BIO TECHNOLOGY boditech

Cardiac

ichroma™ Tn-I Plus

INTENDED USE

ichroma™ Tn-I Plus is a Fluorescence Immunoassay (FIA) for the quantitative determination of cardiac troponin-I (Tn-I) in human whole blood/serum/plasma. It is useful as an aid in management and monitoring of acute myocardial infarction (AMI).

For *in vitro* diagnostic use only.

INTRODUCTION

Cardiac troponins are currently the most sensitive and specific biochemical markers of myocardial necrosis. There are three types of troponin in heart muscle fibers. Those are troponin-C, troponin-I, and troponin-T. Together they contribute to make cardiac muscle fibers contract. The clinical measurement of serum Tn-I has become an important tool in the diagnosis of acute myocardial infarction. Serum Tn-I is a more reliable than creatine kinase as a prognostic marker in people with ischemic chest pain. National and international scientific organizations have suggested the use of troponins, Tn-I and Tn-T, when implementing new diagnostic strategies in patients with acute coronary syndrome.

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-antibody on test strip.

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

COMPONENTS

ichroma™ Tn-I Plus consists of 'cartridges', 'detector tubes', 'detector diluent', capillary tubes 'ID chip' an 'Instruction for use'.

- The cartridge contains the membrane called a test strip which has streptavidin at the test line, with chicken IgY at the control line. All cartridges are individually sealed in an aluminum foil pouch containing a desiccant in a box.
- The detector tube has 2 granules containing anti Tn-I-fluorescence conjugate, anti-chicken IgY-fluorescence conjugate, anti-Tn-I-biotin conjugate, bovine serum albumin (BSA) as a stabilizer and sodium azide as a preservative in phosphate buffered saline (PBS). All detector tubes are packed in a box.
- The detector diluent contains sodium azide as a preservative in phosphate buffered saline (PBS), 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 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, 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 tube. 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 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 the 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 capillary tubes 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.
- No Biotin interference was observed in **ichroma™ Tn-I Plus** when biotin concentration in the sample was below (5.0 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™ Tn-I Plus** will provide accurate and reliable results subject to the below conditions.
  - **ichroma™ Tn-I Plus** should be used only in conjunction with instrument for ichroma™ tests.
  - Have to use recommended anticoagulant sample.

Recommended anticoagulant
Sodium heparin, Lithium heparin, Sodium citrate

STORAGE AND STABILITY

Storage condition			
Component	Storage Temperature	Shelf life	Note
Cartridge	4 - 30 °C	20 months	Disposable
Detector tube	2 - 8 °C	20 months	Disposable
Detector diluent	2 - 8 °C	20 months	Unopened
		20 months	Opened

- 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 the 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-65

Components of **ichroma™ Tn-I Plus**

- Cartridge Box:
  - Cartridge 25
  - 50 µL Capillary tube 25
  - ID chip 1
  - Instruction for Use 1
- Buffer Box
  - ✓ For ichorma™ II
  - Detector tube (Capped with plastic lid) 25
  - Detector diluent 1
  - ✓ For ichroma™ 50
  - Detector tube (Sealed with aluminum foil) 25
  - Detector diluent 1

MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **ichroma™ Tn-I Plus**.

Please contact our sales division for more information.

- Instrument for ichroma™ tests
  - **ichroma™ II** REF FPRR021
  - **ichroma™-50** REF FPRR022
  - **Boditech Tn-I Plus Control** REF CFPO-212

SAMPLE COLLECTION AND PROCESSING

The sample type for **ichroma™ Tn-I Plus** 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.
- However, the whole blood sample should not be kept in a freezer in any case.
- Once the sample was frozen, it should be thawed only once and only for test, because repeated freezing and thawing can result in the changed test values.
- Fingertip blood sample should be collected as follows:
  - Position the hand with the palm facing upwards. Blood should be normally drawn from the middle or ring finger of the non-dominant hand. Apply intermittent pressure towards its tip.
  - Wipe the fingertip clean with an alcohol pad.
  - Allow the finger to dry completely because blood will not form a drop if the puncture site is moist and because the residual alcohol at the fingertip may dilute the blood sample and affect the test result.
  - Hold the finger and puncture the fingertip by firmly pressing a new sterile lancet against it at an off-center position.
  - Wipe away the first drop of blood with a sterile gauze pad or cotton ball.
  - Massage the finger towards its tip to form a new drop of blood. Blood will flow easily if the finger is held lower than the elbow.
  - Hold the handle of a capillary tube and touch the mouth of the capillary to the drop of blood.
  - Let the blood fill the capillary tube completely.
  - It may be sometimes necessary to massage the finger again for an additional drop of blood for filling the capillary tube.

TEST SETUP

- Check the contents of **ichroma™ Tn-I Plus**: Sealed cartridges, detector tubes, detector diluent, capillary tubes, ID chip and instruction for use.
- Ensure that the lot number of the cartridge matches that of the detector tube, detector diluent as well as an ID chip.
- If the sealed cartridge, detector tube and detector diluent have been stored in 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™ test.
  (Please refer to the 'Instrument for ichroma™ tests Operation Manual' for complete information and operating instructions.)

TEST PROCEDURE

■ **ichroma™ II**

<Multi mode>

1) Transfer 150 µL of detector diluent using a pipette to a detector tube containing granules. When the granule form is completely dissolved in the tube, it becomes detection buffer. The detection buffer must be used immediately within 30seconds.
2) Transfer sample 50 µL (Human whole blood/ serum/ plasma/ control) using a pipette to a detector tube.
   If the test is to perform on whole blood, transfer the fingertip blood (collected in a capillary tube) 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 within 30 seconds.
4) Pipette out 75 µL of a sample mixture and load it into the sample well on the cartridge.
5) Leave the sample-loaded cartridge at room temperature for 12 minutes before inserting the device into the holder.
   ⚠*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.
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 mode>

1) Transfer 150 µL of detector diluent using a pipette to a detector tube containing granules. When the granule form is completely dissolved in the tube, it becomes detection buffer. The detection buffer must be used immediately within 30seconds.
2) Transfer sample 50 µL (Human whole blood/ serum/ plasma/ control) using a pipette to a detector tube.
   If the test is to perform on whole blood, transfer the fingertip blood (collected in a capillary tube) 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 within 30seconds.
4) Pipette out 75 µL of a sample mixture and load it into the sample well on the cartridge.
5) 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.
6) Tap the 'START' button on the instrument for ichroma™ tests.
7) Cartridge goes inside the Instrument for ichroma™ tests and will automatically start scanning the sample-loaded cartridge after 12 min.
8) Read the test result on the display screen of the instrument for ichroma™ tests.
   (Please refer to the ichroma™ II operation manual for complete information and operation instructions.)

■ **ichroma™ 50**

1) Insert the tip array in the tip station.
2) Insert the detector array in the reagent station and cover the reagent station.
3) Open the diluent and insert the diluent in the diluent station.
4) Open the cover of the magazine station and pull and lift the cartridge magazine.
5) Insert the cartridges in the cartridge magazine one by one.
6) Insert the cartridge loaded cartridge magazine into the magazine station and close the cover of the magazine station.
7) Insert the sample tube into the blood collection tube rack and load the blood collection tube rack into the sampling station (loading part).
8) Tap the button which is provided in the upper side of the No. of test cartridge region to select ID chip what you want to use.
9) When the selected cartridge slot is activated, set the number of test cartridge by tapping.
10) Tap the button which is provided in the upper side of the No. of reagent region to select ID chip what you want to use.
11) When the selected slot is activated, set the number of detector by tapping.
12) Set the number of pipette tips by tapping.
13) Tap the 'START' button on the left upper of the main screen to start test.
    (Please refer to the ichroma™-50 operation manual for complete information and operation instructions.)

INTERPRETATION OF TEST RESULT

- The instrument for ichroma™ tests calculates the test result automatically and displays Tn-I concentration of the test sample in terms of ng/mL.
- Working range: 0.01-15.00 ng/mL.
- **Expected Values**
  - In studies performed with the **ichroma™ Tn-I Plus** assay involving 100 healthy volunteers in Korea, the upper reference limit (99th percentile) for Tn-I was 0.03 ng/mL. The lowest concentration with a CV less than or equal to 10 % with the **ichroma™ Tn-I Plus** assay was 0.03 ng/mL.
  - Due to the release kinetics of Tn-I, a result below the decision limit within the first hours of the onset of symptoms does not rule out myocardial infarction with certainty. If myocardial infarction is still suspected, repeat the test at appropriate intervals.
  - A cut-off of 0.3 ng/mL Tn-I is recommended for diagnosis of AMI, as this yields optimal performance of 91 % of sensitivity and 92.1 % of specificity. However, laboratories should establish their own diagnostic cut-off concentration based on the clinical practice at their perspective institutions.

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™ Tn-I Plus**. 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)	0.004 ng/mL
Limit of Detection (LOD)	0.01 ng/mL
Limit of Quantitation (LOQ)	0.03 ng/mL

- **Analytical specificity**
  - **Cross-reactivity**
    Biomolecules such as below the ones in the table were added to the test sample(s) at concentrations much higher than their normal physiological levels in the blood. **ichroma™ Tn-I Plus** test results did not show any significant cross-reactivity with these biomolecules.

Cross-reactivity material	Conc. [ng/mL]
CK-MB	60
NT-proBNP	1,000
Myoglobin	1,000
D-Dimer	1,000

  - **Interference**
    Interference materials such as below the ones in the table were added to the test sample(s) the same as the below concentrations. **ichroma™ Tn-I Plus** test results did not show any significant interference with these materials.

Interference material	Concentration
Bilirubin	350 µmol/L
Cholesterol	13 mmol/L
D-Glucose	1,000 mg/dL
Hemoglobin	2 g/L
L-Ascorbic acid	350 µmol/L
Triglyceride mixture	500 mg/dL
Heparin	3,000 U/L
Sodium citrate	2 mg/mL
EDTA	3.4 µmol/L
Biotin	5 ng/mL

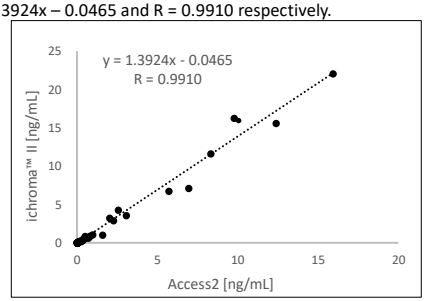
- **Precision**
  - **Between Lot**
    One person tested three different lots of **ichroma™ Tn-I Plus,** ten times at each concentration of the standard material.
  - **Between person**
    Three different persons tested **ichroma™ Tn-I Plus,** ten times at each concentration of the standard material.
  - **Between day**
    One person tested **ichroma™ Tn-I Plus** for five days, ten times at each concentration of the standard material.
  - **Between site**
    One person tested **ichroma™ Tn-I Plus** at three different sites, ten times at each concentration of the standard material.

Conc.	Between-lot		Between-person	
[ng/mL]	AVG	CV (%)	AVG	CV (%)
0.23	0.23	6.7	0.23	6.1
0.94	0.93	5.8	0.94	6.1
7.5	7.57	6	7.48	5.7
Conc.	Between-day		Between-site	
[ng/mL]	AVG	CV (%)	AVG	CV (%)
0.23	0.23	6.4	0.23	5.3
0.94	0.94	5.1	0.94	5.3
7.5	7.53	5.9	7.41	6.5

- **Accuracy**
  The accuracy was confirmed by 3 different lots testing ten times each different concentration.

Tn I [ng/mL]	Lot 1	Lot 2	Lot 3
0.23	0.23	0.23	0.23
0.94	0.95	0.93	0.93
7.5	7.43	7.77	7.45
Tn I [ng/mL]	AVG	CV (%)	Recovery (%)
0.23	0.23	6.1	99
0.94	0.94	6.5	99.8
7.5	7.55	6	100.6

- **Comparability**
  Tn-I concentrations of 100 clinical samples were quantified independently with **ichroma™ Tn-I Plus** and Access2 (Beckman Coulter Inc. USA) 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= 1.3924x – 0.0465 and R = 0.9910 respectively.



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

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

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