaqualone, (1R,2S)-(-)-N-Methyl-Ephedrine, (+/-) 3,4-Methylenedioxyamphetamine, Methylphenidate, Morphine, Naltrexone, (+)-Naproxen, (+/-)-Nor-ephedrine, Nortriptyline, Oxalic Acid, Oxazepam, Oxycodone, Penicillin G, Phencyclidine, Pentamine, Pheniramine, Phenobarbital, Phenothiazine, L-Phenylephrine, β-Phenylethylamine, Promethazine, Quinidine, Riboflavin, Secobarbital, Sodium Chloride, Sulindac, Thioridazine, Trifluoperazine, Tyramine, Vitamin C

SUGGESTED READING

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