



ichroma[™] **CEA Neo**

INTENDED USE

ichroma[™] CEA Neo is a fluorescence immunoassay (FIA) for the quantitative determination of CEA (carcinoembryonic antigen) in **human whole blood/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 lung¹. 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 tumors² arise in any endodermal tissue, including in the gastrointestinal tract, respiratory tract, pancreas and breast². 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 smoke³. 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 cancer⁴.

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 a test strip.

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

COMPONENTS

ichroma[™] CEA Neo consists of 'cartridges', 'detector tubes', and 'detector diluent'.

- The cartridge contains the membrane called a test strip which has anti-CEA at the test line, and rabbit IgG at the control line. All cartridges are individually sealed in an aluminum foil pouch containing a desiccant, and they are further packaged in a box.

- The detector tube has a granule containing anti-CEA-fluorescence conjugate, anti-rabbit IgG-fluorescence conjugate and sodium azide as a preservative in phosphate buffered saline (PBS). All detector tubes are packed in a pouch.
- The detector diluent contains tween 20 as a detergent, sodium azide as a preservative in Tris-HCl, and it is pre-dispensed in a vial. The detector diluent is packed in a box.

WARNINGS AND PRECAUTIONS

- For *in vitro* diagnostic use only.
- 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, detector tube, detector diluent and ID chip) 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 detector tubes. A cartridge should be used for testing one sample only. A detector tube should be used for processing of one sample only.
- The cartridge should remain sealed in its original pouch until just before use. Do not use a 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. Sample with severe hemolysis and/or hyperlipidemia must not be used.
- If test components and/or sample are stored in refrigerator, then allow cartridge, detector tube, detector diluent 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 cartridges, detector tubes, detector diluent and pipette tips should be handled carefully and discarded by an appropriate method in accordance with relevant local regulations.
- The detector tube and the detector diluent contains sodium azide (NaN₃) and it may cause certain health issues like convulsions, low blood pressure, low heart rate, loss of consciousness, lung injury and respiratory failure. Avoid contact with skin, eyes and clothing. In case of contact, rinse immediately with running water.
- No Biotin interference was observed in **ichroma[™] CEA Neo** when biotin concentration in the sample was below 100 ng/mL. If a patient has been taking biotin at dosage of more than 0.03 mg a day, it is recommended to test again 24 hours after discontinuation of biotin intake.
- **ichroma[™] CEA Neo** will provide accurate and reliable results subject to the below conditions.
 - **ichroma[™] CEA Neo** should be used only in conjunction with the instrument for ichroma[™] tests.
 - Have to use recommended anticoagulant.

Recommended anticoagulant
K ₃ EDTA, Sodium heparin

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 antigens to the antibodies which is the 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 antigens with time and/or temperature may also cause false negative result as it makes the antigens 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 in conjunction with clinical symptoms and other relevant test results.

STORAGE AND STABILITY

Storage condition			
Component	Storage Temperature	Shelf life	Note
Cartridge	2 - 30°C	20 months	Disposable
Detector tube	2 - 30°C	20 months	Disposable
Detector diluent	2 - 30°C	20 months	Unopened
		20 months	Opened

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

MATERIALS SUPPLIED

REF CFPC-158

Components of **ichroma™ CEA Neo**

- Cartridge box:
 - Cartridge 25
 - Detector tube 25
 - Detector diluent 1
 - ID chip 1
 - Instructions for use 1

MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately with **ichroma™ CEA Neo**.

Please contact our sales division for more information.

- Instrument for **ichroma™** tests
 - **ichroma™ Reader** **REF** FR203
 - **ichroma™ II** **REF** FPRR021
 - **ichroma™ III** **REF** FPRR037
 - **ichroma™ M3** **REF** FPRR035
 - **ichroma™-50** **REF** FPRR022
 - **ichroma™-50 PLUS** **REF** FPRR036
- **Printer** **REF** FPRR007
- **Boditech CEA Control** **REF** CFPO-246
- **Boditech Tumor marker Control** **REF** CFPO-94

SAMPLE COLLECTION AND PROCESSING

The sample type for **ichroma™ CEA Neo** is human whole blood/serum/plasma.

- It is recommended to test the sample within 18 hours after collection.
- The samples (serum, plasma) should be separated from the clot by centrifugation within 3 hours after the collection of whole blood.
- The samples (whole blood, serum, plasma) may be stored for a week at 2-8°C prior to being tested. If testing will be delayed more than a week, samples (serum, plasma) should be frozen at -20°C.
- The samples (serum, plasma) stored frozen at -20°C for 3 months showed no performance difference.
- However, the whole blood sample should not be kept in a freezer in any case.
- As a repeated freeze-thaw cycle may affect the test result, do not refreeze previously frozen samples

TEST SETUP

- Check the contents of **ichroma™ CEA Neo**: Sealed cartridges, detector tubes, a detector diluent, an ID chip and an instructions for use.
- Ensure that the lot number of the cartridge matches that of the detector tube, the detector diluent as well as an ID Chip.
- If the sealed cartridge, the detector tube and the detector diluent 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'.

※ Please refer to the instrument for **ichroma™** tests operation manual for complete information and operating instructions.

TEST PROCEDURE

► **ichroma™ Reader, ichroma™ II, ichroma™ M3**

(**ichroma™ Reader** is available for testing on single test mode only.)

Multi test mode

- 1) Take 150 µL of detector diluent using a pipette and dispense it to the detector tube containing a granule. When the granule form is completely dissolved in the tube, it becomes detection buffer. (The detection buffer must be used immediately. Do not exceed 30 seconds.)
- 2) Take 30 µL of sample (whole blood/serum/plasma/control) using a pipette and dispense it to the detector tube.
- 3) Close the lid of the detector tube and mix the sample thoroughly by shaking it about 20 times (The sample mixture must be used immediately. Do not exceed 30 seconds.)
- 4) Take 75 µL of the sample mixture and dispense it into the sample well of the cartridge.
- 5) Leave the cartridge at room temperature for 15 minutes.

⚠ Scan the sample-loaded cartridge immediately when

the incubation time is over. If not, it will cause inaccurate test result.

- 6) 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.
- 7) Tap the 'Start' button on the instrument for ichroma™ tests to start the scanning process (ichroma™ M3 is tested automatically after inserting.)
- 8) The instrument for ichroma™ tests will start scanning the sample-loaded cartridge immediately.
- 9) Read the test result on the display screen of the instrument for ichroma™ tests.

Single test mode

- 1) The test procedure is same with the 'Multi test mode 1) - 4)'.
- 2) Insert the sample-loaded 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.
- 3) Press the 'Select' or tap the 'Start' button on the instrument for ichroma™ tests. (ichroma™ M3 is tested automatically after inserting)
- 4) The cartridge goes inside the instrument for ichroma™ tests and will automatically start scanning the sample-loaded cartridge after 15 minutes.
- 5) Read the test result on the display screen of the instrument for ichroma™ tests.

► ichroma™ III

- 1) The test procedure is same with the 'Single test mode'.

► ichroma™-50, ichroma™-50 PLUS

- 1) Insert the tip array in the tip station.
- 2) Insert the detector tube in the reagent station and cover the reagent station to hold the detector tubes in place.
- 3) Open the lid of the detector diluent and insert the detector diluent in the diluent station.
- 4) Insert the cartridge magazine with the cartridges into the magazine station.
- 5) Insert the sample tube into the blood collection tube rack and load the blood collection tube rack into the sampling station (loading part).
- 6) Tap the button located in the upper side of the No. of test cartridge region to select the ID chip that you want to use.
- 7) When the selected cartridge slot is activated, set the number of the detector tube by tapping.
- 8) Set the number of pipette tips by tapping.
- 9) Tap the 'Start' button on the left upper of the main screen to start test.

INTERPRETATION OF TEST RESULT

- The instrument for ichroma™ tests calculates the test result automatically and displays CEA concentration of the test sample in terms of ng/mL.

- Reference range: < 4.7 ng/mL
- 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.
- Quality control tests should also be performed whenever there is any question concerning the validity of the test results.
- Control materials are provided on demand with **ichroma™ CEA Neo**. For more information regarding obtaining the control materials, contact **Boditech Med Inc's Sales Division for assistance**.
(Please refer to the instructions for use of control material.)

PERFORMANCE CHARACTERISTICS

■ Analytical sensitivity

Limit of Blank (LOB)	0.33 ng/mL
Limit of Detection (LOD)	0.45 ng/mL
Limit of Quantitation (LOQ)	1.00 ng/mL

■ Analytical specificity

- Cross-reactivity

Biomolecules listed in the following table were added to the test sample(s) at concentrations much higher than their normal physiological levels in the blood. **ichroma™ CEA Neo** test results did not show any significant cross-reactivity with these biomolecules.

Cross-reactants	Concentration
PSA	400 ng/mL
AFP	1,000 ng/mL
CA 125	3,500 U/mL

- Interference

Interferents listed in the following table were added to the test sample at the concentration mentioned below. **ichroma™ CEA Neo** test results did not show any significant interference with these materials.

Interferents	Concentration
Hemoglobin	10 g/L
Bilirubin, unconjugated	684 μmol/L
Triglycerides	1500 mg/dL
Ascorbic acid	5.25 mg/dL
Glucose	1000 mg/dL
Cholesterol	400 mg/dL

■ Precision

- Single-site study

Repeatability (within-run precision)

within-laboratory precision (Total precision)

Lot to lot precision

3 Lots of **ichroma™ CEA Neo** were tested for 20 days. Each standard material was tested 2 times per day. For each test, each material was duplicated.

AFP [ng/mL]	Single-site study					
	Repeatability		Within-laboratory precision		Lot to lot precision	
	AVG [ng/mL]	CV (%)	AVG [ng/mL]	CV (%)	AVG [ng/mL]	CV (%)
5	5.04	5.30	5.00	5.72	5.02	5.78
15	15.10	5.15	15.17	5.20	15.06	5.79
300	303.60	5.55	303.00	5.69	301.00	5.51

- Multi-site study

Reproducibility

1 Lot of **ichroma™ CEA Neo** was tested for 5 days in 3 different sites (1 person per 1 site, 1 instrument per 1 site). Each standard material was tested 1 time per and 5 replicates per day.

Multi-site study		
AFP [ng/mL]	Reproducibility	
	AVG [ng/mL]	CV (%)
5	4.98	5.52
15	14.75	6.49
300	302.08	5.52

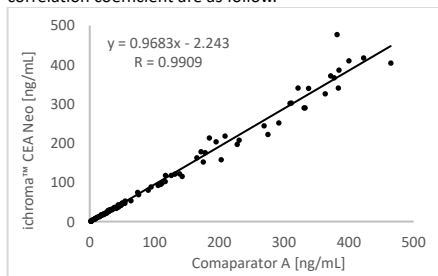
■ **Accuracy**

The accuracy was confirmed by testing with 3 different lots of **ichroma™ CEA Neo**. The tests are repeated 10 times at each concentration of the control standard.

CEA [ng/mL]	Lot 1	Lot 2	Lot 3	AVG [ng/mL]	Recovery (%)
300.00	315.73	296.08	305.84	305.88	102
225.75	230.56	223.12	225.69	226.45	100
151.50	151.73	150.11	151.10	150.98	100
77.25	73.67	79.23	78.66	77.18	100
30.00	30.21	29.69	30.85	30.25	101
8.82	8.70	8.86	9.13	8.89	101

■ **Comparability**

CEA concentrations of 100 clinical samples were quantified independently with **ichroma™ CEA Neo** (**ichroma™ II**) and **comparator A** as per prescribed test procedures. Test results were compared, and their comparability was investigated with linear regression and correlation coefficient (R). The regression equation and correlation coefficient are as follow.



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. Matsuoaka, 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:

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