

**Multi-Drug Screen Cup**with **Technology****Package Insert****Oxidants/Specific Gravity/pH/Nitrite/Glutaraldehyde/Creatinine/****AMP500/COC/THC/MTD/MET500/MDMA/MOP****English****DESCRIPTION**

A rapid, instrumented screening test for the simultaneous, qualitative detection of multiple drugs and/or metabolites in human urine. Designed for use exclusively with the GIMA Instrumented Test System with DxLINK™ Technology.

For in vitro diagnostic use.

INTENDED USE & SUMMARY

The speed and sensitivity of immunoassays have made them the most widely accepted method to screen urine for the presence of drugs of abuse.¹ Lateral flow immunoassay products have traditionally required visual results interpretation, whereby the operator makes a visual assessment relating to the presence or absence of a colored line.

The GIMA Multi-Drug Screen Cup is designed to eliminate the subjectivity of visual result interpretation. The product allows for automated results interpretation when used in conjunction with the GIMA Instrumented Test System with DxLINK™ Technology. The GIMA Multi-Drug Screen Cup tests for any combination of the following drugs and/or metabolites in urine:

Test	Calibrator	Cut-off (ng/mL)
Amphetamine (AMP 500)	d-Amphetamine	500
Cocaine (COC)	Benzoyllecgonine	300
Marijuana (THC)	11-nor- Δ^9 -THC-9 COOH	50
Methadone (MTD)	Methadone	300
Methamphetamine (MET 500)	d-Methamphetamine	500
Methylenedioxymethamphetamine (MDMA)	d,l-Methylenedioxymethamphetamine	500
Morphine (MOP 300)	Morphine	300

This test will detect other related compounds, please refer to the Analytical Specificity table in this package insert.

The GIMA Multi-Drug Screen Cup is also available with Specimen Validity Tests (S.V.T.) for the following parameters: Oxidants/Pyridinium Chlorochromate, Specific Gravity, pH, Nitrite, Glutaraldehyde and Creatinine. Specimen Validity Tests must be interpreted visually. The GIMA Multi-Drug Screen Cup provides only a presumptive analytical test result. A more specific alternate methodology must be used in order to obtain a confirmed analytical result. Clinical and professional judgment should be applied, particularly when presumptive positive results are observed.

PRINCIPLE

The GIMA Multi-Drug Screen Cup utilizes immunoassay technology based on the principle of competitive binding. Drugs which may be present in the urine specimen compete against their respective drug conjugates for binding sites on their specific antibodies.

During testing, a urine specimen migrates across the membrane by capillary action. If a drug is present in the urine specimen below its cut-off concentration, it will not saturate the binding sites of its specific antibodies. The antibodies will then bind with the drug-protein conjugate and a colored line will appear in the corresponding test region. If a drug is present in the urine specimen above the cut-off concentration, it will saturate the binding sites of the antibodies. In this event, a colored line will not form in the corresponding test region. The presence of a colored line in the test region is indicative of a negative test result. The absence of a colored line in the test region is indicative of a positive test result. To serve as a procedural control, the appearance of a colored line in the control region indicates that proper specimen volume and correct procedural techniques were employed.

Test results interpretation is conducted by the GIMA Instrumented Test System with DxLINK™ Technology. An image of the screening device is electronically captured through the use of the scanner. The test system software analyzes test and control line reactivity and yields qualitative test results. Each screening device is equipped with a specialized System Quality Control Label with fixed color intensity. During the image analysis, the test system automatically analyzes the control label to ensure accurate detection and interpretation of color intensity.

S.V.T./ADULTERANT PRINCIPLE

The intentional tampering of urine specimens with the intent of altering test results is commonly referred to as adulteration. The use of adulterants can produce false negative results by either interfering with the screening test or destroying the drugs present in the urine. Dilution may also be employed in an attempt to produce false negative drug test results.

S.V.T. tests assist in assessing the integrity of the urine sample. Each S.V.T. strip contains chemically treated reagent pads. These reagent pads exhibit color changes based on chemical properties of the urine specimen. S.V.T. results are interpreted visually by comparing the reagent pads and printed color chart three to five minutes following test activation. The color comparison provides a semi-quantitative screen for any combination of oxidants/pyridinium chlorochromate, specific gravity, pH, nitrite, glutaraldehyde and creatinine in human urine.

- **Oxidants/Pyridinium chlorochromate** tests for the presence of oxidizing agents such as bleach and hydrogen peroxide. Pyridinium Chlorochromate (PCC) is a commonly used adulterant.² Normal human urine should not contain oxidants or PCC.
- **Specific gravity** tests for sample dilution. The normal range is from 1.003 to 1.030. Values outside this range may be the result of specimen dilution or adulteration.
- **pH** tests for the presence of acidic or alkaline adulterants in urine. Normal pH levels should be in the range of 4.0 to 9.0. Values outside of this range may indicate the sample has been altered.
- **Nitrite** tests for commonly used commercial adulterants, which act by oxidizing the major cannabinoid metabolite THC-COOH.³ Normal urine should contain no trace of nitrite. Positive results generally indicate the presence of an adulterant.

- **Glutaraldehyde** tests for commonly used adulterants, which may cause false negative screening results by disrupting the enzyme used in some immunoassay tests.² Glutaraldehyde is not normally found in urine; therefore, detection of glutaraldehyde in a urine specimen is generally an indicator of adulteration.
- **Creatinine** is a waste product of creatine, an amino acid contained in muscle tissue and found in urine.¹ A person may attempt to foil a test by drinking excessive amounts of water or diuretics such as herbal teas. Low creatinine levels may indicate dilute urine. The absence of creatinine (< 5 mg/dL) is indicative of a specimen not consistent with human urine.

REAGENTS

Each drug test contains mouse monoclonal antibody-coupled particles and corresponding drug-protein conjugates. A goat antibody is employed in each control line.

S.V.T. REAGENTS

Abbreviation	Reagent	Reactive indicator	Buffers and non-reactive ingredients
OX	Oxidants/PCC	0.36%	99.64%
S.G.	Specific Gravity	0.25%	99.75%
pH	pH	0.06%	99.94%
NIT	Nitrite	0.07%	99.93%
GLUT	Glutaraldehyde	0.02%	99.98%
CRE	Creatinine	0.04%	99.96%

PRECAUTIONS

- For *in vitro* diagnostic use.
- Designed for use exclusively with the GIMA Instrumented Test System with DxLINK™ Technology. Do not interpret drug test results visually.
- Ensure that the test cup is properly sealed following specimen collection.
- Do not use after the expiration date.
- The test cup should remain in the sealed pouch until use. If the pouch is damaged, discard the test cup.
- All specimens should be considered potentially hazardous and handled in the same manner as an infectious agent.
- The used test cup should be discarded according to local regulations.

STORAGE AND STABILITY

Store as packaged in the sealed pouch either at room temperature or refrigerated (2-30°C). **DO NOT FREEZE.** The test cup is stable through the expiration date printed on the sealed pouch. The test cup must remain in the sealed pouch until use. Do not use beyond the expiration date.

SPECIMEN COLLECTION AND STORAGE

Urine Collection

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 precipitants should be centrifuged, filtered, or allowed to settle to obtain a clear supernatant for testing.

Specimen Storage

Urine specimens may be stored at 2-8°C for up to 48 hours prior to testing. For prolonged storage, specimens may be frozen and stored below -20°C. Frozen specimens should be thawed and mixed well before testing. When test configurations include S.V.T., storage of urine specimens should not exceed 2 hours at room temperature or 4 hours refrigerated prior to testing. For best results, test specimens immediately following collection.

MATERIALS

Materials Provided

- 25 GIMA Multi-Drug Screen Cups with DxLINK™ Technology (REF 24576)
- 1 Package insert
- 25 Security seal labels
- 5 SVT/Adulterant Color Chart

Materials Required, Not Provided

- Timer
- Windows-based computer with the following: Operating systems: Windows 7, Windows 8 or Windows 10

Materials Required, Provided Separately

- GIMA Instrumented Test System with DxLINK™ Technology Software Installation CD-ROM- 24571, version 1.2 or greater
- 1 Avison Scanner including:
 - 1 Power Cord
 - 1 AC Adapter
 - 1 USB Cord
 - 1 Scanner Stand

DIRECTIONS FOR USE

If refrigerated, allow the test cup, urine specimen, and/or controls to equilibrate to room temperature (15-30°C) prior to testing.

1. Remove the cup from the sealed pouch and use within 30 minutes.
2. Remove the key by twisting it from the center of the cup cap.
3. Collect specimen in the cup and secure the cap tightly by pressing down on the pull tab until an audible click is heard.
4. Check the temperature label (Temp Label) up to 4 minutes after specimen collection. A green color will appear to indicate the temperature of the urine specimen. The normal range for a urine specimen is 33-38°C (90-100°F).
5. Date and initial the security seal label then place it over the cap. Ensure that no portion of the security seal is obstructing the test panel view.
6. Place the cup on a flat surface and push the key into the socket of the cup to initiate the test. Set the timer for 5 minutes.
7. Interpret the S.V.T. results between 3 and 5 minutes. Compare the colors on the S.V.T. strip to the enclosed color chart.
8. At 5 minutes, place the cup on the GIMA Instrumented Test System with DxLINK™ Technology, following the instructions in the GIMA Instrumented Test System Operator Guide.

INTERPRETATION OF RESULTS

The GIMA Instrumented Test System will automatically interpret drug test results. (Please refer to System Operator Guide).

A "Presumptive Positive" test result indicates that the concentration of one or more of the drugs may have exceeded the designated cut-off.

A "Negative" test result indicates that the concentration of all drugs did not exceed the designated cut-offs.

An "Invalid" test result most likely indicates that insufficient specimen volume or incorrect procedural techniques were employed. Please repeat testing procedure with a new multi-drug screen cup.

An "Abnormal" result indicates that one or more of the adulteration parameters were interpreted by the operator as "Abnormal". Clinical judgment should be applied in determining the validity of the associated clinical sample and testing results.

SVT/ADULTERANT INTERPRETATION

(Please refer to the color chart)

Semi-quantitative results are obtained by visually comparing the reacted color blocks on the strip to the printed color blocks on the color chart. No instrumentation is required.

QUALITY CONTROL

A procedural control is included in the test. A colored line appearing in the control line 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.

Each screening device is equipped with a specialized System Quality Control Label with fixed color intensity. During the image analysis, the test system automatically analyzes the control label to ensure accurate detection and interpretation of color intensity.

LIMITATIONS

1. The GIMA Multi-Drug Screen Cup provides only a preliminary screening result. A more specific alternative methodology must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) and Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS) are preferred confirmatory methods.^{4,5} are the preferred confirmatory methods.
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 presumptive positive result most likely 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. The test does not distinguish between drugs of abuse and certain medications.
7. A presumptive positive result might be obtained from certain foods or food supplements.
8. The test is designed for use exclusively with the GIMA Instrumented Test System with DxLINK™ Technology. Do not interpret drug test results visually.

S.V.T/ADULTERATION LIMITATIONS

1. The S.V.T. tests included with this product are intended to aid in the determination of abnormal specimens. While comprehensive, these tests are not intended to be an all-inclusive representation of possible adulterants.
2. Oxidants/PCC: Normal human urine should not contain oxidants or PCC. The presence of high levels of antioxidants in the specimen, such as ascorbic acid, may result in false negative results for the oxidants/PCC pad.
3. Specific Gravity: Elevated levels of protein in urine may cause abnormally high specific gravity values.
4. Nitrite: Nitrite is not a normal component of human urine. However, nitrite found in urine may indicate urinary tract infections or bacterial infections. Nitrite levels of > 20 mg/dL may produce false positive glutaraldehyde results.
5. Glutaraldehyde: Is not normally found in urine. However certain metabolic abnormalities such as ketoacidosis (fasting, uncontrolled diabetes or high-protein diets) may interfere with the test results.
6. Creatinine: Normal creatinine levels are between 20 and 350 mg/dL. Under rare conditions, certain kidney diseases may show dilute urine.

PERFORMANCE CHARACTERISTICS

Accuracy/Analytical Sensitivity

To determine the analytical sensitivity, 360 contrived specimens were tested. The specimens consisted of 120 drug-free, 120 weak-negative, 120 positive urines, tested across 3 different GIMA Instrumented Test Systems with DxLINK™ Technology.

		AMP500	COC	THC	MTD	MET500	MDMA	MOP
Drug Free	#pos	0	0	0	0	0	0	0
	#neg	120	120	120	120	120	120	120
	% correct results	>99	>99	>99	>99	>99	>99	>99
	95% CI	97.5-100	97.5-100	97.5-100	97.5-100	97.5-100	97.5-100	97.5-100
Weak Negative	#pos	0	1	0	0	1	0	0
	#neg	120	119	120	120	119	120	120
	% correct results	>99	99.2	>99	>99	99.2	>99	>99
	95% CI	97.5-100	95.4-100	97.5-100	97.5-100	95.4-100	97.5-100	97.5-100
Positive	#pos	120	120	120	120	120	120	120
	#neg	0	0	0	0	0	0	0
	% correct results	>99	>99	>99	>99	>99	>99	>99
	95% CI	97.5-100	97.5-100	97.5-100	97.5-100	97.5-100	97.5-100	97.5-100

To determine the accuracy, at least 44 drug positive urine specimens for each analyte at varying concentrations and 40 drug negative urine specimens were tested using at least 348 cups on the GIMA Instrumented Test System with DxLINK™ Technology.

% Agreement with LC-MS/MS

	AMP 500	COC	THC	MTD	MET 500	MDMA	MOP
Positive Agreement	40/40= >99%	40/40=>99%	45/45=>99%	42/42= >99%	43/44=98%	40/43= 93%	39/40=98%
Negative Agreement	69/81=85%	46/46=>99%	45/48=94%	48/49= 98%	85/97=88%	47/55= 85%	46/47=98%
Overall Agreement (95% CI)	90% (83-95%)	>99% (96-100%)	97% (91-99%)	99% (94-100%)	91% (85-95%)	89% (81-94%)	98% (92-100%)

Analytical Specificity

The specificity of the GIMA Multi-Drug Screen Cup with DxLINK™ Technology was tested with structurally similar compounds. The concentration of each compound that produced a positive result during development studies is listed below.

AMPHETAMINE 500		METHAMPHETAMINE 500	
d-Amphetamine	500	d-Methamphetamine	500
d,l-Amphetamine	1,500	3,4-Methylenedioxyethylamphetamine (MDEA)	10,000
Ciprofloxacin	5,000	(1R,2S)-(-)-Ephedrine	25,000
3,4-Methylenedioxyamphetamine (MDA)	4,000	p-Hydroxymethamphetamine	7,500
COCAINE		l-Methamphetamine	
Benzoyllecgonine	300	3,4-Methylenedioxymethamphetamine (MDMA)	1,000
Cocaine	600	METHYLENEDIOXYMETHAMPHETAMINE (MDMA)	
Cocaethylene	25,000	3,4-Methylenedioxymethamphetamine (MDMA)	500
MARIJUANA		3,4-Methylenedioxyamphetamine (MDA)	4,000
11-nor- Δ^9 -THC-9 COOH	50	3,4-Methylenedioxyethylamphetamine (MDEA)	300
11-nor- Δ^8 -THC-9 COOH	30	MORPHINE 300	
Δ^9 -THC	1,500	Morphine	300
Δ^9 -THC	1,500	Codeine	200
Cannabinol	50,000	Ethylmorphine	400
METHADONE		Hydrocodone	25,000
Methadone	300	Hydromorphone	12,500
		Levorphanol	25,000
		6-Monoacetylmorphine (6-MAM)	400
		Morphine 3- β -D-glucuronide	1,500

Cross-Reactivity

The following compounds were found not to cross-react when tested at concentrations up to at least 100µg/ml (unless otherwise stated in parenthesis.)

Non Cross-Reacting Compounds

N-Acetylprocainamide (6.25)	Creatinine	Ketamine	Pseudoephedrine
Acetylsalicylic acid	Dextromethorphan	Labetalol (50)	Salicylic acid
Amoxicillin	Doxylamine	Meprobamate	Serotonin
Ampicillin	Digoxin	Methoxyphenamine	Sulindac
l-Ascorbic acid	Diphenhydramine	Methylphenidate	Tetracycline
Aspartame	Ecgonine	Naproxen	Thiamine
Atropine	β -Estradiol	Norpseudoephedrine	d,l-Tyrosine
Bilirubin	Estrone-3-sulfate	Oxalic acid	Tolbutamide
Caffeine	Erythromycin	Oxycodone	Triamterene
Cannabidiol	Fenoprofen	Oxymorphone	Trifluoperazine
Chloralhydrate	Hemoglobin	Penicillin-G	Trimethoprim
Chlorpromazine	Hydrocortisone	Perphenazine	d,l-Tryptophan
Cholesterol	3-Hydroxytyramine	Phenelzine	Uric acid
Clonidine	d,l-Isoproterenol	Prednisone	Verapamil
Cortisone	Isosuprine	d,l-Propanolol	Zomepirac
l-Cotinine			













BIBLIOGRAPHY

1. Tietz NW. *Textbook of Clinical Chemistry*. W.B. Saunders Company. 1986; 1735
2. Cody B, J.T., "Specimen Adulteration in drug urinalysis. *Forensic Sci. Rev.*, 1990, 2:63.
3. Tsai C, S.C. et.al., *J. Anal. Toxicol.* 1998; 22 (6): 474
4. Baselt RC. *Disposition of Toxic Multi-Drugs and Chemicals in Man*. 8th Ed. Biomedical Publ., Davis, CA. 2014
5. Hawks RL, CN Chiang. *Urine Testing for Drugs of Abuse*. National Institute for Drug Abuse (NIDA), Research Monograph 73, 1986

SVT/Adulterant Color Chart

Abnormal	Abnormal	OX	Oxidants/Pyridinium chlorochromate	NIT	Nitrite
Normal	Normal	S.G.	Specific gravity	GLUT	Glutaraldehyde
		pH	pH	CRE	Creatinine

Index of Symbols

	Consult instructions for use		Tests per kit		Manufacturer		Store in a dry place and avoid humidity
	For <i>in vitro</i> diagnostic use only		Use by		Do not reuse		Keep away from direct sunlight
	Store between 2-30°C		Lot Number		Catalog #		CE Mark



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MADE IN P.R.C.

