



Human cTnI Immunoassay

Catalog Number: EA800107

For the quantitative determination of human cTnI concentrations in cell culture supernates, serum, and plasma.

For research use only. Not for use in diagnostic procedures.

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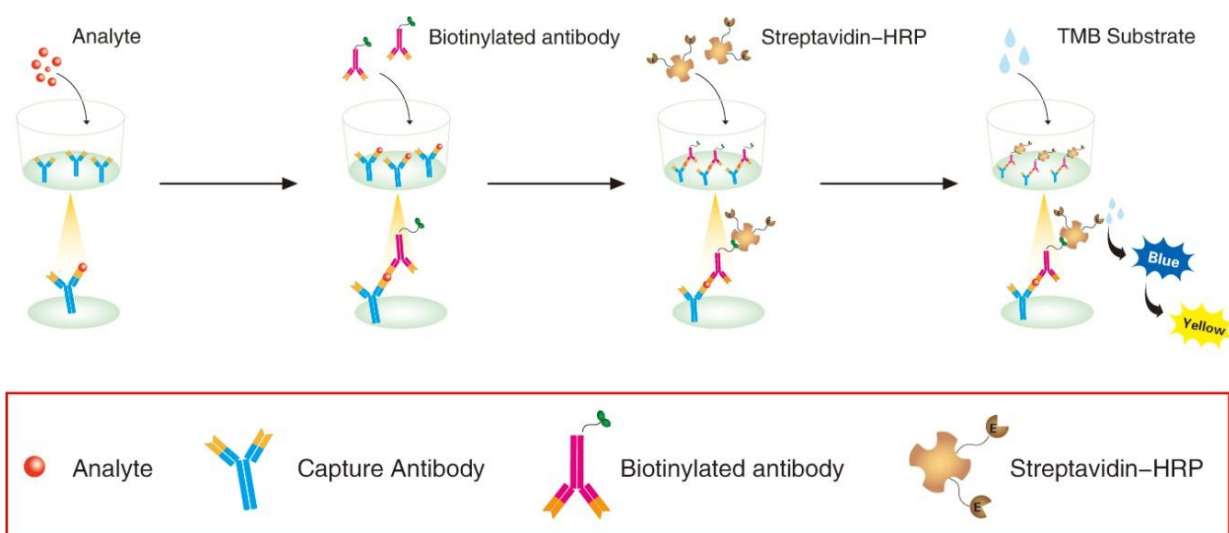
BACKGROUND

Troponin is a complex of three regulatory proteins (troponin C, troponin I, and troponin T) that is integral to muscle contraction in skeletal muscle and cardiac muscle, but not smooth muscle. Cardiac Troponin I (cTnI) is a protein that in felines is encoded by the *TNNI3* gene. It is a tissue-specific subtype of troponin I. It has been shown to interact with PKD2L1, Troponin C type 1 and Polycystic kidney disease 2. An increased level of cTnI in the blood has been shown to be a biomarker of heart disorders, the most important of which is myocardial infarction (MI). Raised troponin levels indicate cardiac muscle cell death as the enzyme is released into the blood upon injury to the heart. It is measured in the blood to differentiate between unstable angina and MI (heart attack) in people with chest pain or acute coronary syndrome. A person who had had a MI would have an area of damaged heart muscle and so would have elevated cardiac troponin levels in the blood. This can also occur in people with coronary vasospasm, a type of MI involving severe constriction of the cardiac blood vessels. After a MI cTnI may remain high for up to 2 weeks. It is important to note that cTnI is a marker of all heart muscle damage, not just myocardial infarction, which is the most severe form of heart disorder. However, diagnostic criteria for raised troponin indicating MI is currently set by the WHO at a threshold of 2 ug or higher. CTnI is also increased in patients with heart failure, where it also predict mortality and ventricular rhythm abnormalities. They can rise in inflammatory conditions such as myocarditis and pericarditis with heart muscle involvement (myopericarditis). cTnI can also indicate several forms of cardiomyopathy. In a community-based cohort study indicating the importance of silent cardiac damage, troponin I has been shown to predict mortality and first coronary heart disease event in men free from cardiovascular disease at baseline.

PRINCIPLE OF THE ASSAY

This assay employs the quantitative sandwich enzyme immunoassay technique. A monoclonal antibody specific for cTnI has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any cTnI present is captured by the coated antibody after incubation. Following extensive washing, a biotin-conjugate antibody specific for cTnI is added to detect the captured cTnI protein in sample. For signal development, horseradish peroxidase (HRP)-conjugated Streptavidin is added, followed by tetramethyl-benzidine (TMB) reagent. Following a wash to remove any unbound combination, and enzyme conjugate is added to the wells. Solution containing sulfuric acid is used to stop color development and the color intensity which is proportional to the quantity of bound protein is measurable at 450nm.

Schematic diagram:



TECHNICAL HINTS AND LIMITATIONS

1. This ELISA should not be used beyond the expiration data on the kit label.
2. To avoid cross-contamination, use a fresh reagent reservoir and pipette tips for each step.
3. To ensure accurate results, some details, such as technique, plasticware and water sources should be emphasized.
4. A thorough and consistent wash technique is essential for proper assay performance.
5. A standard curve should be generated for each set of samples assayed.
6. It is recommended that all standards and samples be assayed in duplicate.
7. Avoid microbial contamination of reagents and buffers. Buffers containing protein should be made under aseptic conditions and be prepared fresh daily.
8. In order to ensure the accuracy of the results, the standard curve should be made every time.

PRECAUTIONS

The Stop Solution suggested for use with this kit is an acid solution. Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling.

KIT COMPONENTS& STORAGE CONDITIONS

PART	SIZE	STORAGE OF OPENED/ RECONSTITUTED MATERIAL
Microwell Plate - antibody coated 96-well Microplate (8 wells ×12 strips)	1 plate	Return unused wells to the foil pouch containing the desiccant pack. Reseal along entire edge of the zip-seal. May be stored for up to 1 month at 2 – 8°C**
Standard -lyophilized,12000 pg/ml upon reconstitution	2 vials	Aliquot and Store at -20°C** for six months
Concentrated Biotin-Conjugated antibody (100X) - 120 ul/vial	1 vial	Store at 2-8°C **for six months
Concentrated Streptavidin-HRP solution (100X) - 120 ul/vial	1 vial	Store at 2-8°C** for six months
Standard /Sample Diluent - 16 ml/vial	1 bottle	Store at 2-8°C** for six months
Biotin-Conjugate antibody Diluent - 16 ml/vial	1 bottle	Store at 2-8°C** for six months
Streptavidin-HRP Diluent - 16 ml/vial	1 bottle	Store at 2-8°C** for six months
Wash Buffer Concentrate (20x) - 30 ml/vial	1 bottle	Store at 2-8°C** for six months
Substrate Solution - 12 ml/vial	1 bottle	Store at 2-8°C** for six months
Stop Solution - 12 ml/vial	1 bottle	Store at 2-8°C** for six months
Plate Cover Seals	4 pieces	

**Provided this is within the expiration date of the kit.

OTHER SUPPLIES REQUIRED BUT NOT SUPPLIED



1. Microplate reader capable of measuring absorbance at 450 nm.
2. Pipettes and pipette tips.
3. Deionized or distilled water.
4. Squirrt bottle, manifold dispenser, or automated microplate washer.
5. 500 mL graduated cylinder.

SPECIMEN COLLECTION & STORAGE

Cell Culture Supernates - Centrifuge cell culture media at 1000×g to remove debris. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

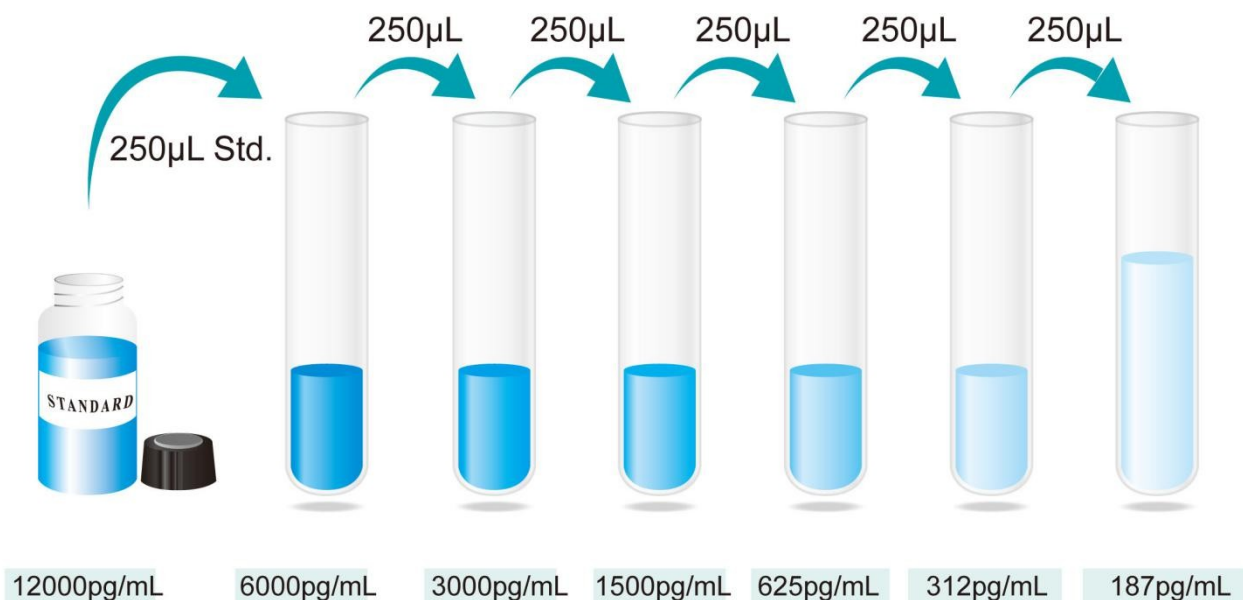
Serum - Use a serum separator tube (SST) and allow samples to clot for 2 hours at room temperature or overnight at 2-8°C. Centrifuge approximately for 15 minutes at 1000×g. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Plasma - Collect plasma using EDTA, heparin, or citrate as an anticoagulant. Centrifuge for 15 minutes at 1000×g within 30 minutes of collection. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Note: The normal human serum or plasma samples are suggested to make a 1:2 dilution.

REAGENTS PREPARATION

1. **Temperature returning** - Bring all kit components and specimen to room temperature (20-25°C) before use.
2. **Wash Buffer** - Dilute 30mL of Wash Buffer Concentrate with 570mL of deionized or distilled water to prepare 600mL of Wash Buffer. If crystals have formed in the concentrate Wash Buffer, warm to room temperature and mix gently until the crystals have completely dissolved.
3. **Standard/Sample** - Reconstitute the Standard with 0.5mL of Standard/Sample Diluent. This reconstitution produces a stock solution of 12000pg/mL. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions. Pipette 250 μ L of Standard/Sample Diluent into 6000pg/ml tube and the remaining tubes. Use the stock solution of 12000pg/mL to produce a 2-fold dilution series (below). Mix each tube thoroughly and change pipette tips between each transfer. The 12000 pg/mL standard serves as the high standard. The Standard/Sample Diluent serves as the zero standard (0 pg/mL).



Preparation of cTnI standard dilutions

***If you do not run out of re-melting standard, store it at -20°C. Diluted standard shall not be reused.**

- 4. Working solution of Biotin-Conjugate anti-human cTnI antibody:** Make a 1:100 dilution of the concentrated Biotin-Conjugate solution with the Biotin-Conjugate antibody Diluent in a clean plastic tube.

***The working solution should be used within one day after dilution.**

- 5. Working solution of Streptavidin-HRP:** Make a 1:100 dilution of the concentrated Streptavidin-HRP solution with the Streptavidin-HRP Diluent in a clean plastic tube.

***The working solution should be used within one day after dilution.**

ASSAY PROCEDURE

Prepare all reagents and standards as directed. Wash the plate 3 times before assay.



Add 100µl standard or samples to each well, shaking with Micro-oscillator (100r/min) to incubate 60 minutes at room temperature (25±2°C). Aspirate and wash 4 times



Aspirate and wash 4 times

Add 100µl working solution of Biotin-Conjugate anti-human cTnI antibody to each well, shaking with Micro-oscillator (100r/min) to incubate 60 minutes at room temperature (25±2°C).



Aspirate and wash 4 times

Add 100µl working solution of Streptavidin-HRP to each well, shaking with Micro-oscillator (100r/min) to incubate 20 minutes at room temperature (25±2°C).

Aspirate and wash 5 times



Aspirate and wash 5 times

Add 100µl Substrate solution to each well, incubate 5-20 minutes (depending on signal) at room temperature (25±2°C). Protect from light.



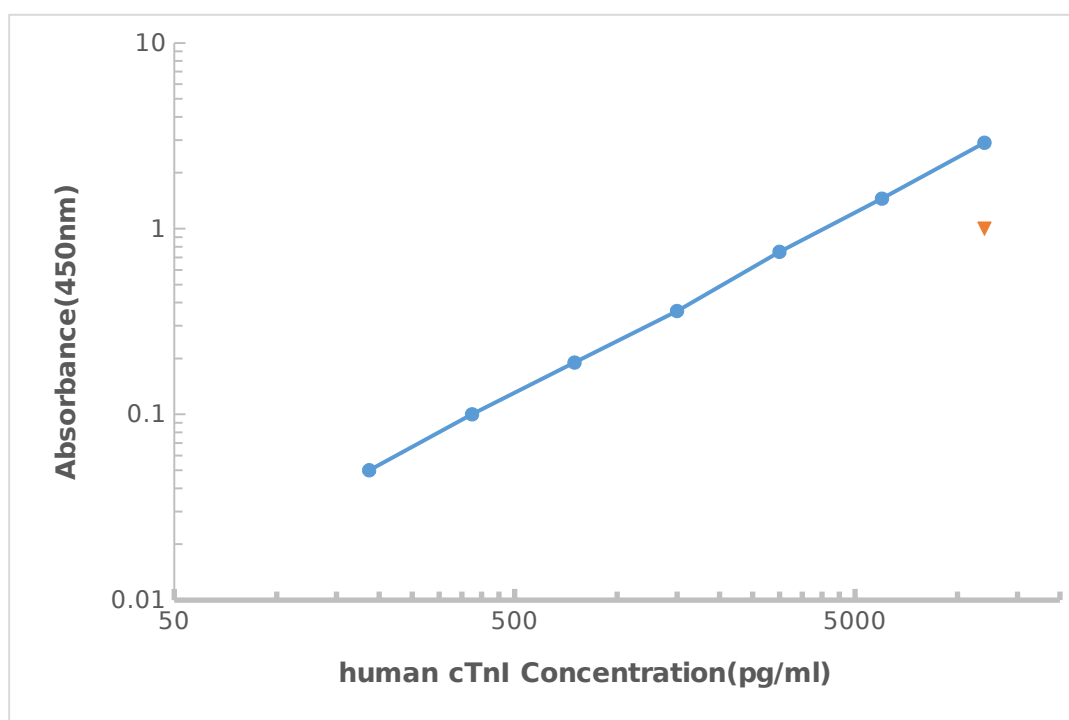
Add 50µl Stop solution to each well. Read at 450nm within 30 minutes.

CALCULATION OF RESULTS

1. The standard curve is used to determine the amount of specimens.
2. First, average the duplicate readings for each standard, control, and sample. All O.D. values are subtracted by the mean value of blank control before result interpretation.
3. Construct a standard curve by reducing the data using computer software capable of generating a four parameter logistic (4-PL) curve-fit. As an alternative, construct a standard curve by plotting the mean absorbance for each standard on the y-axis against the concentration on the x-axis and draw a best fit curve through the points on the graph.
4. The data may be linearized by plotting the log of the cTnI concentrations versus the log of the O.D. and the best fit line can be determined by regression analysis. This procedure will produce an adequate but less precise fit of the data. If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.
5. This standard curve is provided for demonstration only. A standard curve should be generated for each set of samples assayed.

Typical data using the cTnI ELISA

Standard(pg/ml)	OD.	OD.	Average	Corrected
0	0.082	0.09	0.086	---
187.5	0.178	0.167	0.172	0.086
375	0.221	0.225	0.223	0.137
750	0.336	0.352	0.344	0.258
1500	0.525	0.546	0.535	0.449
3000	0.954	0.934	0.944	0.858
6000	1.362	1.339	1.350	1.264
12000	2.159	2.182	2.170	2.084



Representative standard curve for cTnI ELISA.

Performance Characteristics

SENSITIVITY: The minimum detectable dose was 35pg/mL.

SPECIFICITY: This assay recognizes both natural and recombinant human cTnI. The factors listed below were prepared at 100ng/ml in Standard /sample Diluent and assayed for cross-reactivity and no significant cross-reactivity or interference was observed.

Factors assayed for cross-reactivity

Recombinant human	Recombinant mouse	Recombinant porcine
BMP1		
BMP2		
IL-2		
IL-4		
IFN γ		
TGF β 1		
TGF β 2		
TGF β 3		
TN F- α		

REPEATABILITY: The coefficient of variation of both intra-assay and inter-assay were less than 10%.

RECOVERY: The recovery of cTnI spiked to three different levels in four samples throughout the range of the assay in various matrices was evaluated.

Recovery of cTnI in two matrices

Sample Type	Average % of Expected Range (%)	Range (%)
Citrate plasma	85	78-96
Cell culture supernatants	90	82-98

LINEARITY: To assess the linearity of the assay, three samples were spiked with high concentrations of cTnI in various matrices and diluted with the appropriate Sample Diluent to produce samples with values within the dynamic range of the assay. (The plasma samples were initially diluted 1:1)

Dilution ratio	Recovery (%)	Citrate plasma	Cell culture supernatants
1:2	Average% of Expected	92	95
	Range (%)	83-91	88-105
1:4	Average% of Expected	91	93
	Range (%)	82-100	84-102
1:8	Average% of Expected	90	94
	Range (%)	82-99	83-105
1:16	Average% of Expected	93	96
	Range (%)	85-102	88-105



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