QuickScreen Benzodiazepine (dipstick) (RAP-3004)

Revised 3 Nov. 2010 rm (Vers. 2.1) **IVD**

Please use only the valid version of the package insert provided with the kit.

Intended Use

The QuickScreen One Step Benzodiazepines Screening Test is a rapid, qualitative immunoassay for the detection of Benzodiazepines in urine at a cutoff concentration of 200 ng/mL. This assay is intended for use in clinical toxicology laboratories, physicians' offices, drug-of-abuse clinics, law enforcement agencies and on-site workplace drug testing programs.

This test provides only a preliminary test result. A more specific alternate testing method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmatory method. Other confirmation methods are available. Clinical consideration and professional judgment should be applied to any drug-of-abuse test result, certainly when preliminary positive results are observed.

Summary & Explanation of the Test

Benzodiazepines form one of the largest classes of abused pharmaceuticals. These products are sedative/hypnotics and anti-anxiety drugs that produce a calming effect, thus they are often prescribed as tranquilizers. Frequently abused Benzodiazepines include Alprazolam (Xanax®), Diazepam (Valium®), Lorazepam (Ativan®), Triazolam (Halcion®), Chlordiazepoxide (Librium®), Flurazepam (Dalmane®) and Temazepam (Restoril®). A trend has been observed in the past several years of abuse of these legitimate pharmaceuticals in conjunction with illicit controlled substances such as methadone and heroin. Benzodiazepines may be detected for up to two weeks in urine.

Urine-based screening tests for drugs of abuse range from complex analytical procedures to simple immunoassay tests. The sensitivity and rapidity of immunoassays have made them the most accepted method of preliminary screening for drugs of abuse in urine. This allows the laboratory to eliminate the large number of negative specimens and focus on the smaller number of initially positive samples.

Principles of the Procedure

The QuickScreen One Step Benzodiazepines Screening Test is a competitive immunoassay used to screen for the presence of Benzodiazepines in urine. It is a chromatographic absorbent device in which drugs or drug metabolites in a sample compete with drug / protein conjugate immobilized on a porous membrane for a limited number of antibody /dye conjugate binding sites. The test device employs a unique combination of monoclonal and polyclonal antibodies to selectively identify Benzodiazepines in urine with a high degree of confidence.

In the procedure, the absorbent end of the test device is inserted into the urine sample. The urine is absorbed into the device by capillary action, mixes with the antibody / dye conjugate, and flows across the pre-coated membrane. **When sample Benzodiazepine levels are below 200 ng/mL** (the detection sensitivity of the test), antibody / dye conjugate binds to the drug / protein conjugate immobilized in the Test Region (**T**) of the device. This produces a colored Test Band that, ***regardless of its intensity***, indicates a negative result.

When sample Benzodiazepine levels are at or above 200 ng/mL free drug in the sample binds to the antibody / dye conjugate, preventing the antibody / dye conjugate from binding to the drug / protein conjugate immobilized in the Test Region (**T**) of the device. This prevents the development of a distinct colored band, indicating a potentially positive sample.

In either case, a colored Control Band is produced in the Control Region (**C**) by a non-specific antibody-dye / conjugate reaction. This band serves as a built-in quality control device, demonstrating antibody recognition and reactivity, and confirming test completion.

Reagents & Materials Provided

1. **50 test devices containing:**
   a. Monoclonal anti-Benzodiazepine antibody / colloidal gold conjugate in a protein matrix containing 0.1% sodium azide coated in the sample path
   b. Benzodiazepine derivative / protein conjugate immobilized as a line in the test region
   c. Goat anti-mouse antibody immobilized as a line in the control region
2. **Directional Insert**
3. (Optional) Single Specimen Collection Kit (Cat. # 9501 or equivalent) – or –
4. **(Optional) Split Specimen Collection Kit (Cat. # 9502 or equivalent)**

Note: In addition to the materials supplied, a clock or other suitable timer is required.

Warnings & Precautions

1. FOR *IN VITRO* DIAGNOSTIC USE ONLY.
2. For Professional use only.
3. Urine samples have the potential to be infectious. Follow Universal Precautions for proper handling and disposal methods.
4. Do not use this kit beyond its expiration date.
5. This method was established using urine only. No other fluid has been evaluated.
6. Do not reuse the Test Device.

Storage & Handling Requirements

Store at room temperature (15 – 28 °C). Do not freeze. Refer to expiration date for stability.

Sample Collection & Preparation

A fresh urine sample should be collected in one of the above-mentioned specimen collection kit or equivalent. Alternately, a clean, dry plastic or glass container, unused and without preservatives, may be used for specimen collection. Testing requires at least $^1/_2$-inch (50 – 60 mL) of urine in the sample container. If required by your procedure, aliquot a portion of urine into the split sample container for later confirmation of results. If not required, dispose of all but $^1/_2$-inch of urine and save the remainder for the QuickScreen test.
Samples may be tested immediately or stored for up to 48 hours at 2 – 8 °C.
For longer storage, freeze samples at –20 °C or below.

Assay Procedure

Preparation

1. Confirm that all samples and test components are at room temperature (15 – 28 °C) before testing.
2. Do not break the seal on the foil pouch until you are ready to perform the test.

Testing

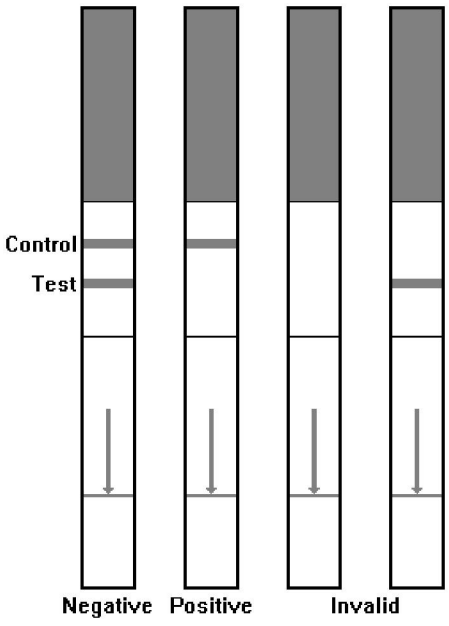
1. Open the foil pouch at the notch and remove the test device. Take care not to touch the exposed membrane.
2. Insert the reactive end of the device into the urine sample. DO NOT immerse the device any deeper into the sample than the maximum level indicated by the line on the device label.
3. Read test results immediately at ten (10) minutes. Results read after 15 minutes have elapsed should be considered invalid.

Interpretation of Test Results

Negative – A negative result is indicated when two (**2**) colored bands appear, one in the Control Region (**C**) and one in the Test Region (**T**). This result indicates a Benzodiazepine level that is below the detection sensitivity of 200 ng/mL.

Positive – A positive result is indicated when only one (**1**) colored band appears in the Control Region (**C**) and no band appears in the Test Region (**T**). This result indicates a Benzodiazepine level that is at or above the detection sensitivity of 200 ng/mL.

Invalid – A test must be considered invalid if no bands appear or if a band appears in the Test Region without a Control Band. The presence of a Control Band is necessary to confirm assay performance.



Quality Control

An internal procedural control line has been incorporated into the test device to help ensure proper kit performance and reliability. However, the use of external controls is recommended. Positive and negative controls within 25% of the cutoff should produce the expected results. For positive controls, only one (1) colored band will appear in the Control Region (C), and no band will appear in the Test Region (T). For negative controls, two (2) colored bands will appear, one in the Control Region (C) and one in the Test Region (T).

Limitations of the Procedure

1. **The possibility exists that substances and factors not described in this directional insert may interfere with the test, causing false results (*e.g.*, technical or procedural error).**
2. This test has been developed for testing urine samples only. The performance of this test using other specimens has not been substantiated.
3. **Adulterated urine samples may produce erroneous results. Strong oxidizing agents such as bleach (hypochlorite) can oxidize drug analytes. If a sample is suspected of being adulterated, obtain a new sample.**
4. All positive samples must be confirmed by another method. Gas chromatography / mass spectrometry (GC/MS) is the method of choice to confirm the presence and concentration of a drug in urine.
5. This test is a qualitative, competitive screening assay. It is not designed to determine the quantitative concentration of drugs or the level of intoxication.
6. Because the QuickScreen Test is a competitive assay, no prozone effect is present.
7. **Occasionally, samples containing target drug concentrations below the cutoff sensitivity for the test may produce a positive result.**

Performance Characteristics

Sensitivity

The QuickScreen One Step Benzodiazepines Screening Test detects Benzodiazepines at a cutoff concentration of 200 ng/mL. Sensitivity of the QuickScreen Test was evaluated on 100 urine samples and compared with 2 commercially available immunoassays. Using the cutoff concentration stated above, an agreement of >99% was observed. In addition, 2 clinical laboratories observed a combined sensitivity of >99% (51/51) when comparing QuickScreen to a commercially available (Emit II) immunoassay.

Specificity

In separate laboratory studies, including clinical trials, a specificity of 92% (138/150) was observed when compared to commercially available benzodiazepine tests.

Accuracy

The accuracy of the QuickScreen One Step Benzodiazepines Screening Test was evaluated on 100 urine samples and compared with 2 commercially available immunoassays using the 200 ng/mL cutoff concentrations. An agreement of 94% (94/100) was observed. In addition, studies at 2 separate, independent clinical laboratories produced an agreement of >94% (95/101) when compared to the Emit II assay.

Precision

Eight urine pools ranging from 0 to 600 ng/mL, as confirmed by GC/MS analysis, were assayed twice a day for 20 days with the QuickScreen One Step Benzodiazepines Screening Test. The results were interpreted individually by 2 technicians. The inter- and intra-assay coefficients of variation were <1% for all samples.

Cross-Reactivity

The following structurally related compounds were spiked into normal human urine, tested and found to cross-react with the QuickScreen One Step Benzodiazepines Screening Test. The results, expressed in ng/mL, are that amount of compound capable of giving a result equivalent to 200 ng/mL Oxazepam.

Alprazolam	500	Lorazepam, (±)	500
Bromazepam	600	Lormetazepam	400
Chlordiazepoxide	300	Medazepam	1,000
Clonazepam	500	Nitrazepam	200
Desmethyldiazepam	750	Oxazepam	200
Diazepam	400	Prazepam	1,000
Flunitrazepam	400	Temazepam	250
Flurazepam	1,000	Triazolam	500

Interfering Substances

The following compounds were spiked into normal human urine and tested for interference with the QuickScreen One Step Benzodiazepines Screening Test. These compounds were tested to 100 µg/mL, unless otherwise noted, with no interference observed.

Acetoacetic Acid • Acetone • *N*-Acetylprocainamide • Acetylsalicylic Acid (Aspirin) • Albumin • Alphenal • Amantadine • (+)-Amethopterin • Amikacin • *dl*-Aminoglutethimide • Aminopyrine • Amitriptyline • Amobarbital • Amoxicillin • *d*, *dl* & *l*-Amphetamine • Ampicillin • Apomorphine • Aprobarbital • (–)-Arterenol • *l*-Ascorbic Acid (Vitamin C) • *d*, *dl* & *l*-Aspartic Acid • Atropine • Barbital • Barbituric Acid • Benzoic Acid • Benzoylecgonine • Benzphetamine • Benztropine Methane Sulfonate • Bilirubin • Bromocriptine Mesylate • (+)-Brompheniramine • Butabarbital • Butalbital • Butethal • Cannabidiol • Cannabinol • Carbamazepine • Cephalexin • Chloramphenicol • Chloroquine • (+) & (±)-Chlorpheniramine • Chlorpromazine • Chlorpropamide • Chlorprothixene • Cimetidine • Clemastine • Clomipramine • Clonidine • Cocaine • Codeine • (–)-Cotinine • Creatinine • Cyclizine • Cyclobenzaprine • Cyclosporin A • Cyproheptadine • (–)-Deoxyephedrine • Desipramine • Dextromethorphan • 5,5-Dial-lylbarbituric Acid • Diflunisal • Digoxin • 4-Dimethylaminoantipyrine • Diphenhydramine • Diphenoxylate • 5,5-Diphenylhydantoin • Disopyramide • Doxepin • Doxylamine • (+) & (–)-*ψ*-Ephedrine • (+), (±) & (–)-Ephedrine • (±) & (–)-Epinephrine • Erythromycin • Estriol • Estrone-3-Sulfate • Ethosuximide • Ethyl-*p*-Aminobenzoate • Ethylenediaminetetraacetic Acid (EDTA) • 2-Ethylidene-1,5-Dimeth-yl-3,3-Diphenylpyrrolidine (EDDP) • Ethylmorphine[A] • Fenfluramine • Fenoprofen • Fentanyl[A] • Furosemide • Gentamicin • Gentisic Acid • *dl*-Glutethimide • Griseofulvin • Guaiacol Glyceryl Ester • Hemoglobin • Heroin[A] • Hexobarbital • Hydrochlorothiazide • Hydrocodone • Hydromorphone • *dl*-*β*-Hydroxybutyric Acid • *o*-Hydroxyhippuric Acid • 5-Hydroxyindole-3-Acetic Acid • 5-Hydroxyin-dole-2-Carboxylic Acid • 11-Hydroxy-Δ^9-THC[B] • 3-Hydroxytyramine • Hydroxyzine • Imipramine • Indole-3-Acetic Acid • Indole-3-Butyric Acid • Indomethacin • (+), (±) & (–)-Isoproterenol • Isoxsuprine • Kanamycin • Ketamine • Ketoprofen • Labetalol • Levorphanol • Lidocaine • Lithium Carbonate • Lysergic Acid Diethylamide (LSD)[C] • Melanin • Meperidine • Mephentermine • Meprobamate • Mescaline • *dl*-Metanephrine • (±)-Methadone • (+)-Methamphetamine • Methaqualone • (S)-6-Methoxy-*α*-Methyl-2-Naphthaleneacetic Acid • 2-Methyl-3-(3,4-Dihydroxyphenyl)-*dl* & *l*-Alanine • (±)-3,4-Methylene-dioxyamphetamine • (±)-3,4-Methylenedioxymethamphetamine • Methylphenidate • Methyprylon • Metoclopramide • Morphine • Morphine-3-*β*-D-Glucuronide • Nafcillin • Nalorphine • Naloxone • Naltrexone • Naphazoline • *α* & *β*-Naphthaleneacetic Acid • Netilmicin • Niacinamide • Nialamide • Nicotinic Acid • Nifedipine • Nomifensine • Norcodeine •

Nordoxepin[A] • Norethindrone • Normorphine[A] • 11-Nor-Δ^8 & Δ^9-THC-9-Carboxylic Acid[B] • Nortriptyline • Noscapine • Nylidrin • Orphenadrine • Oxalic Acid • Oxycodone • Oxymetazoline • Papaverine • Penicillin G • Pentazocine • Pentobarbital • Phencyclidine • Phenelzine • Pheniramine • Phenobarbital • Phenothiazine • Phentermine • Phenylacetone • *l*-Phenylalanine • Phenylbutazone • *trans*-2-Phenylcyclopropylamine • *l*-Phenylephrine • (R)-(+)-α, (±)-α & β-Phenylethylamine • (±)-Phenylpropanolamine • Piroxicam • Potassium Chloride • Prednisolone • Primidone • Procainamide • Procaine • Prochlorperazine • Promazine • Promethazine • (+)-Propoxyphene • 2-Propylpentanoic Acid • Protriptyline • Pyrilamine • Quinidine • Quinine • Ranitidine • Riboflavin • Salicylic Acid • (–)-Scopolamine • Secobarbital • Sulindac • Terbutaline • Tetracycline • Tetraethylthiuram Disulfide (Antabuse) • Δ^8 & Δ^9-Tetrahydrocannabinol • Tetrahydrozoline • Thebaine • Theophylline • (±)-Thiopental • Thioridazine • *cis*-Thiothixene • Tobramycin • Triamterene • Trifluoperazine • Triflupromazine • *dl*-Trihexyphenidyl • Trimethobenzamide • Trimethoprim • Trimipramine • Triprolidine • Tyramine • Urea • Uric Acid • Vancomycin • (±)-Verapamil • Zomepirac

[A] No interference was observed when the compound was tested to 10 µg/mL.

[B] No interference was observed when the compound was tested to 5 µg/mL.

[C] No interference was observed when the compound was tested to 2.5 µg/mL.

Bibliography

1. **Federal Register, Department of Health and Human Services, Mandatory Guidelines for Federal Workplace Drug Testing Programs 53 (**69**) 1988**
2. Urine Testing for Drugs of Abuse, NIDA Research Monograph 73, (1986)
3. Dasgupta A., Saldana S., Kinnaman G., Smith M., Johansen K., Clinical Chemistry, **39**:104-108 (1993)
4. **Liu R.H., Goldberger B.A., Handbook of Workplace Drug Testing, AACC Press (1995)**
5. Jeffcoat A.R, *et al*, Drug Metabolism and Disposition, **17**-2 (1989)
6. Inaba T., Journal of Canadian Physiology and Pharmacology, **67**:1154-1157 (1989)
7. Karch S.B., Drug Abuse Handbook, CRC Press (1998)