



# ichroma™ CEA

## INTENDED USE

**ichroma™ CEA** is a fluorescence Immunoassay (FIA) for the quantitative determination of CEA in **human serum/plasma**. It is useful as an aid in management and monitoring of cancer patients.

For *in vitro* diagnostic use only.

## INTRODUCTION

CEA is an oncofetal glycoprotein, which is found at high levels in the fetal colon and at lower levels in the normal adult colonic epithelium. CEA occurs at abnormally high levels in several benign disorders and in some malignant tumors, including those of the stomach, small intestine, colon, rectum, pancreas, liver, breast, ovary, cervix, and lung<sup>1</sup>. CEA is a 180-kD glycoprotein that occurs at high levels in colon epithelial cells during embryonic development. Levels of CEA are significantly lower in colon tissue of adults, but can become elevated when inflammation or tumors<sup>2</sup> arise in any endodermal tissue, including in the gastrointestinal tract, respiratory tract, pancreas and breast<sup>2</sup>. CEA is also expressed by epithelial cells in several non-malignant disorders, including diverticulitis, pancreatitis, inflammatory bowel disease, cirrhosis, hepatitis, bronchitis and renal failure and also in individuals who smoke<sup>3</sup>. This fact has made it difficult to use serum CEA determination as a sensitive method for cancer screening. However, serum CEA levels have been useful in monitoring individuals for the recurrence of cancer<sup>4</sup>.

## PRINCIPLE

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

The more antigen in sample forms the more antigen-antibody complex and leads to stronger intensity of fluorescence signal on detector antibody, which is processed by instrument for ichroma™ tests to show CEA concentration in sample.

## COMPONENTS

**ichroma™ CEA** consists of 'Cartridges', 'Detection Buffer Tubes' and an 'ID chip'.

- The cartridge contains a test strip, the membrane which has anti human CEA at the test line, while chicken IgY at the control line.
- Each cartridge is individually sealed in an aluminum foil pouch containing a desiccant. 25 sealed cartridges are packed in a box which also contains an ID chip.
- The detection buffer contains anti human CEA-fluorescence conjugate, anti chicken IgY-fluorescence conjugate, bovine serum albumin (BSA) as a stabilizer and sodium azide in phosphate buffered saline (PBS) as a preservative.
- The detection buffer is dispensed in a tube. 25 detection buffer tubes are packaged in a box and further packed in a Styrofoam box with ice-pack for the shipment.

## WARNINGS AND PRECAUTIONS

- For *in vitro* diagnostic use only.
- Carefully follow the instructions and procedures described in this 'Instructions 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 misleading of test result(s).
- Do not reuse. A detection buffer tube should be used for processing one sample only. So should a cartridge.
- The cartridge should remain sealed in its original pouch before use. Do not use the cartridge, if it is damaged or already opened.
- Frozen sample should be thawed only once. For shipping, samples must be packed in accordance with the regulations. Sample with severe hemolytic and hyperlipidemia cannot be used and should be recollected.
- Just before use, allow the cartridge, detection buffer and sample to be at room temperature for approximately 30 minutes.
- **ichroma™ CEA** as well as the instrument for ichroma™ tests should be used away from vibration and/or magnetic field. During normal usage, it can be noted that instrument for ichroma™ tests may produce minor vibration.
- Use 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™ CEA** will provide accurate and reliable results subject to the following conditions.
  - Use **ichroma™ CEA** should be used only in conjunction with instrument for ichroma™ tests.
  - Any anticoagulants other than EDTA, heparin sodium, sodium citrate should be avoided.

## STORAGE AND STABILITY

- The cartridge is stable for 20 months (while sealed in an aluminum foil pouch) if stored at 4-30 °C.
- The detection buffer dispensed in a tube is stable for 20 months if stored at 2-8 °C.
- After the cartridge pouch is opened, the test should be performed immediately.

## 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. The non-responsiveness of the antigen to the antibodies is most common where the epitope is masked by some unknown components, so as not to be detected or captured by the antibodies. The instability or degradation of the antigen with time and/or temperature may cause the false negative 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.

## MATERIALS SUPPLIED

**REF** 13013

Components of **ichroma™ CEA**

- Cartridge Box:
  - Cartridges 25
  - ID Chip 1
  - Instruction For Use 1
- Box containing Detection Buffer tubes

- Detection Buffer Tubes 35

### MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **ichroma™ CEA**. Please contact our sales division for more information.

- Instrument for **ichroma™** tests
  - **ichroma™ Reader** [REF](#) FR203
  - **ichroma™ II** [REF](#) FPRR021
  - **ichroma™ D** [REF](#) 13303
- **ichroma™ Printer** [REF](#) FPRR007
- **Boditech Tumor marker Control** [REF](#) CPFO-94

### SAMPLE COLLECTION AND PROCESSING

- The sample type for **ichroma™ CEA** is human serum/plasma.
- It is recommended to test the sample within 24 hours after collection.
- The serum or plasma should be separated from the clot by centrifugation within 3 hours after the collection of whole blood.
- Samples may be stored for up to a week at 2-8°C prior to being tested. If testing will be delayed more than a week, samples should be frozen at -20 °C.
- Samples stored frozen at -20 °C for 2 months 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™ CEA**: Sealed Cartridge, Detection Buffer Tubes and ID Chip.
- Ensure that the lot number of the cartridge matches that of the ID chip as well as the detection buffer.
- Keep the sealed cartridge (if stored in refrigerator) and the detection buffer tube at room temperature for at least 30 minutes just prior to the test. Place the cartridge on a clean, dust-free and flat surface.
- Turn on the instrument for **ichroma™** tests.
- Insert the ID Chip into the ID chip port of the instrument for **ichroma™** tests.
- Press the 'Select' button on the instrument for **ichroma™** tests. (Please refer to the 'Instrument for **ichroma™** tests Operation Manual' for complete information and operating instructions.)

### TEST PROCEDURE

- 1) Transfer 150 µL (Human serum/plasma/control) of sample using a transfer 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 test cartridge.
- 4) Leave the sample-loaded test cartridge at room temperature for 12 minutes.  
 ⚠ Scan the sample-loaded cartridge immediately when the incubation time is over. If not, it will cause inexact 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 has been marked on the cartridge especially for this purpose.
- 6) Press 'Select' button on the instrument for **ichroma™** tests to start the scanning process.
- 7) 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.

### INTERPRETATION OF TEST RESULT

- Instrument for **ichroma™** tests calculates the test result automatically and displays CEA concentration of the test sample in terms of ng/mL.
- The cut-off (reference value)
  - Non-Smoker: 4 ng/mL
  - Smoker: 5 ng/mL (95 % of healthy subjects)
- Working range : 1-500 ng/mL

### QUALITY CONTROL

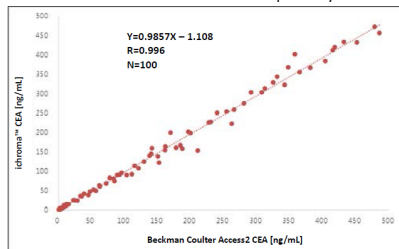
- Quality control tests are a part of the good testing practice to confirm the expected results and validity of the assay and should be performed at regular intervals.
- The control tests should be performed immediately after opening a new test lot to ensure the test performance is not altered.
- Quality 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™ CEA**. 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

- **Specificity:** There, in test samples, are biomolecules such as bilirubin, lipid and hemoglobin for interference test, and disease related makers such as NCA in higher concentration than their normal physiological levels. But this doesn't interfere with the **ichroma™ CEA** test measurements, nor occurs any significant cross-reactivity.
- **Precision:** The intra-assay precision was calculated by one evaluator, who tested different concentration of control standard ten times each with three different lots of **ichroma™ CEA**. The inter-assay precision was confirmed by 3 different evaluators with 3 different lots, testing five times each different concentration.

CEA [ng/mL]	Intra-assay		Inter-assay	
	Mean	CV (%)	Mean	CV (%)
6.5	6.86	8.66	6.81	7.76
65	68.54	3.81	67.13	4.49
130	131.67	5.12	129.23	5.60













- **Comparability:** CEA concentrations of 100 clinical samples were quantified independently with **ichroma™ CEA** and Beckman Coulter Access2 as per prescribed test procedures. Test results were compared and their comparability was investigated with linear regression and coefficient of correlation (R). Linear regression and coefficient of correlation between the two tests were  $Y=0.9857X - 1.108$  and  $R = 0.996$  respectively.



## REFERENCES

1. Jothy, S., S-Y. Yuan, and K. Shirota. 1993. Transcription of carcinoembryonic antigen in normal colon and colon carcinoma. *Am. J. Pathol.* 143:250-257.
2. Benchimol, S., A. Fuks, S. Jothy, N. Beauchemin, K. Shirota, and C.P. Stanners. 1989. Carcinoembryonic antigen, a human tumor marker, functions as an intercellular adhesion molecule. *Cell* 57:327-334.
3. Oikawa, S., C. Inusuka, M. Kuroki, Y. Matsuoka, G. Kosaki, and H. Nakazato. 1989. Cell adhesion of non-specific cross-reacting antigen (NCA) and carcinoembryonic antigen (CEA) expressed on CHO cell surface: homophilic and heterophilic adhesion. *Biochem. Biophys. Res. Commun.* 164:39-45.
4. Averbach, A.M., and P.H. Sugarbaker. 1995. Use of Tumor Markers and Radiologic Tests in Follow-up. In *Cancer of the Colon, Rectum and Anus*.

**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:

**Boditech Med Inc.'s Technical Services**


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