Cardiac Troponin I

Product-#: D-TRO-W23-002

Rapid test for the detection of Cardiac Troponin I (cTnI) in human whole blood, serum or plasma specimens

INTENDED USE

The DIMA® cTnI Test is an immunochromatographic rapid test for the qualitative presumptive detection of cardiac Troponin I in human whole blood, serum or plasma specimens. This kit is intended for use as an aid in the diagnosis of a myocardial infarction (MI). The test is designed for professional in vitro diagnostic use.

A positive result indicates a high risk for myocardial infarction (MI). A negative result, however, does not exclude a MI and further follow-up testing is required including quantitative cardiac troponin testing.

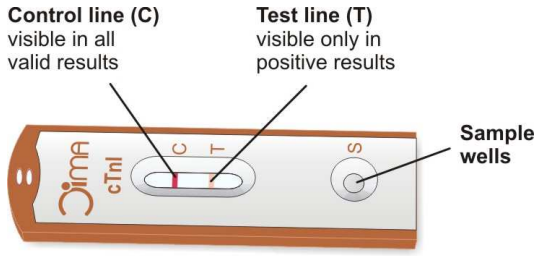
SUMMARY

Cardiac Troponin I (cTnI) is a protein found in cardiac muscle with a molecular weight of 22.5 kDa. Troponin I is part of a three subunit complex comprising of Troponin T and Troponin C. Along with tropomyosin, this structural complex forms the main component that regulates the calcium sensitive ATPase activity of actomyosin in striated skeletal and cardiac muscle. After cardiac injury occurs, Troponin I is released into the blood 4-6 hours after the onset of pain. The release pattern of cTnI is similar to CK-MB, but while CK-MB levels return to normal after 72 hours, Troponin I remains elevated for 6-10 days, thus providing for a longer window of detection for cardiac injury. The high specificity of cTnI measurements for the identification of myocardial damage has been demonstrated in conditions such as the perioperative period, after marathon runs, and blunt chest trauma. cTnI release has also been documented in cardiac conditions other than acute myocardial infarction (AMI) such as unstable angina, congestive heart failure, and ischemic damage due to coronary artery bypass surgery. Because of its high specificity and sensitivity in the myocardial tissue, Troponin I has recently become the most preferred biomarker for myocardial infarction.

PRINCIPLE

The DIMA® cTnI Test selectively detects cardiac Troponin I by a visual reading of a colour formation in the reactive area.

cTnI is detected with the aid of specific antibodies against the protein. After the addition of the sample, a colour-labelled antibody specifically binds to cTnI if it is present in the sample. When the cTnI-antibody-complexes migrate upward on the membrane by capillary action, they are captured with the aid of another specific antibody at the test result line area (T) of the test. A red test result line is generated. If no cTnI is present the colour labelled antibody cannot bind in the T-line area. No red test result line is formed. Therefore, the presence of a coloured test result line indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a coloured line will always appear in the control line region (C) indicating that proper volume of specimen has been added and membrane wicking has occurred.



REAGENTS

The test devices include anti-Troponin I antibody coated pointer particles and anti-Troponin I antibodies coated on the membrane.

PRECAUTIONS

- For professional in vitro diagnostic use only
- For single use only
- Do not freeze any components of the test kit
- Do not use components after stated expiration date (see pouch and box label)
- Do not use test if pouch is damaged
- Do not eat, drink or smoke in the area where the specimens or kits are handled
- Handle all specimens as if they contained infectious agents
- Observe established precautions for microbiological risks throughout all procedures and standard guidelines for appropriate disposal of specimens
- Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are being tested
- Used testing materials should be discarded according to local regulations
- Humidity and high temperature can adversely affect results
- Bring all reagents to room temperature (15-30°C) before use
- Do not spill the specimens into the reaction area
- Do not touch the reaction area of the device to avoid contamination
- The test device should remain in the sealed pouch until use
- Interpret results after 10 minutes but not later than 20 minutes
- Store and transport the test device always at 2-30°C
- Avoid cross-contamination of specimens by using a new specimen pipette for each specimen
- Do not interchange or mix reagents from different lots.
- The potentially infectious materials (e. g. antibodies) or other components of the test (chemicals) do not constitute any danger if test device is used according to instructions

STORAGE AND STABILITY

The kit should be stored at 2-30°C. The test is stable through the expiry date printed on the sealed pouch. The test must remain in the sealed pouch until use. Do not freeze!

Care should be taken to protect the components of the kit from contamination. Do not use if there is evidence of microbial contamination or precipitation. Biological contamination of dispensing equipment, containers or reagents can lead to false results.

MATERIALS

Materials Provided

- Test devices, single pouched
- Disposable dropper (within pouch)
- Dropper vial with buffer
- Package insert

Materials Required But Not Provided

- Specimen collection containers; citrate containers may be used
- Centrifuge – for preparation of serum / plasma specimens
- Lancets – for fingerstick whole blood
- Timer

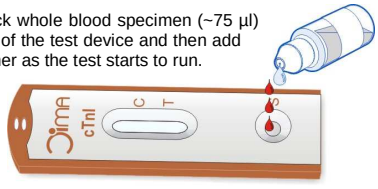
SPECIMEN COLLECTION AND STORAGE

- The DIMA® cTnI Test Cassette is intended for use with human whole blood, serum, or plasma specimens only.
- Serum or plasma should be separated as soon as possible to avoid haemolysis. Only clear, non-haemolysed specimens are recommended for use with this test.
- Perform testing immediately after specimen collection. Do not leave specimens at room temperature for prolonged periods. Serum and plasma specimens may be stored at 2-8°C for up to 3 days. For long term storage, specimens should be kept below -20°C. Whole blood collected by venipuncture should be stored at 2-8°C if the test is to be run within 2 days of collection. Do not freeze whole blood specimens. Whole blood collected by fingerstick should be tested immediately.
- Suitable anticoagulants for venous whole blood samples or the preparation of plasma samples is citrate. Citrate whole blood may be used as well directly during test procedure. EDTA is known to decompose troponin complexes and heparin may lead to fibrin clots interfering with the test performance, do not use EDTA or heparin as anticoagulant.
- Bring specimens to room temperature prior to testing. Frozen specimens must be completely thawed and mixed well prior to testing. Avoid repeated freezing and thawing of specimens.
- Icteric, lipemic, haemolysed, heat treated and contaminated specimens may cause erroneous results.
- There is a slight possibility that some whole blood specimens with very high viscosity or which have been stored for more than 2 days may not run properly on the test device. Repeat the test with a serum or plasma specimen from the same patient using a new test device.
- If specimens are to be shipped, pack them in compliance with all applicable regulations for transportation of etiological agents.

DIRECTIONS FOR USE

Bring tests, specimens, buffer and/or external controls to room temperature (15-30°C) before testing.

1. Remove the test from its sealed pouch, and use it as soon as possible. Remove the test from its sealed pouch, and use it as soon as possible, within in 1 hour at the latest. For best results, the assay should be performed immediately after opening the sealed pouch. Label the device with patient or control identification and place it on a clean, level surface.
2. Holding the dropper vertically, dispense 3 drops (~75 µl) of serum or plasma into the round sample well (S). Start the timer as the test starts to run.
   OR
   Holding the dropper vertically, dispense 3 drops (~75 µl) of whole blood (or citrate whole blood) into the round sample well (S) of the test device and then add 1 drop of buffer (~40 µl). Start the timer as the test starts to run.
   OR
   Allow 2-3 hanging drops of fingerstick whole blood specimen (~75 µl) to fall into the round sample well (S) of the test device and then add 1 drop of buffer (~40 µl). Start the timer as the test starts to run.
   Avoid trapping air bubbles in the specimen well (S) and do not add any liquid to the reaction area.
   As the test begins to work you can see a reddish liquid front moving across the white membrane.



3. Wait for the colour line(s) to appear. Interpret results after 10 minutes. Negative results should be confirmed after 20 minutes. Do not interpret any result after more than 20 minutes.

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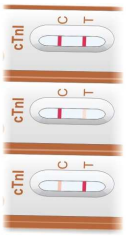
INTERPRETATION OF RESULTS



POSITIVE: 2 lines appear. One line appears in the control line area (C) and one line in the test line area (T). A positive result indicates that Troponin I has been detected.

NOTE: The intensity of colour in the test area (T) may vary depending on the concentration of Troponin I present in the specimen. Therefore, any shade of colour in the test area (T) should be considered positive. Please note that this is a qualitative test only, and cannot determine the concentration of analytes in the specimen.

NEGATIVE: One line appears in the control line area (C). No line appears in the test line area (T). A negative result indicates that no Troponin I is present in the specimen or that it is below the detection level of the test device.

INVALID: Control line fails to appear. Results from any test which has not produced a control line at the specified reading time must be discarded.
Insufficient specimen volume, expired test components or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

QUALITY CONTROL

Internal Quality Control

An internal procedural control is included in the test. A red line appearing in the control area (C) is an internal positive procedural control. It confirms that sufficient specimen volume was used, and indicates an adequate membrane wicking and a proper procedural technique.

External Quality Control

External controls are not supplied with this kit. It is recommended to perform positive and negative controls for each kit as good laboratory practice and as deemed necessary by internal laboratory procedures to confirm the test procedure and to verify proper test performance.

LIMITATIONS

1. The DIMA® cTnI Test is for professional in vitro diagnostic use, and should only be used for the qualitative detection of cardiac Troponin I. This test does not allow for quantitative results, neither can the concentration be determined by this test.
2. The DIMA® cTnI Test will only indicate the presence of Troponin I in the specimen and should not be used as the sole criteria for the diagnosis of myocardial infarction.
3. If the test result is negative and clinical symptoms persist, additional testing using other clinical methods is recommended. The minimum detection limit of the assay is 1.0 ng/mL of cTnI in specimens. Thus, a negative result does not at any time rule out the existence of Troponin I in blood, because the protein concentration may be below the minimum detection level of the test. Please keep in mind that the rise of Troponin I takes place several hours after the onset of pain. If the testing takes place too early, cTnI concentrations might still be too low to be detected by the assay. *A negative test result does not exclude the possibility of a myocardial infarction at any time.*
4. As with all diagnostic tests, a confirmed diagnosis should only be made by a physician after all clinical and laboratory findings have been evaluated.
5. Some specimens containing unusually high titres of heterophile antibodies or rheumatoid factor (RF) may affect expected results. Even if the test results are positive, further clinical evaluation should be considered with other clinical information available to the physician.
6. In rare cases it is possible that the antigen-antibody reaction of the test is inhibited by the presence of auto-antibodies in the patient's blood, which block the binding sites. False negative test results might be the consequence. Please note that this is a general problem with all detection methods based on an antigen-antibody reaction for the detection of proteins.
7. There is a slight possibility that some whole blood specimens with very high viscosity or which have been stored for more than 2 days may not run properly on the test cassette. Repeat the test with a serum or plasma specimen from the same patient using a new test cassette.

PERFORMANCE CHARACTERISTICS

Diagnostic Sensitivity and Specificity

The DIMA® cTnI Test has been evaluated with a leading commercial cTnI EIA test at a cut-off of 1.0 ng/mL using clinical specimens. The results show that the sensitivity of the DIMA® cTnI Test is 98.8% and the specificity is 98.9% relative to the leading EIA test. cTnI concentrations below 1.0 ng/ml are usually not detected with the DIMA cTnI test. That means that in comparison with more sensitive cTnI testing methods a lower diagnostic sensitivity is expected. Therefore a negative test result should not be used to exclude an MI as in some conditions cTnI concentrations might be below 1.0 ng/ml.

Method		EIA		Total Result
DIMA® cTnI Test	Results	Positive	Negative	
	Positive	158	7	165
	Negative	2	603	605
Total Result		160	610	770

Relative sensitivity: 98.8% (95%CI*: 95.6%~99.8%)
Relative specificity: 98.9% (95%CI*: 97.7%~99.5%)
Accuracy: 98.8% (95%CI*: 97.8%~99.5%) *Confidence Intervals

Analytical sensitivity

The minimum detection limit of the assay is 1.0 ng cTnI/ml. For the regular control of the minimum detection limits, standard materials of Hytest are used: (free cTnI).
Due to the heterogeneity of commercially available standard materials the concentrations achieved with different methods of measurement can differ in part highly from each other.

Precision

Intra-Assay

Within-run precision has been determined by using 15 replicates of five specimens: a negative, cTnI 1.0ng/mL positive, cTnI 5.0ng/mL positive, cTnI 10 ng/mL positive and cTnI 40 ng/mL positive. The negative, cTnI 1.0ng/mL positive, cTnI 5.0ng/mL positive, cTnI 10ng/mL positive and cTnI 40ng/mL positive values were correctly identified >99% of the time.

Inter-Assay

Between-run precision has been determined by 15 independent assays on the same five specimens: a negative, cTnI 1.0ng/mL positive, cTnI 5.0ng/mL positive, cTnI 10ng/mL positive and cTnI 40ng/mL positive specimens. Three different lots of the DIMA® cTnI Test have been tested over a 3-day period using negative, cTnI 1.0ng/mL positive, cTnI 5.0ng/mL positive, cTnI 10ng/mL positive and cTnI 40ng/mL positive specimens. The specimens were correctly identified >99% of the time.

Cross-reactivity

The DIMA® cTnI Test has been tested by 10,000 ng/mL Skeletal Troponin I, 2,000 ng/mL Troponin T, 20,000 ng/mL Cardiac Myosin, HBsAg, HBsAb, HBeAg, HBeAb, HBcAb, syphilis, anti-HIV, anti-H.pylori, MONO, anti-CMV, anti-Rubella and anti-Toxoplasmosis positive specimens. The results showed no cross-reactivity.

Interfering Substances

The following potentially interfering substances were added to cTnI negative and positive specimens.

Acetaminophen:	20 mg/dL	Caffeine:	20 mg/dL
Acetylsalicylic Acid:	20 mg/dL	Gentisic Acid:	20 mg/dL
Ascorbic Acid:	20mg/dL	Albumin:	10,500mg/dL
Creatin:	200 mg/dL	Hemoglobin:	1,000 mg/dL
Bilirubin:	1,000mg/dL	Oxalic Acid:	600mg/dL
Cholesterol:	800mg/dL	Triglycerides:	1,600mg/dL

None of the substances at the concentration tested interfered in the assay.

LITERATURE

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SYMBOLS

IVD	In vitro diagnostic medical device		Do not reuse
Σ	Sufficient for n testings		Use by
LOT	Batch code		Temperature limitations
	Manufacturer		Consult instructions for use

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