BZO Rapid Test Cassette
(Whole Blood/Serum/Plasma)
Package Insert

A rapid test for the qualitative detection of Benzodiazepines in human whole blood or serum or plasma. For medical and other professional in vitro diagnostic use only.

【INTENDED USE】

The BZO Rapid Test Cassette (whole blood/serum/plasma) is a lateral flow chromatographic immunoassay for the detection of Benzodiazepines in whole blood or serum or plasma at a cut-off concentration of 100ng/ml. This test will detect other related compounds, please refer to the 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】

Benzodiazepines are medications that are frequently prescribed for the symptomatic treatment of anxiety and sleep disorders. They produce their effects via specific receptors involving a neurochemical called gamma aminobutyric acid (GABA). Because they are safer and more effective, benzodiazepines have replaced barbiturates in the treatment of both anxiety and insomnia. Benzodiazepines are also used as sedatives before some surgical and medical procedures, and for the treatment of seizure disorders and alcohol withdrawal.

Risk of physical dependence increases if benzodiazepines are taken regularly (e.g., daily) for more than a few months, especially at higher than normal doses. Stopping abruptly can bring on such symptoms as trouble sleeping, gastrointestinal upset, feeling unwell, loss of appetite, sweating, trembling, weakness, anxiety and changes in perception.

Only trace amounts (less than 1%) of most benzodiazepines are excreted unaltered in the whole blood or serum or plasma; most of the concentration in whole blood or serum or plasma is conjugated drug. The detection period for benzodiazepines in whole blood or serum or plasma is 3-7 days.

【PRINCIPLE】

The BZO Rapid Test Cassette (whole blood/serum/plasma)is an immunoassay based on the principle of competitive binding. Drugs that may be present in the whole blood/serum/plasma specimen compete against the drug conjugate for binding sites on the antibody.

During testing, a whole blood/serum/plasma specimen migrates upward by capillary action. Benzodiazepines, if present in the whole blood/serum/plasma specimen below the cut-off level, will not saturate the binding sites of the antibody in the test. The antibody coated particles will then be captured by immobilized Benzodiazepines-protein 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 Benzodiazepines level exceeds the cut-off level because it will saturate all the binding sites of anti- Benzodiazepines antibodies.

A drug-positive whole blood/serum/plasma specimen will not generate a colored line in the test line region because of drug competition, while a drug-negative whole blood/serum/plasma 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- Benzodiazepines antibody coupled particles and Benzodiazepines -protein conjugate. A goat antibody is employed in the control line system.

【PRECAUTIONS】

- For professional in vitro diagnostic use only. Do not use after the expiration date.
- Do not eat, drink or smoke in the area where the specimens or kits are handled.
- Do not use test if pouch is damaged
- Handle all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout testing and follow the standard procedures for proper disposal of specimens.
- Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are being tested.
- The used test should be discarded according to local regulations.
- Humidity and temperature can adversely affect results.

【STORAGE AND STABILITY】

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

【SPECIMEN COLLECTION AND PREPARATION】

- The BZO Rapid Test Cassette can be performed using whole blood (from venipuncture or fingerstick) /serum/plasma.
- To collect **Fingerstick Whole Blood specimens**:
  - Wash the patient's hand with soap and warm water or clean with an alcohol swab. Allow to dry.
  - Massage the hand without touching the puncture site by rubbing down the hand towards the fingertip of the middle or ring finger.
  - Puncture the skin with a sterile lancet. Wipe away the first sign of blood.
  - Gently rub the hand from wrist to palm to finger to form a rounded drop of blood over the puncture site.
  - Add the Fingerstick Whole Blood specimen to the test by using **a capillary tube**:
    - Touch the end of the capillary tube to the blood until filled to approximately 40 μl. Avoid air bubbles.
    - Place the bulb onto the top end of the capillary tube, then squeeze the bulb to dispense the whole blood to the specimen area of the test cassette.
- Testing should be performed immediately after the specimens have been collected. Do not leave the specimens at room temperature for prolonged periods. For long term storage, specimens should be kept below -20°C. Whole blood/serum/plasma collected by venipuncture should be stored at 2-8°C if the test is to be run within 2 days of collection. Do not freeze whole blood or serum or plasma specimens. whole blood or serum or plasma collected by fingerstick should be tested immediately.
- Bring specimens to room temperature prior to testing. Frozen specimens must be completely thawed and mixed well prior to testing. Specimens should not be frozen and thawed repeatedly.
- If specimens are to be shipped, they should be packed in compliance with local regulations covering the transportation of etiologic agents.

【MATERIALS】

Materials Provided

• Test cassettes • Droppers • Buffer • Package insert

Materials Required But Not Provided

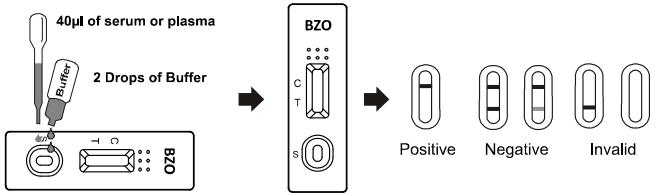
• Specimen collection containers • Centrifuge
•lancets (for fingerstick whole blood only) • Timer
•Heparinized capillary tubes and dispensing bulb (for fingerstick whole blood only)

【DIRECTIONS FOR USE】

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

For serum or plasma specimen:

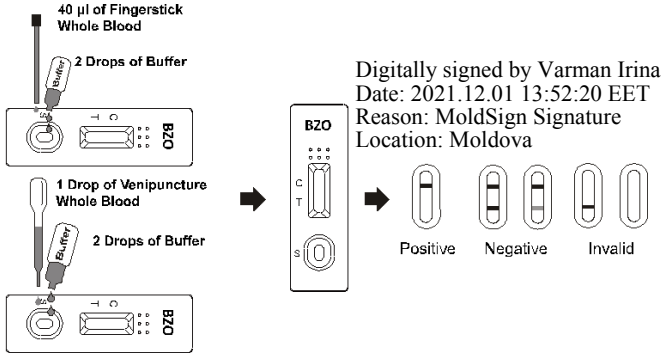
1. Bring the pouch to room temperature (15-30℃) before opening it. Remove the cassette from the sealed pouch and use it within one hour.
2. Place the cassette on a clean and level surface. Hold the dropper vertically and transfer **1 full drop of serum or plasma** (approximately 40ul), then add **2 drops of buffer** (approximately 80 μl) to the specimen well of the cassette, and then start the timer. Avoid trapping air bubbles in the specimen well. See illustration below.
3. Wait for the colored line(s) to appear. **Read the result at 5 minutes**. Do not interpret the result after 10 minutes.



For whole blood specimen:

1. Bring the pouch to room temperature before opening it. Remove the test cassette from the sealed pouch and use it as soon as possible.
2. Place the cassette on a clean and level surface.
   For **Venipuncture Whole Blood** specimen:
   - Hold the dropper vertically and transfer **1 drop of whole blood**(approximately 40μl) to the specimen well, then **add 2 drops of buffer** (approximately 80 μl), and start the timer. See illustration below.

   For **Fingerstick Whole Blood** specimen:
   - To use a capillary tube: Fill the capillary tube and **transfer approximately 40μl of fingerstick whole blood specimen** to the specimen area of test cassette, then add**2 drops of buffer**(approximately 80 μl) and start the timer. See illustration below.
3. Wait for the colored line(s) to appear. **Read results at 5 minutes.** Do not interpret the result after 10 minutes.



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【INTERPRETATION OF RESULTS】

(Please refer to the illustration above)

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

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

POSITIVE: One colored line appears in the control line region (C). No line appears in the test line region (T). This positive result indicates that the Benzodiazepines concentration exceeds the detectable cut-off 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. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

【QUALITY CONTROL】

A procedural control is included in the test. A colored line appearing in the control region (C) is the internal procedural control. It confirms sufficient specimen volume and correct procedural technique. Control standards are not supplied with this kit; however, it is recommended that positive and negative controls be tested as a good laboratory practice to confirm the test procedure and to verify proper test performance.

【LIMITATIONS】

1. The BZO Rapid Test Cassette (whole blood/serum/plasma) 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.[2]
2. It is possible that technical or procedural errors, as well as other interfering substances in the Whole blood or serum or plasma specimen may cause erroneous results.
3. A positive result indicates presence of the drug or its metabolites but does not indicate level of intoxication, administration route or concentration in Whole blood or serum or plasma.
4. A negative result may not necessarily indicate drug-free Whole blood/serum/plasma. Negative results can be obtained when drug is present but below the cut-off level of the test.
5. Test does not distinguish between drugs of abuse and certain medications.

【EXPECTED VALUES】

This negative result indicates that the Benzodiazepines concentration is below the detectable level of 100ng/ml. Positive result means the concentration of Benzodiazepines is above the level of 100ng/ml. The BZO Rapid Test Cassette has a sensitivity of 100ng/ml

【PERFORMANCE CHARACTERISTICS】

Accuracy

A side-by-side comparison was conducted using The BZO Rapid Test Cassette and GC/MS at the cut-off of 100ng/ml. Testing was performed on 90 clinical specimens previously collected from subjects present for Drug Screen Testing. The following results were tabulated:

Clinic Result of Whole Blood

Method		GC/MS		Total Results
BZO Rapid Test Cassette	Results	Positive	Negative	
	Positive	19	2	21
	Negative	2	67	69
Total Results		21	69	90
% Agreement		90.5%	97.1%	95.6%

Clinic Result of Serum or Plasma

Method		GC/MS		Total Results
BZO Rapid Test Cassette	Results	Positive	Negative	
	Positive	19	2	21
	Negative	2	67	69
Total Results		21	69	90
% Agreement		90.5%	97.1%	95.6%

Analytical Sensitivity

A drug-free whole blood/serum/plasma pool was spiked with Benzodiazepines at the following concentrations of ±50%cutoff and 3x cutoff,The data are summarized below:

For whole blood:

BZO Concentration (ng/ml)	Percent of Cut-off	n	Visual Result	
			Negative	Positive
0	0	30	30	0
50	-50%	30	30	0
100	Cut-off	30	15	15
150	+50%	30	0	30
300	3X	30	0	30

For serum or plasma:

BZO Concentration (ng/ml)	Percent of Cut-off	n	Visual Result	
			Negative	Positive
0	0	30	30	0
50	-50%	30	30	0
100	Cut-off	30	15	15
150	+50%	30	0	30
300	3X	30	0	30

Analytical Specificity

The following table lists compounds that are positively detected in whole blood/serum/plasma by The BZO Rapid Test Cassette (whole blood/serum/plasma) at 5 minutes.

Compound	Concentration (ng/ml)
Alprazolam	40
7-hydroxyalprazolam	500
Bromazepam	60
Chlordiazepoxide	150
Clonazepam	150
Clorazepatedipotassium	300
Delorazepam	60
Desalkylflurazepam	60
Diazepam	1,000
Estazolam	60
Flunitrazepam	2,000
(±) lorazepam	40
RS-lorazepamglucuronide	300
Midazolam	300
Nitrazepam	100
Nordiazepam	40
Oxazepam	300
Temazepam	2,000
Triazolam	1,000

Precision

A study was conducted at three hospitals 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 specimens, containing no Benzodiazepines, and 50% Benzodiazepines above and below the 100ng/ml cut-off was provided to each site. The following results were tabulated:

BZO Concentration (ng/ml)	n per Site	Site A		Site B		Site C	
		-	+	-	+	-	+
0	10	10	0	10	0	10	0
50	10	8	2	9	1	9	1
150	10	1	9	1	9	2	8

Cross-Reactivity

A study was conducted to determine the cross-reactivity of the test with compounds in either drug-free whole blood/serum/plasma or Benzodiazepines positive whole blood/serum/plasma. The following compounds show no cross-reactivity when tested with The BZO Rapid Test Cassette (whole blood/serum/plasma) at a concentration of 100 μg/ml.

Non Cross-Reacting Compounds

Acetaminophen	Deoxycorticosterone	MDE	β-Phenylethylamine
Acetophenetidin	Dextromethorphan	Meperidine	Phenylpropanolamine
N-Acetylprocainamide	Diclofenac	Meprobamate	Prednisolone
Acetylsalicylic acid	Diflunisal	Methadone	Prednisone
Aminopyrine	Digoxin	l-Methamphetamine	Procaine
Amitryptyline	Diphenhydramine	Methoxyphenamine	Promazine
Amobarbital	Doxylamine	(±) - 3,4-Methylenedioxy-amphetamine	Promethazine
Amoxicillin	Ecgonine	D,l-Propranolol	
Ampicillin	Ecgoninemethylester	(±) - 3,4-Methylenedioxy-methamphetamine	D-Propoxyphene
l-Ascorbic acid	(-)-ψ-Ephedrine		D-Pseudoephedrine
D,l-Amphetamine sulfate	[1R,2S] (-) Ephedrine	Morphine-3-β-D glucuronide	Quinacrine
Apomorphine	(l) - Epinephrine	Morphine Sulfate	Quinidine
Aspartame	Erythromycin	Nalidixic acid	Quinine
Atropine	β-Estradiol	Naloxone	Ranitidine
Benzilic acid	Estrone-3-sulfate	Naltrexone	Salicylic acid
Benzoic acid	Ethyl-p-aminobenzoate	Naproxen	Secobarbital
Benzoylecgonine	Fenoprofen	Niacinamide	Serotonin
Benzphetamine	Furosemide	Nifedipine	Sulfamethazine
Bilirubin	Gentisic acid	Norcodein	Sulindac
(±) – Brompheniramine	Hemoglobin	Norethindrone	Tetracycline
Caffeine	Hydralazine	D-Norpropoxyphene	Tetrahydrocortisone, 3-Acetate
Cannabidiol	Hydrochlorothiazide	Noscapine	
Cannabinol	Hydrocodone	D,l-Octopamine	Tetrahydrocortisone 3-(β-D-glucuronide)
Chloralhydrate	Hydrocortisone	Oxalic acid	

Chloramphenicol	O-Hydroxyhippuric acid	Oxolinic acid	Tetrahydrozoline
Chlorothiazide	p-Hydroxyamphetamine	Oxycodone	Thiamine
(±) – Chlorpheniramine	p-Hydroxy-	Oxymetazoline	Thioridazine
Chlorpromazine	methamphetamine	Papaverine	D,l-Tyrosine
Chlorquine	3-Hydroxytyramine	Penicillin-G	Tolbutamide
Cholesterol	Ibuprofen	Pentazocine	Triamterene
Clomipramine	Imipramine	Pentobarbital	Trifluoperazine
Clonidine	Iproniazid	Perphenazine	Trimethoprim
Cocaethylene	(±) - Isoproterenol	Phencyclidine	Trimipramine
Cocaine	Isoxsuprine	Phenelzine	Tryptamine
Codeine	Ketamine	Phenobarbital	D,l-Tryptophan
Cortisone	Ketoprofen	Phentermine	Tyramine
(-) Cotinine	labetalol	Trans-2-phenylcyclo-	Uric acid

Interfering Substances

The BZO Rapid Test Cassette (whole blood/serum/plasma) has been tested for possible interferencefrom visibly hemolyzed and lipemic specimens. In addition, no interference was observed in specimens containing up to 100 mg/dl hemoglobin;up to 100 mg/dl bilirubin; and up to 200 mg/dl human serum albumin.

【BIBlIOGRAPHY】

1. Tietz NW. Textbook of Clinical Chemistry. W.B. Saunders Company. 1986; 1735
2. Baselt RC. Disposition of Toxic Drugs and Chemicals in Man.2nd Ed. Biomedical Publ., Davis, CA. 1982; 488

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