BTNX INC.

Rapid Response®

Microalbumin Creatinine Test Strips

REF U2.3-1S25 Product Insert

Reagent Strips for Semi-Quantitative Determination of Albumin and Creatinine in Urine Specimens.

For *in vitro* diagnostic use only.

Visual Test Interpretation Only.

Intended Use

The Rapid Response® Microalbumin Creatinine Test Strips are used for semi-quantitative determination of albumin and creatinine in urine. Affixed to each firm plastic strip are two reagent areas that test for albumin and creatinine in urine. Measurement of the two tests at the same time from a random single-void urine sample allows for determination of the albumin to creatinine ratio (ACR).
For *in-vitro* Diagnostic Use Only.

Background

Microalbuminuria, an abnormal elevation of the urinary albumin excretion rate, is often one of the first signs of renal disease or damage that can lead to renal failure[1]. Patients with hypertension or diabetes have the highest risk of renal disease where microalbumin may be present[3,4]. Microalbuminuria refers to small detectible amounts of albumin in the urine.
Creatinine is a byproduct of muscle metabolism and creatinine excretion into the urine is usually constant[5]. Creatinine measurement is used in the diagnosis and treatment of renal diseases, to monitor renal dialysis, and as a calculation basis for measuring other urine analytes. Though the concentration (or dilution) of urine varies throughout the day, the urinary creatinine level is relatively stable which allows its measurement to be used as a corrective factor in random/spot urine samples. When albumin and creatinine are measured simultaneously from a single-void / random urine sample, the albumin to creatinine ratio (ACR) can be determined. The ACR is the preferred test for screening of microalbuminuria recommended by the American Diabetes Association[6].
The Rapid Response® Microalbumin Creatinine Test Strips are packaged with a drying agent in a bottle with a twist off cap. The tests are ready to use and results are obtained by direct comparison of the test areas to color blocks printed on the bottle label. Each strip should only be used once and the entire reagent strip is disposable.

Principle

Albumin: At a constant pH, albumin binds with sulfonephthalein dye to develop of any blue color. The resulting color ranges from pale green to aqua blue.
Creatinine: In this assay, creatinine reacts with a creatinine indicator in an alkaline condition to form a purplish-brown color complex. The concentration of creatinine is directly proportional to the color intensity of the test pad.
REAGENTS (Based on dried weight at time of impregnation)
Microalbumin: 1.9% w/w sulfonephthalein color; 94.2% w/w buffer; 3.9% w/w non-reactive ingredients.
Creatinine: 2.5% w/w copper sulfate; 4.5% w/w benzidine; 56.4% buffer; 36.6% w/w non-reactive ingredients.

Precautions

1. For *in-vitro* diagnostic use only.
2. For laboratory use only
3. In accordance with the principles of Good Laboratory Practice, GLP, it is strongly recommended that all specimens be treated as potentially infectious and handled with all necessary precautions.
4. Discard all used devices into a biohazard container.
5. Do not use strips after the stated expiration date.
6. Do not expose test to extreme temperatures. Test performance may be affected.
7. They have been determined to be non-hazardous under the guidelines issued by OSHA in 29 CFR 1910.1200(d).
8. If the laboratory (USA only) modifies the test system instructions, then the test is considered high complexity and subject to all applicable CLIA requirements.

Storage and Stability

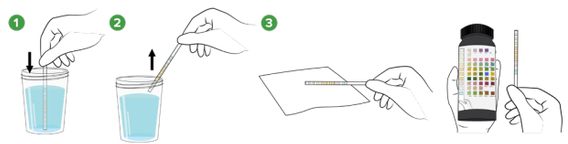
Store at 15°C-30°C (59°F-86°F) and out of direct sunlight. Do not use after expiration date. Do not touch test areas. Replace cap immediately and tightly. All unused strips must remain in the original bottle. Transfer to any other container may cause reagent strips to deteriorate and become non-reactive. Do not remove desiccant from bottle. Do not open container until ready to use. Opened bottles should be used within 3 months after first opening.
Protection against moisture, light and heat is essential to guard against altered reagent reactivity. Discoloration or darkening of reagent areas may indicate deterioration. If this is evident, the reagent strips should be discarded. Please consult local authorities for proper disposal of used product.

Specimen Collection and Preparation

- Collect urine sample in a clean container and test as soon as possible. Do not centrifuge. The use of urine preservatives is not recommended. If testing cannot be performed within one hour after voiding, refrigerate the specimen immediately. Allow refrigerated specimen to return to room temperature before testing.

Test Procedure

1. Remove from the bottle only enough strips for immediate use and replace cap tightly.
2. Completely immerse reagent areas of the strip in fresh, well-mixed urine. Remove the strip immediately to avoid dissolving out the reagent areas. (See illustration 1.)
3. While removing, touch the side of the strip against the rim of the urine container to remove excess urine. (See illustration 2.) Blot the lengthwise edge of the strip on an absorbent paper towel to further remove excess urine and avoid running over (contamination from adjacent reagent pads.) (See illustration 3.)
4. Compare each reagent area to its corresponding color blocks on the color chart and read at the times specified. Proper read time is critical for optimal results.
5. Obtain results by direct color chart comparison.



Results Interpretation

Results are obtained by direct comparison of the color blocks printed on the bottle label. The color blocks represent nominal values; actual values will vary around the nominal values. As with all laboratory tests, definitive diagnostic or therapeutic decisions should not be based on any single test result or method.

Calculations:
Determine Albumin/Creatinine Ratio (ACR) as follows:
ACR = Albumin result (mg/L)/Creatinine result (g/L)
= mg Albumin / g Creatinine

Example: Albumin result <20 mg/L
Creatinine result = 1000 mg/L = 1 g/L
ACR is <20/1.
Result < 30 mg/g (Normal)

Results Table

The following table shows the results that can be obtained visually in both conventional and SI units:

Test	Abbr	Results	
		Conventional Units	S. I. Units
Albumin	ALB	<20 mg/L (Normal) 30 mg/L 80 mg/L 150 mg/L	<20 mg/L (Normal) 30 mg/L 80 mg/L 150 mg/L
Creatinine	CRE	100 mg/L 500 mg/L 1000 mg/L 2000 mg/L 3000 mg/L	0.9 mmol/L 4.4 mmol/L 8.8 mmol/L 17.7 mmol/L 26.5 mmol/L
Albumin to Creatinine Ratio	ALB/CRE or ACR	<30 mg/g (Normal)	<3.4 mg/mmol (Normal)
		30-300 mg/g (Abnormal)	3.4 - 33.9 mg/mmol (Abnormal)
		>300 mg/g (High Abnormal)	>33.9 mg/mmol (High Abnormal)

Quality Control

For best results, confirm performance of reagent strips whenever a new bottle is first opened by testing known negative and positive controls that include values for microalbumin and creatinine. Each laboratory should establish its own goals for adequate standards of performance, and should question handling and testing procedures if these standards are not met.

Limitations

1. The strips are to be read visually. No instrument should be used to interpret the results.
2. Comparison to the color chart is dependent on the interpretation of the individual. It is therefore, recommended that all laboratory personnel interpreting the results of these strips be tested for color blindness.
3. The presence of hemoglobin (5 mg/dL or visibly bloody urine), bilirubin (15 mg/dl or visibly dark brown color urine) may cause erroneous results with the albumin and creatinine tests. Vitamin C over 100mg/dl does not affect the results of microalbumin and creatinine.
4. Substances that cause abnormal urine color, such as drug containing azo dyes (e.g., Pyridium, AZO Gantrisin, AZO Gantanol), nitrofurantoin (Macrodantin, Furadantin) and riboflavin may affect the readability of the reagent areas on urinalysis reagent strips.
5. Urinary albumin excretions can be elevated by exercise, urinary tract infections, and acute illness with fever. It is recommended that individuals avoid strenuous exercise prior to testing.
6. For use in a laboratory setting by lab-professionals only.

Expected Values

Albumin: Normal albumin levels in random urine are under 20 mg/L. Microalbuminuria is indicated by results of 20-200 mg/L. Values above 200 mg/L indicate clinical albuminuria. The detection of albuminuria at levels at or above 30mg/L will help clinicians to better diagnose diabetes in its early stages[6].
Creatinine: Creatinine is normally present in random urine in concentrations of 10 to 300 mg/dL (0.9 to 26.5 mmol/L).
Albumin/Creatinine Ratio: Albumin is normally present in urine at concentrations of less than 30 mg albumin / g creatinine (<3.4 mg/mmol). Microalbuminuria is indicated at a ratio result

of 30-300 mg/g (3.4-33.9 mg/mmol) (Abnormal) and clinical albuminuria at a ratio result of >300 mg/g (>33.9 mg/mmol) (High Abnormal)[6].

Performance Characteristics

The performance characteristics of the Rapid Response® Microalbumin Creatinine Test Strips have been determined both in the laboratory and in clinical tests. Parameters of importance to the user are sensitivity, specificity, accuracy, and precision. Generally, the Rapid Response® Microalbumin Creatinine Test Strips have been developed to be specific for the constituent to be measured with the exception of interferences listed above. (See LIMITATIONS)

For visually read strips, accuracy is a function of the manner in which the color blocks on the bottle label are determined and the discrimination of the human eye in reading the test. Precision is difficult to assess in a test of this type because of the variability of the human eye. It is for this reason that users are encouraged to develop their own standards of performance.

Accuracy: A total of 86 random urine specimens were collected from outpatients. These samples were assayed for albumin and creatinine using Bayer Clinitek Microalbumin and the Rapid Response® Microalbumin Creatinine Test Strips. In order to cover assay range, some of urine specimens were spiked with known concentrations of albumin and creatinine. Sensitivity is defined as the percentage of positive results obtained by Rapid Response® Microalbumin Creatinine Test Strips to those obtained by the comparative methods, while specificity refers to the percentage of negative results.

The Rapid Response® Microalbumin Creatinine Test Strips detects urinary albumin in concentration as low as 10 mg/L. Percent agreement with Bayer Clinitek Microalbumin in microalbumin test: 91.9%.

Positive Agreement: 96.5%
Negative Agreement: 98.3%

The Rapid Response® Microalbumin Creatinine Test Strips detects urinary creatinine in concentration as low as 100 mg/L. Percent agreement with Bayer Clinitek Microalbumin in creatinine tests: 86%

Precision: Urine specimens of different levels of concentration of albumin and creatinine were assayed. Each level was assayed 25 times. The following percentages were obtained. Percent agreement of replicate reading in Micro Albumin: 96.8% Percent agreement of replicate reading in Creatinine: 92%.

Bibliography

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4. Mujais SK. Marked proteinuria in hypertensive nephrosclerosis, Am J Nephrol, 5 (3), p190-5, 1985.
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Glossary of Symbols

Consult instructions for use		Test per Kit		EC REP Authorized Representative	
35.6°F 2°C 86°F 30°C Store between 35.6°F to 86°F		Use by		Do Not Reuse	
LOT Lot Number		IVD For *in vitro* diagnostic use only		REF Catalogue #	

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