Diabetes

ichroma™ Microalbumin

INTENDED USE

ichroma™ Microalbumin is a fluorescence Immunoassay (FIA) for the quantitative determination of Microalbumin in human urine. It is useful as an aid in management and monitoring of determination of kidney damage from diabetes.

For *in vitro* diagnostic use only.

INTRODUCTION

A Microalbumin test evaluates urine for the presence of a protein called albumin[1]. Albumin is normally found in the blood and filtered by the kidneys[2]. When the kidneys are working properly, albumin is not present in the urine. However, when the kidneys are damaged, small amounts of albumin leak into the urine. This condition is called Microalbumin[1, 2,3,4].

Microalbumin is most frequently caused by kidney damage from diabetes. However, many other conditions can lead to kidney damage, such as high blood pressure, heart failure, cirrhosis, or systemic lupus erythmatosus(SLE). If kidney damage is not treated at an early stage, larger amounts of albumin and protein may leak into the urine[5,6]. This condition is called macroalbuminuria or proteinuria. When the kidneys spill protein, it can mean serious kidney damage is present. This can lead to chronic kidney disease. A microalbumin urine test can be done on a sample of urine collected randomly (usually after the first time you urinate in the morning), a sample collected over a 24-hour period, or a sample collected over a specific period of time, such as 4 hours or overnight[7].

PRINCIPLE

The test uses a sandwich immunodetection method; the detector antibodies in buffer bind to antigens in the sample, forming antigen-antibody complexes, and migrate onto nitrocellulose matrix to be captured by the other immobilized-antibodies on test strip.

More antigens in the sample will form more antigen-antibody complexes and lead to stronger fluorescence signal by detector antibodies, which is processed by instrument for ichroma™ tests to show microalbumin concentration in the sample.

COMPONENTS

ichroma™ Microalbumin consists of 'Cartridges', 'Detection Buffer Tubes', 'ID chip' and 'Instruction for use'.

- The cartridge contains the membrane called a test strip which has anti human microalbumin at the test line, chicken IgY at the control line, and human serum albumin at the antigen line. All cartridges are individually sealed in an aluminum foil pouch containing a desiccant in a box.
- The detection buffer contains anti human microalbumin - fluorescence conjugate, anti chicken IgY-fluorescence conjugate, anti human microalbumin, citrate, NaCl, bovine serum albumin (BSA) as a stabilizer and sodium azide as a preservative in phosphate. All detection buffer tubes are packaged in a box.

WARNINGS AND PRECAUTIONS

- For *in vitro* diagnostic use only.
- Follow instructions and procedures described in this 'Instruction for use'.
- Use only fresh samples and avoid direct sunlight.
- Lot numbers of all the test components (cartridge, ID chip and detection buffer) must match each other.
- Do not interchange the test components between different lots or use the test components after the expiration date, either of which might yield incorrect test result(s).
- Do not reuse cartridges or detection buffer tubes. A detection buffer tube should be used for processing of one sample only. A cartridge should be used for testing one sample only.
- The cartridge should remain sealed in its original pouch until just before use. Do not use cartridge, if pouch is damaged or has already been opened.
- Frozen sample should be thawed only once. For shipping, samples must be packed in accordance with local regulations.
- Allow cartridge, detection buffer and sample to be at room temperature for approximately 30 minutes before use.
- The instrument for ichroma™ tests may generate slight vibration during use.
- Used detection buffer tubes, pipette tips and cartridges should be handled carefully and discarded by an appropriate method in accordance with relevant local regulations.
- An exposure to larger quantities of sodium azide may cause certain health issues like convulsions, low blood pressure and heart rate, loss of consciousness, lung injury and respiratory failure.
- **ichroma™ Microalbumin** will provide accurate and reliable results subject to the below conditions.
  - **ichroma™ Microalbumin** should be used only in conjunction with instrument for ichroma™ tests.

LIMITATION OF THE TEST SYSTEM

- The test may yield false positive result(s) due to the cross-reactions and/or non-specific adhesion of certain sample components to the capture/detector antibodies.
- The test may yield false negative result(s) due to the non-responsiveness of the antigen to the antibodies which is most common if the epitope is masked by some unknown components, so therefore not being able to be detected or captured by the antibodies. The instability or degradation of the antigen with time and/or temperature may also cause false negative result as it makes antigen unrecognizable by the antibodies.
- Other factors may interfere with the test and cause erroneous results, such as technical/procedural errors, degradation of the test components/reagents or presence of interfering substances in the test samples.
- Any clinical diagnosis based on the test result must be supported by a comprehensive judgment of the concerned physician including clinical symptoms and other relevant test results.

STORAGE AND STABILITY

Storage condition		
Component	Storage Temperature	Shelf life
Cartridge	4 - 30 °C.	20 months
Detection buffer	2 - 8 °C	20 months

- After the cartridge pouch is opened, the test should be performed immediately.

MATERIALS SUPPLIED

REF i-CHROMA MAU-25

Components of **ichroma™ Microalbumin**

- Cartridge Box:
  - Cartridges 25
  - ID Chip 1
  - Instruction for Use 1
- Detection buffer Box:
  - Detection Buffer Tubes 25

MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **ichroma™ Microalbumin**.

Please contact our sales division for more information.

- Instrument for ichroma™ tests
  - **ichroma™ Reader** REF FR203
  - **ichroma™ II** REF FPRR021
- **ichroma™ Printer** REF FPRR007
- **Boditech MAU Control** REF CFPO-4

SAMPLE COLLECTION AND PROCESSING

The sample type for **ichroma™ Microalbumin** is human urine.

- It is recommended to test the sample within 24 hours after collection.
- Samples may be stored for up to two days at 2-8 °C prior to being tested. If testing will be delayed more than two days, samples should be frozen at -20 °C.
- Samples stored frozen at -20 °C for 8 weeks showed no performance difference
- Once the sample was frozen, it should be used one time only for test, because repeated freezing and thawing can result in the change of test values.

TEST SETUP

- Check the contents of **ichroma™ Microalbumin**: Sealed Cartridges, Detection Buffer Tubes, ID Chip and Instruction for use.
- Ensure that the lot number of the cartridge matches that of the the detection buffer as well as ID chip
- If the sealed cartridge and the detection buffer have been stored in a refrigerator, place them on a clean and flat surface at room temperature for at least 30 minutes before testing.
- Turn on the instrument for ichroma™ tests.
- Insert the ID Chip into the ID chip port of the instrument for ichroma™ tests
  (Please refer to the 'Instrument for ichroma™ tests Operation Manual' for complete information and operating instructions.)

TEST PROCEDURE

<Multi Mode>

1) Transfer 10 µL (Human urine/control) of sample using a pipette to a tube containing the detection buffer.
2) Close the lid of the detection buffer tube and mix the sample thoroughly by shaking it about 10 times.
   (The sample mixture must be used immediately.)
3) Pipette out 75 µL of a sample mixture and load it into the sample well on the cartridge.
4) Leave the sample-loaded cartridge at room temperature for 12 minutes.

⚠ *Scan the sample-loaded cartridge immediately when the incubation time is over. If not, it will cause inaccurate test result.*

5) To scan the sample-loaded cartridge, insert it into the cartridge holder of the instrument for ichroma™ tests. Ensure proper orientation of the cartridge before pushing it all the way inside the cartridge holder. An arrow is marked on the cartridge especially for this purpose.
6) Press the 'Select' or tap the 'Start' button on the instrument for ichroma™ tests to start the scanning process.
7) The instrument for ichroma™ tests will start scanning the sample-loaded cartridge immediately.
8) Read the test result on the display screen of the instrument for ichroma™ tests.

<Single Mode>

1) Transfer 10 µL (Human urine/control) of sample using a pipette to a tube containing the detection buffer.
2) Close the lid of the detection buffer tube and mix the sample thoroughly by shaking it about 10 times. (The sample mixture must be used immediately.)
3) Pipette out 75 µL of a sample mixture and load it into the sample well on the cartridge.
4) Inserting the cartridge into the holder of the instrument for ichroma™ tests. Ensure proper orientation of the cartridge before pushing it all the way inside the cartridge holder. An arrow is marked on the cartridge especially for this purpose.
5) Tap the 'Start' or press the 'Select' button on the instrument for ichroma™ test.
6) Cartridge goes inside the Instrument for ichroma™ tests and will automatically start scanning the sample-loaded cartridge after 12 minutes.
7) Read the test result on the display screen of the instrument for ichroma™ tests.

INTERPRETATION OF TEST RESULT

- The instrument for ichroma™ tests calculates the test result automatically and displays microalbumin concentration of the test sample in terms of mg/L.
- The cut-off (reference range): 18 mg/L
- Working range : 2-300 mg/L

QUALITY CONTROL

- Quality control tests are a part of the good testing practice to confirm the expected results and validity of the assay and should be performed at regular intervals.
- The control tests should be performed immediately after opening a new test lot to ensure the test performance is not altered.
- Quality control tests should also be performed whenever there is any question concerning the validity of the test results.
- Control materials are not provided with **ichroma™ Microalbumin**. For more information regarding obtaining the control materials, contact Boditech Med Inc.'s Sales Division for assistance.
  (Please refer to the instruction for use of control material.)

PERFORMANCE CHARACTERISTICS

- **Analytical sensitivity**
  - Limit of Blank (LoB) 0.417 mg/L
  - Limit of Detection (LoD) 1.085 mg/L
  - Limit of Quantification (LoQ) 2 mg/L

- **Analytical specificity**
  - **Cross-reactivity**
    There was no significant cross-reactivity from these materials with the **ichroma™ Microalbumin** test measurements.

Cross reactivity materials	Conc.
CEA	500 µg/mL
PSA	500 µg/mL
AFP	500 µg/mL
ALT	500 µg/mL
Troponin I	500 µg/mL
CRP	500 µg/mL
Myoglobin	500 µg/mL

  - **Interference**
    There was no significant interference from these materials with the **ichroma™ Microalbumin** test measurements.

Interference materials	Conc.
Creatinine	442 µmol/L
L-ascorbic acid	170 µmol/L
Bilirubin, unconjugated	257 µmol/L
D-glucose	55 mmol/L
Urea	42.9 mmol/L
Hemoglobin	2 g/mL

- **Precision**
  One person tested ichroma™ Microalbumin 2 times of everyday during 21 days in same place.
  - Repeatability (within-run precision)
    Repeatability of **ichroma™ Microalbumin** was evaluated with some test result of 1 Lot.
  - Total precision (within-laboratory)
    Total precision (within-run, between-run, between-day) of **ichroma™ Microalbumin** was evaluated with some test result of 1 Lot.
  - Lot to lot precision
    Lot to lot precision of **ichroma™ Microalbumin** was evaluated with some test result of 3 Lots.
  - Between person
    Three different persons tested **ichroma™ Micro-albumin;** ten times at each concentration of the control standard.
  - Between Site
    One person tested **ichroma™ Microalbumin** at three different sites; ten times at each concentration of the control standard.
  - Between reader
    One person tested **ichroma™ Microalbumin** at three different readers; ten times at each concentration of the control standard.

Conc. (mg/L)	Repeatability (within-run)		Total precision (within-laboratory precision)	
	AVG	CV (%)	AVG	CV (%)
4.5	4.52	5.87	4.49	5.81
23	23.01	6.17	23.03	6.31
100	99.72	4.72	100.3	5.5
Conc.	Lot to Lot precision		Between-person	
(mg/L)	AVG	CV (%)	AVG	CV (%)
4.5	4.51	5.57	4.53	5.85
23	23.02	5.97	23	5.81
100	99.94	5.63	100.4	5.64
Conc.	Between-site		Between-Readers	
(mg/L)	AVG	CV (%)	AVG	CV (%)
4.5	4.49	5.44	4.48	5.84
23	22.72	6.14	23.33	5.4
100	101.3	6.29	99.56	6.06

■ **Accuracy**

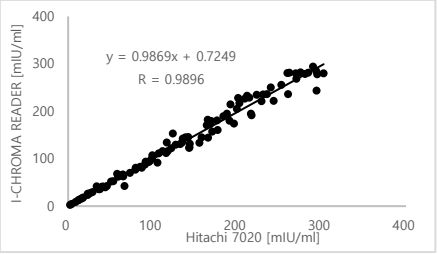
The accuracy was confirmed by testing with 3 different Lots of **ichroma™ Microalbumin**. The tests are repeated 10 times in each different concentration.

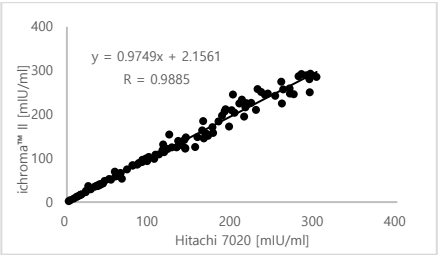
Expected value [mg/L]	Lot 1	Lot 2	Lot 3	AVG	Recovery (%)
2	1.99	2.1	1.98	2.02	101
5.04	5.02	5.07	5.06	5.05	100
9.99	10.02	9.96	9.87	9.95	100
20.12	19.83	19.96	20.4	20.06	100
40.23	39.61	38.57	39.97	39.39	98
74.99	72.47	77.31	75.1	74.96	100
100.84	102.08	98.25	99.94	100.09	99
200.56	199.71	203.13	197.64	200.16	100
300.28	301.2	294.28	291.26	295.58	98

■ **Comparability**

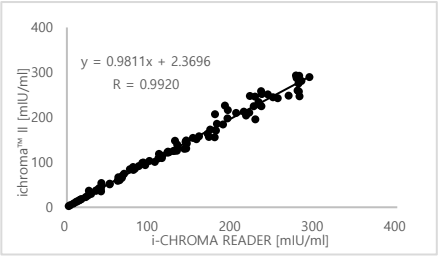
Microalbumin concentrations of 100 urine samples were quantified independently with i-CHROMA READER, ichroma™ II and Hitachi 7020 as per prescribed test procedures. Test results were compared, and their comparability was investigated with linear regression and coefficient of correlation (R).

	Hitachi 7020	
	linear regression	coefficient of correlation
i-CHROMA READER	y = 0.9869x + 0.7249	R=0.9896
ichroma™ II	y = 0.9749x + 2.1561	R=0.9885





	i-CHROMA READER	
	linear regression	coefficient of correlation
ichroma™ II	y = 0.9811x + 2.3696	R=0.9920



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Note: Please refer to the table below to identify various symbols

	Sufficient for <n> tests
	Read instruction for use
	Use by Date
	Batch code
	Catalog number
	Caution
	Manufacturer
	Authorized representative of the European Community
	In vitro diagnostic medical device
	Temperature limit
	Do not reuse
	This product fulfills the requirements of the Directive 98/79/EC on in vitro diagnostic medical devices

For technical assistance; please contact:
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