



# ichroma™ hsCRP

## INTENDED USE

**ichroma™ hsCRP** is a fluorescence Immunoassay (FIA) for the quantitative determination of CRP in human whole blood/serum/plasma. It is useful as an aid in management and monitoring of risk of cardiovascular diseases.

For *in vitro* diagnostic use only.

## INTRODUCTION

The C-Reactive Protein (CRP) is synthesized by the liver in response to interleukin-6 and well known as one of the classical acute-phase reactants and as a marker of inflammation. It has recently been suggested that a marker of inflammation, along with serum cholesterol, may be critical component in the development and progression of atherosclerosis<sup>1,2</sup>. A growing body of evidence has supported the idea that cardiovascular diseases including coronary heart disease, ischemic stroke, and acute myocardial infarction, develop, at least in part, because of a chronic low-level CRP of the vascular endothelium<sup>3,4</sup>. Apparently, high-sensitivity CRP (hsCRP) is emerging as the strongest and most independent predictive risk factor for atherosclerosis and CVD<sup>5,6</sup>. American Heart Association (AHA) and the Centers for Disease Control and Prevention (CDC) issued a statement regarding use of C-reactive protein to assess risk of cardiovascular diseases.

## 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 CRP concentration in sample.

## COMPONENTS

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

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

## 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 the 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.
- 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™ hsCRP** will provide accurate and reliable results subject to the below conditions.

- Use **ichroma™ hsCRP** should be used only in conjunction with instrument for ichroma™ tests.

- Have to use recommended anticoagulant sample.

Sample type	Recommended anticoagulant
Whole blood	EDTA, heparin, Sodium citrate
Plasma	
Serum	Not applicable.

## 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(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.

## MATERIALS SUPPLIED

**REF** CFPC-6

Components of **ichroma™ hsCRP**

- Cartridge Box:
  - Cartridges 25
  - ID Chip 1
  - Instruction For Use 1
  - Sample collectors 25
- Box containing Detection Buffer Tubes
  - Detection Buffer Tubes 25

## MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **ichroma™ hsCRP**. 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 CRP Control** [REF](#) CFPO-100

## SAMPLE COLLECTION AND PROCESSING

The sample type for **ichroma™ hsCRP** is human whole blood/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. If longer storage is required, e.g. if the test could not be performed within 24 hours, serum or plasma should be immediately frozen below -20 °C. The freezing storage of sample up to 3 months does not affect the quality of results.
- In case of the whole blood sample, it should not be kept in a freezer in any case.
- Once the sample was frozen, it should be used one time only for test, because repeated freezing and thawing can result in the change test values.

## TEST SETUP

- Check the contents of **ichroma™ hsCRP**: Sealed Cartridge, Detection Buffer Tubes, Sample Collectors 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

### < Multi mode >

- 1) Make a puncture on the top of the detection buffer tube by inserting an empty sample collector.
- 2) Draw 10 µL (Human whole blood / serum / plasma / control) of sample with a sample collector.
- 3) Assemble the sample collector and the tube into one.
- 4) Shake 10 times or more until the sample out of the sample collector by inversion. The mixture of buffer and the sample has to be used within 30 seconds.
- 5) Remove the cap off the top of assembled tube. Discard two drops of reagent onto the paper towel before applying to the cartridge
- 6) Load only two drops of the mixture onto the sample well of the cartridge.
- 7) Leave the cartridge at room temperature for 3 min before inserting the device into the holder.  
▲ Scan the sample-loaded cartridge immediately when the incubation time is over. If not, it will cause inexact test result.
- 8) 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.

- 9) Press 'Select' button on the instrument for **ichroma™** tests to start the scanning process.
- 10) Instrument for **ichroma™** tests will start scanning the sample-loaded cartridge immediately.
- 11) Read the test result on the display screen of the instrument for **ichroma™** tests.

### < Single Mode >

- 1) Make a puncture on the top of the detection buffer tube by inserting an empty sample collector.
- 2) Draw 10 µL (Human whole blood/serum/plasma/control) of sample with a sample collector.
- 3) Assemble the sample collector and the tube into one.
- 4) Shake 10 times or more until the sample out of the sample collector by inversion. The mixture of buffer and the sample has to be used within 30 seconds.
- 5) Remove the cap off the top of assembled tube. Discard two drops of reagent onto the paper towel before applying to the cartridge
- 6) Load only two drops of the mixture onto the sample well of the cartridge.
- 7) Inserting the device 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 has been marked on the cartridge especially for this purpose.
- 8) Press 'Select' or 'START' button on the instrument for **ichroma™** tests.
- 9) Cartridge goes inside the Instrument for **ichroma™** tests and will automatically start scanning the sample-loaded cartridge after 3 min.
- 10) 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 CRP concentration of the test sample in terms of mg/L.
- The cut-off (reference value).
  - Low risk: <1.0 mg/L
  - Average risk: 1.0-3.0 mg/L
  - High risk: >3.0 mg/L
- Working range: 0.1-10 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™ hsCRP**. 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)	0.012 mg/L
Limit of Detection (LoD)	0.029 mg/L
Limit of Quantitative (LoQ)	0.10 mg/L
- **Analytical Specificity**
  - **Interference**  
There was no significant interference from these materials with the **ichroma™ hsCRP** test measurements.

materials	Concentration
Ascorbic acid	350 µmol/L
Bilirubin	350 µmol/L
Albumin (Protein)	60 g/L
Glucose	120 mg/dL
Triglyceride mixture	500 mg/dL
Hemoglobin	2,000 µg/ml

**- Cross reactivity**

There was no significant cross-reactivity from these materials with the **ichroma™ hsCRP** test measurements.

materials	Concentration
CEA	500 µg/ml
AFP	100 µg/ml
ALT	500 µg/ml
Troponin I	500 µg/ml
CK-MB	500 µg/ml
NT-proBNP	500 µg/ml
Serum amyloid P	500 µg/ml

**■ Precision**

- Between Lot

One person tested three different lots of **ichroma™ hsCRP**, five times at each concentration of the control standard.

- Between person

Three different persons tested **ichroma™ hsCRP**, five times at each concentration of the control standard.

- Between day

One person tested **ichroma™ hsCRP** during five days, five times at each concentration of the control standard.

- Between site

Three persons tested **ichroma™ hsCRP** at three different sites, five times at each concentration of the control standard.

Conc. [mg/L]	Between-lot		Between-person		Between-day		Between-site	
	AVG	CV(%)	AVG	CV(%)	AVG	CV(%)	AVG	CV(%)
0.5	0.48	3.53	0.49	4.71	0.48	3.84	0.49	3.80
1.5	1.48	3.53	1.47	4.26	1.49	3.42	1.49	3.78
5	5.01	5.56	4.90	8.50	5.03	4.79	5.03	3.03

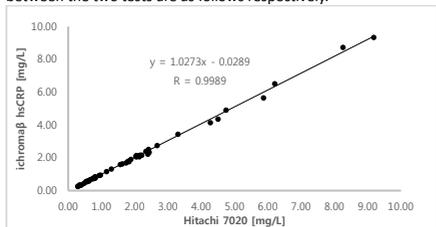
**■ Accuracy**

The accuracy was confirmed by 3 different lots testing ten times each different concentrations.

CRP [mg/L]	Lot 1	Lot 2	Lot 3	AVG	Recovery (%)
0.5	0.47	0.49	0.49	0.48	97%
1.5	1.48	1.47	1.50	1.48	99%
5	5.12	5.04	5.12	5.09	102%

**■ Comparability**

CRP serum samples were quantified independently with **ichroma™ hsCRP** and Hitachi 7020 (Hitachi Inc. Japan) 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 are as follows respectively.



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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

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