Chemstrip® Micral®

From the Makers of ACCU-CHEK® Products

Dip and Read Immunoassay For The Semi-Quantitative Determination of Microalbuminuria

REF **11544039160**

(30 Test Strips/Vial)

Intended Use

Semi-quantitative test for the detection of microalbumin in urine. Elevated urinary microalbumin levels constitute an early sign of possible kidney or cardiovascular diseases, which are characterized by albuminuria. Detection of microalbuminuria can aid in the diagnosis and treatment of incipient nephropathy in diabetics and hypertensive patients.[1–10]

FOR PROFESSIONAL USE ONLY.
FOR *IN VITRO* DIAGNOSTIC USE ONLY.

Summary

Microalbuminuria refers to an albumin concentration in the urine which is greater than normal, but usually not detectable with routine protein dipstick assays which permit measurement of albumin at levels of 15 mg/dL or greater. There are multiple renal disease etiologies in which laboratory findings include proteinuria.[11] Albumin is the prominent protein in most renal diseases.[11] Monitoring low concentrations of albumin in the urine is helpful for early detection in patients at risk for renal disease.

Those at risk for renal disease in which albuminuria may be present include, but are not limited to, patients with type 1 and type 2 diabetes, hypertension,[12,13] and renal disease in pregnancy.[14,15] Of all patients beginning therapy for end-stage renal disease in the United States, diabetic nephropathy is the major cause of renal failure in 25 %.[16] Recent studies of the natural history of patients with long-standing diabetes showed that microalbuminuria preceded clinical diabetic nephropathy.[17] Further studies indicate that normalization of blood glucose and blood pressure can prolong the progression from microalbuminuria to clinical nephropathy.[17]

Test Principle

The albumin present in the urine specifically binds with a soluble antibody-gold conjugate present on a zone on the test strip. Excess conjugate is retained in a separation zone containing immobilized human albumin. This allows only the conjugate-albumin immunocomplex from the sample to reach the detection zone. After one minute, the intensity of the color produced (white to red) is directly proportional to the albumin content in the urine.

Reagent Composition

For Each Urine Test Strip

Monoclonal Antibodies: Anti-human albumin IgG labeled with colloidal gold (mouse) ..... 6 µg/cm²
Fixed albumin ..... 9.5 µg/cm²

Precautions and Warnings

For *in vitro* diagnostic use.

The "universal precautions" recommended by the Centers for Disease Control and Prevention should be followed whenever blood or body fluids are handled. These precautions include wearing gloves.[18]
Micral test strips contain albumin of human origin. While the blood used comes exclusively from donors who have tested negative for HIV 1+2 antibodies, HCV and HbsAG, the test strips should be handled with the same care as potentially infectious material, i.e. do not touch test zone or remove white covering foil from test strip.

Dispose of used test strips according to the regulations for potentially infectious materials. The remaining packaging components can be disposed as ordinary packaging materials.

Storage and Stability

Strips can be stored refrigerated or at room temperature. Expiration dates will differ.
If stored refrigerated: Store at 36 to 46 °F (2 to 8 °C). Do not freeze. In order to avoid exposure to moisture, the vial must be tightly and immediately closed after removal of strips, using the original stopper. Do not use after the expiration date printed on the vial and box.
If stored at room temperature: The strips expire 6 months from the date taken out of refrigeration. Write the date strips were removed from refrigeration in the appropriate box on the vial. Discard at the end of 6 months or the expiration date on the vial, whichever comes first.

Specimen Collection and Preparation

When performing a test using Micral test strips, the urine specimen should be collected in a clean, dry container. When a urine culture is ordered, it is necessary to collect the specimen in a sterile container.[19] Perform the culture prior to testing for microalbuminuria as the test strip will contaminate the specimen. Due to the physiological variation of albumin, it is recommended that three separate morning (midstream) urine samples be collected and analyzed within a given week. If testing cannot be performed within three days of collection, the urine sample should be refrigerated. Urine that has been refrigerated (for a maximum of two weeks) must be brought to at least 50 °F (10 °C) before testing. Any turbidity of the urine does not affect the test results.[20] The use of urine preservatives with this product has not been evaluated; therefore, the use of preservatives is not recommended. Urine samples that have been allowed to stand at room temperature for more than 3 days or refrigerated for more than 14 days are considered unacceptable for analysis.[23] The sample should not be frozen.

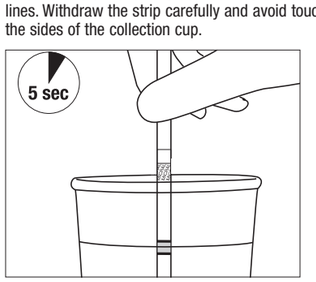
Procedure

Materials Provided: One vial containing 30 Micral test strips. A visual comparison color scale for reading test results is printed on the vial label.

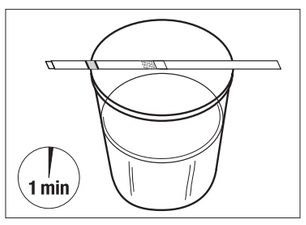
Materials Required, But Not Provided: A timer and a clean specimen collection container. It is also recommended that commercial control products be used for quality control checks.

Assay: Use strips immediately after removing vial from refrigerator.

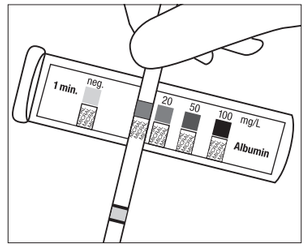
1. Dip the test strip into the urine for 5 seconds. Make sure that the urine level is between the two black lines. Withdraw the strip carefully and avoid touching the sides of the collection cup.



2. Place the strip on a nonabsorbent surface or across the top of the collection cup to allow excess urine to drain.



3. After approximately **1 minute**, match the color of the test pad above the inscription "MICRAL" with the color scale on the test strip vial. A wet detection area indicates that the reaction has come to an end. Since individual urine color can differ, the detection pad hue compared to the vial label may vary. In such a case, a particular color block should be assigned only if the intensity is at least equal to the intensity of the color block on the vial label. If the color development is slightly uneven, the average color is relevant. Comparison of the color reaction with the color scale is possible for up to **5 minutes**, then the color disintegrates.



Calibration

Calibration of Micral urine test strips by the user is not required.

Quality Control

Quality control for this procedure consists of following good laboratory techniques, ensuring that reagents have been properly stored and specimens handled according to instructions. The analyst should be aware of the sources of error outlined under *Limitations.* Each laboratory should establish its own goals for adequate standards of performance.

Commercially prepared control solutions should be used on a regular basis, as established by your institution's quality control protocols. The value range of the controls should be within the Micral test strip reading range of 0-100 mg/L.

If the expected results are not obtained and repetition of the assay excludes errors in technique, the following steps should be taken:

1. Check the "Exp. Date" on the vial label.
2. To verify that the Micral urine test strip has not been exposed to extreme heat or moisture, open a new vial of test strips and retest.
3. For further information, contact ACCU-CHEK Customer Care at 1-800-440-3638, available 24 hours a day, 365 days a year.

Results

Results are obtained by direct visual comparison with the color scale printed on the vial label. The levels of the color blocks are as follows: Neg., 20 mg/L, 50 mg/L and 100 mg/L. The visual color chart is intended to represent semi-quantitative findings and serves as a screening mechanism. If quantitative results are desired to confirm a positive result, it is recommended that further testing of the urine be carried out utilizing a reference procedure.

Determination of albumin concentrations above 100 mg/L: In order to determine albumin concentrations above 100 mg/L, the urine sample can be diluted by mixing one part of urine with two parts of water. The original albumin concentration is then calculated by multiplying the result obtained by 3.

Limitations

The amount of albumin excreted in the urine can vary according to changes in posture, amount of hydration, physical activity, blood pressure in the individual, and during pregnancy. Because of this individual variation, it is recommended that at least three separate samples be collected and analyzed within a given week to obtain an accurate assessment of the patient.[21] Urine samples should not be obtained following strenuous physical activity.

A wet detection pad indicates that the reaction has come to an end. If the detection pad is still dry after one minute despite correct immersion depth and duration, check the color development after another one or two minutes.

Acute illnesses that present with fever are known to cause an increase in urinary albumin excretion, such as urinary tract infection or bleeding into the urinary tract. Urine from menstruating females will occasionally yield a false positive result. Therefore, a decision of the usefulness of the test must be made by the professional. It is recommended that testing of individuals be performed when there is no longer a condition.

No cross-reactivity exceeding 0.5% has been found with IgA, IgG, human leukocytes and erythrocytes, Bence-Jones proteins, α1-antitrypsin, acidic α1-glycoprotein, α-amylase, retinol binding protein, hemoglobin, transferrin or Tamm-Horsfall proteins.[22]

Except for oxytetracycline which leads to a 15% elevation of the test result, no interference by drugs has been found, but it is recommended that the test be repeated after medication has been discontinued.[23]

Specimens should not be collected in containers that have been cleaned with strong oxidizing agents.

If the specimen is colder than 10 °C (50 °F), the color reaction is diminished.

Expected Values

The albumin concentration of an average urine specimen should not exceed 15–20 mg/L.[17]

Clinical diabetic nephropathy is indicated when microalbuminuria (> 20 mg/L) is present in at least two of the three morning urine samples.[21]

A normal microalbuminuria value does not rule out renal disease.[1]

Performance Characteristics

The performance characteristics of the Micral product have been determined in both the laboratory and clinical tests. Parameters of importance to the user are sensitivity, specificity, accuracy, and precision. Generally, the tests have been developed to be specific for the constituent to be measured with the exception of interferences listed previously.

For visually read strips, accuracy is a function of the manner in which the color blocks on the vial label are determined and the discrimination of the human eye in reading the tests. 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 each user is encouraged to develop his own standards for performance.

Studies in a sample population prone to renal pathology were conducted to compare Micral semi-quantitative results with values obtained from a quantitative RIA method and a quantitative immunoprecipitin method.[20]

Accuracy

RIA (Radioimmunoassay)

Random urine specimens were collected from patients under the care of endocrinologists and who presented themselves at clinics or hospitals. These samples were assayed by a quantitative RIA method and by Micral test strips. The following results were obtained:

		RIA Method: Albumin Concentration (mg/L) ≥ 20	RIA Method: Albumin Concentration (mg/L) < 20
Micral Test Strips	≥ 20	193	15
Albumin Concentration (mg/L)	< 20	13	243

n = 464
Sensitivity = 93.7 %
Specificity = 94.2 %
Accuracy = 94.0 %

Immunoprecipitin

Random, 24-hour, and first morning urine specimens were collected from patients under the care of endocrinologists and who presented themselves at clinics or hospitals. These samples were assayed by a quantitative immunoprecipitin method and by Micral test strips. The following results were obtained:

Random Urine Specimens

		Immunoprecipitin Method: Albumin Concentration (mg/L) ≥ 20	Immunoprecipitin Method: Albumin Concentration (mg/L) < 20
Micral Test Strips	≥ 20	188	22
Albumin Concentration (mg/L)	< 20	20	234

n = 464
Sensitivity = 90.4 %
Specificity = 91.4 %
Accuracy = 90.9 %

24-Hour Urine Specimens

		Immunoprecipitin Method: Albumin Concentration (mg/L) ≥ 20	Immunoprecipitin Method: Albumin Concentration (mg/L) < 20
Micral Test Strips	≥ 20	97	6
Albumin Concentration (mg/L)	< 20	5	162

n = 270
Sensitivity = 95.1 %
Specificity = 96.4 %
Accuracy = 95.9 %

First Morning Urine Specimens

		Immunoprecipitin Method: Albumin Concentration (mg/L) ≥ 20	Immunoprecipitin Method: Albumin Concentration (mg/L) < 20
Micral Test Strips	≥ 20	86	15
Albumin Concentration (mg/L)	< 20	6	161

n = 268
Sensitivity = 93.5 %
Specificity = 91.5 %
Accuracy = 92.2 %

Precision

Within Run – Ten replicates of four urine specimens at different levels were assayed by three operators. The level of precision was determined based on the frequency with which each operator obtained replicate readings on the same specimen. The following percents of replicate readings were obtained:

Concentration Tested (mg/L)	Operator 1	Operator 2	Operator 3
0	100 %	100 %	100 %
25	100 %	100 %	90 %
55	100 %	100 %	100 %
110	100 %	80 %	100 %

Lot-to-Lot – Ten replicates of each level were assayed on two lots of Micral test strips by three operators. The following percents of replicate readings were obtained:

Concentration Tested (mg/L)	Operator 1	Operator 2	Operator 3
0	100 %	100 %	100 %
25	100 %	100 %	90 %
55	100 %	100 %	100 %
110	100 %	90 %	100 %

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