

Luminex[®] Performance Assay

Human Cardiac Premixed Kit B

Catalog Number FCST12

For the simultaneous quantitative determination of multiple human cardiac biomarker concentrations in serum, plasma, and platelet-poor plasma.

This package insert must be read in its entirety before using this product.
For research use only. Not for use in diagnostic procedures.

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INTRODUCTION

Cardiovascular disease is the leading cause of death worldwide, and multiple factors may contribute to its initiation and progression (1-3). Consequently, substantial effort is focused on identifying changes at the molecular level that are indicative of a developing coronary problem. Altered levels of specific cardiac biomarkers present in serum or plasma samples may suggest the presence of an underlying disease state (4). Many of these proteins are indicators of inflammation or stress, inhibitors of extracellular matrix remodeling, or factors that affect cholesterol homeostasis, three processes that may be involved in the pathogenesis of cardiovascular disease.

Assessing the levels of multiple cardiac biomarkers may be more revealing than analyzing a single protein. However, quantifying multiple proteins on an individual level can be time-consuming and expensive. This kit can be used to simultaneously assess the levels of multiple cardiac biomarkers in a single sample. For ease of use, the microparticles and the biotinylated detection antibodies are premixed in respective vials.

Analyte	Microparticle Region	Performance Data Online (www.RnDSystems.com/pdf/...)
C-Reactive Protein/CRP	04	LUCB1707.pdf
Cystatin C	08	LUCB1196.pdf
Myeloperoxidase/MPO	12	LUCB3174.pdf
P-Selectin/CD62P	21	LUCB137.pdf
Serpin E1/PAI-1	26	LUCB1786.pdf
TIMP-1	37	LUCB970.pdf

PRINCIPLE OF THE ASSAY

Luminex Performance Assay multiplex kits are designed for use with the Luminex® 100™, Luminex 200™, or Bio-Rad® Bio-Plex® dual laser, flow-based sorting and detection analyzers.

Analyte-specific antibodies are pre-coated onto color-coded microparticles. Microparticles, standards and samples are pipetted into wells and the immobilized antibodies bind the analytes of interest. After washing away any unbound substances, a biotinylated antibody cocktail specific to the analytes of interest is added to each well. Following a wash to remove any unbound biotinylated antibody, streptavidin-phycoerythrin conjugate (Streptavidin-PE), which binds to the biotinylated detection antibodies, is added to each well. A final wash removes unbound Streptavidin-PE. The microparticles are resuspended in buffer and read using the Luminex or Bio-Plex analyzer. One laser is microparticle-specific and determines which analyte is being detected. The other laser determines the magnitude of the phycoerythrin-derived signal, which is in direct proportion to the amount of analyte bound.

LIMITATIONS OF THE PROCEDURE

- FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.
- The kit should not be used beyond the expiration date on the kit label.
- Do not mix or substitute reagents with those from other lots or sources.
- If samples generate values higher than the highest standard, further dilute the samples with Calibrator Diluent and repeat the assay.
- Any variation in standard diluent, operator, pipetting technique, washing technique, incubation time or temperature, and kit age can cause variation in binding.
- Variations in sample collection, processing, and storage may cause sample value differences.
- This assay is designed to eliminate interference by other factors present in biological samples. However, until these factors have been tested in the Luminex Performance Assay, the possibility of interference cannot be excluded.
- Luminex Performance Assays afford the user the benefit of multianalyte analysis of biomarkers in a single complex sample. A single multipurpose diluent is used to optimize recovery, linearity, and reproducibility. Such a multipurpose diluent may not optimize any single analyte to the same degree that a unique diluent selected for analysis of that analyte can optimize conditions. Therefore, some performance characteristics may be more variable than those for assays designed specifically for single analyte analysis.
- **Only the analytes listed on the Standard Value Card can be measured with this base kit. Refer to the enclosed certificate of analysis for specific analytes included in this kit.**

TECHNICAL HINTS

- When mixing or reconstituting protein solutions, always avoid foaming.
- To avoid cross-contamination, change pipette tips between additions of each standard level, between sample additions, and between reagent additions. Also, use separate reservoirs for each reagent.
- To ensure accurate results, proper adhesion of plate sealers during incubation steps is necessary.
- Protect microparticles and Streptavidin-PE from light at all times to prevent photobleaching.
- For best results, adjust the vacuum strength on the plate washer to between 15 and 40 cm of mercury.

PRECAUTIONS

The Cardiac Panel B Standard contains MPO derived from human blood. The source material was tested at the donor level using FDA licensed methods and found to be non-reactive for anti-HIV-1/2, anti-HCV, and Hepatitis B surface antigen. As no testing can offer complete assurance of freedom from infectious agents, the Standard should be handled as if capable of transmitting infection.

Some components in this kit contain ProClin® which may cause an allergic skin reaction. Avoid breathing mist.

Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling. Please refer to the MSDS on our website prior to use.

MATERIALS PROVIDED & STORAGE CONDITIONS

Store the unopened kit at 2-8 °C. Do not use past kit expiration date.

PART	PART #	DESCRIPTION	STORAGE OF OPENED, DILUTED, OR RECONSTITUTED MATERIAL
Human Cardiac Panel B Standard Cocktail	893950	2 vials of recombinant or natural human cardiac biomarkers in a buffered protein base with preservatives; lyophilized.	Discard after use. Use a fresh standard for each assay.
Human Cardiac Premixed Kit B Microparticle Cocktail	894119	1.2 mL of a concentrated microparticle cocktail with preservatives.	May be stored for up to 1 month at 2-8 °C.* <i>Once diluted, any unused microparticle cocktail must be discarded.</i>
Human Cardiac Premixed Kit B Biotin Antibody Cocktail	894118	1.2 mL of a concentrated biotin antibody cocktail with preservatives.	May be stored for up to 1 month at 2-8 °C.*
Microparticle Diluent	895529	6 mL of a buffered protein base with blue dye and preservative.	
Biotin Antibody Diluent 2	895832	5.5 mL of a buffered protein base with preservative.	
Calibrator Diluent RD6-56	895957	3 vials (21 mL/vial) of a buffered protein base with preservatives.	
Streptavidin-PE	892525	0.07 mL of a 100-fold concentrated streptavidin-phycoerythrin conjugate with preservatives.	
Wash Buffer Concentrate	895003	21 mL of a 25-fold concentrated solution of buffered surfactant with preservative. <i>May turn yellow over time.</i>	
Microplate	640763	1 filter-bottomed 96-well microplate used as a vessel for the assay.	
Mixing Bottles	895505	2 empty 8 mL bottles used for mixing microparticles with Microparticle Diluent.	
Plate Sealers	640445	6 adhesive foil strips.	
Standard Value Card	749147	1 card listing the Standard reconstitution volume and working standard concentrations for this kit lot.	

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

OTHER SUPPLIES REQUIRED

- Luminex 100, Luminex 200, or Bio-Rad Bio-Plex analyzer with X-Y platform.
- Microplate vacuum manifold (Millipore Multiscreen™ Vacuum Manifold Catalog # MAVM096 or equivalent).
- Pipettes and pipette tips.
- Deionized or distilled water.
- Multi-channel pipette, manifold dispenser, or automated dispensing unit.
- 500 mL graduated cylinder.
- Horizontal orbital microplate shaker (0.12" orbit) capable of maintaining a speed of 500 ± 50 rpm.
- Microcentrifuge.
- **Polypropylene** test tubes for dilution of standards and samples.

SAMPLE COLLECTION AND STORAGE

The sample collection and storage conditions listed below are intended as general guidelines. Sample stability has not been evaluated.

Serum - Allow samples to clot for 30 minutes at room temperature before centrifugation for 15 minutes at 1000 x g. Remove serum and assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

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

Platelet-poor Plasma - Collect plasma on ice using EDTA or heparin as an anticoagulant. Centrifuge at 2-8 °C at 1000 x g within 30 minutes of collection. An additional centrifugation step of the separated plasma at 10,000 x g for 10 minutes is recommended for complete platelet removal. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Note: *Citrate plasma has not been validated for use in this assay.*

MPO is present in neutrophil granules and is released upon neutrophil exposure to activated platelets. Therefore, to measure circulating levels of MPO, platelet-poor plasma should be collected for measurement. It should be noted that many protocols for plasma preparation, including procedures recommended by the Clinical and Laboratory Standards Institute (CLSI), result in incomplete removal of platelets from blood. This will cause variable and irreproducible results for assays of factors released by platelet activation.

SAMPLE PREPARATION

Serum, plasma, and platelet-poor plasma samples require a 100-fold dilution. A suggested 100-fold dilution is 10 μ L of sample + 990 μ L of Calibrator Diluent RD6-56. Mix thoroughly.

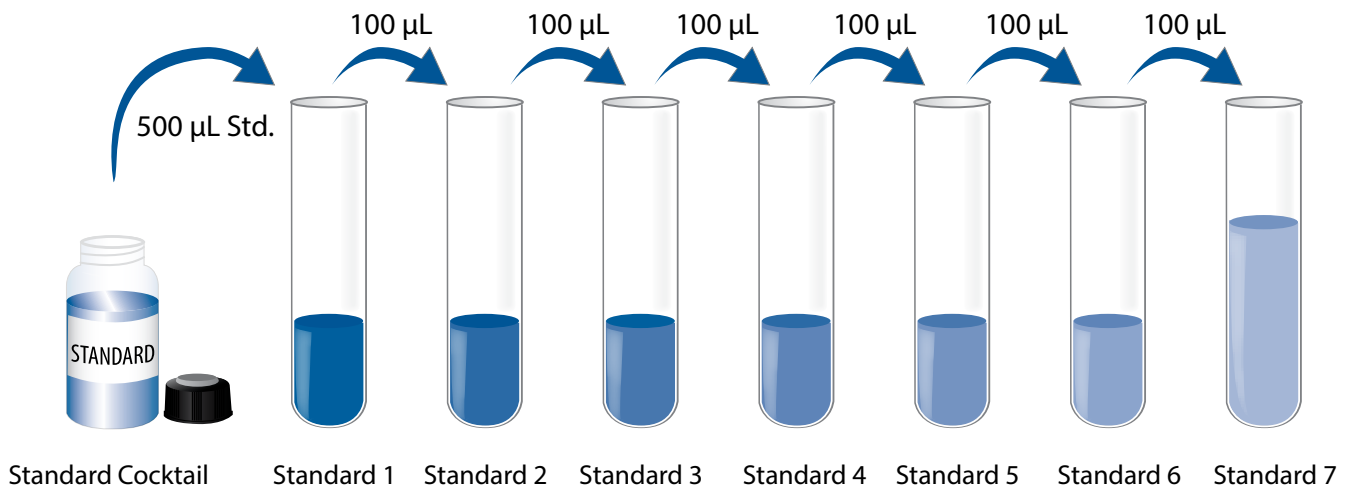
REAGENT PREPARATION

Bring all reagents to room temperature before use.

Wash Buffer - If crystals have formed in the concentrate, warm to room temperature and mix gently until the crystals have completely dissolved. Add 20 mL of Wash Buffer Concentrate to deionized or distilled water to prepare 500 mL of Wash Buffer.

Standard - Reconstitute the Standard Cocktail with Calibrator Diluent RD6-56. Refer to the Standard Value Card for the reconstitution volume and assigned values. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions.

Use polypropylene tubes. Pipette 500 μ L of reconstituted Standard into the Standard 1 tube. Pipette 200 μ L of Calibrator Diluent RD6-56 into the remaining tubes. Use Standard 1 to produce a 3-fold dilution series (below). Mix each tube thoroughly before the the next transfer. Standard 1 serves as the high standard. Calibrator Diluent RD6-56 serves as the blank.



DILUTED MICROPARTICLE COCKTAIL PREPARATION

1. Centrifuge the Microparticle Cocktail vial for 30 seconds at 1000 x g prior to removing the cap.
2. Gently vortex the vial to resuspend the microparticles, taking precautions not to invert the vial.
3. Dilute the Microparticle Cocktail in the mixing bottle provided.

Number of Wells Used	Microparticle Cocktail	+	Microparticle Diluent
96	1000 µL	+	4.5 mL
72	750 µL	+	3.375 mL
48	500 µL	+	2.25 mL
24	250 µL	+	1.125 mL

Note: Protect microparticles from light during handling. Diluted microparticles cannot be stored. Prepare microparticles within 30 minutes of use.

DILUTED BIOTIN ANTIBODY COCKTAIL PREPARATION

1. Centrifuge the Biotin Antibody Cocktail vial for 30 seconds at 1000 x g prior to removing the cap.
2. Gently vortex the vial, taking precautions not to invert the vial.
3. Dilute the Biotin Antibody Cocktail in Biotin Antibody Diluent 2. Mix gently.

Number of Wells Used	Biotin Antibody Cocktail	+	Biotin Antibody Diluent 2
96	1000 µL	+	4.5 mL
72	750 µL	+	3.375 mL
48	500 µL	+	2.25 mL
24	250 µL	+	1.125 mL

STREPTAVIDIN-PE PREPARATION

Use a polypropylene amber bottle or a polypropylene tube wrapped with aluminum foil. Protect Streptavidin-PE from light during handling and storage.

1. Centrifuge the Streptavidin-PE vial for 30 seconds at 1000 x g prior to removing the cap.
2. Gently vortex the vial, taking precautions not to invert the vial.
3. Dilute the 100X Streptavidin-PE to a 1X concentration by adding 55 µL of Streptavidin-PE to 5.5 mL of Wash Buffer.

INSTRUMENT SETTINGS

Adjust the probe height setting on the Luminex analyzer to avoid puncturing the membrane. Refer to the instrument manual.

- a) Assign the bead region for each analyte being measured (see page 1)
- b) 50 events/bead
- c) Minimum events: 0
- d) Flow rate: 60 μ L/minute (fast)
- e) Sample size: 50 μ L
- f) Doublet Discriminator gates at approximately 7500 and 15,500
- g) Collect Median Fluorescence Intensity (MFI)

Note: For the Bio-Rad Bio-Plex analyzer, set the gates at 4300 and 10,000. The CAL2 setting for the Bio-Rad Bio-Plex analyzer should be set at the low RP1 target value.

ASSAY PROCEDURE

Bring all reagents and samples to room temperature before use. It is recommended that all samples and standards be assayed in duplicate.

Note: Protect microparticles and Streptavidin-PE from light at all times.

1. Prepare all reagents, working standards, and samples as directed in the previous sections.
2. Pre-wet the filter-bottomed microplate by filling each well with 100 μ L of Wash Buffer. Remove the liquid through the filter at the bottom of the plate using a vacuum manifold designed to accommodate a microplate.
Note: After each final wash cycle and subsequent reagent addition, blot the bottom of the microplate with a paper towel to prevent wicking.
3. Add 50 μ L of Standard or sample* per well of the pre-wet filter-bottomed microplate.
4. Resuspend the diluted Microparticle Cocktail by inversion or vortexing. Add 50 μ L of the Microparticle Cocktail to each well. Securely cover with a foil plate sealer. Incubate for 3 hours at room temperature on a horizontal orbital microplate shaker (0.12" orbit) set at 500 ± 50 rpm. A plate layout is provided to record standards and samples assayed.
5. Using a vacuum manifold designed to accommodate a microplate, wash by removing the liquid, filling each well with Wash Buffer (100 μ L), and removing the liquid again. All of the liquid must be removed through the filter at the bottom of the microplate to avoid any loss of microparticles. Complete removal of liquid is essential for good performance. Perform the wash procedure three times.
6. Add 50 μ L of diluted Biotin Antibody Cocktail to each well. Securely cover with a new foil plate sealer, and incubate for 1 hour at room temperature on the shaker set at 500 ± 50 rpm.
7. Repeat the wash as in step 5.
8. Add 50 μ L of diluted Streptavidin-PE to each well. Securely cover with a new foil plate sealer, and incubate for 30 minutes at room temperature on the shaker set at 500 ± 50 rpm.
9. Repeat the wash as in step 5.
10. Resuspend the microparticles by adding 100 μ L of Wash Buffer to each well. Incubate for 1 minute at room temperature on the shaker set at 500 ± 50 rpm.
11. Read within 90 minutes using the Luminex or Bio-Rad analyzer.

*Samples require dilution. See the Sample Preparation section.

CALCULATION OF RESULTS

Use the Standard concentrations on the Standard Value Card and calculate 3-fold dilutions for the remaining levels. Average the duplicate readings for each standard and sample and subtract the average blank Median Fluorescence Intensity (MFI).

Create a standard curve for each analyte by reducing the data using computer software capable of generating a five parameter logistic (5-PL) curve-fit.

Since samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.

CALIBRATION

This assay is calibrated against highly purified recombinant human CRP, Cystatin C, P-Selectin, Serpin E1, and TIMP-1 produced at R&D Systems and natural human MPO.

REFERENCES

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2. Chan, K.H. *et al.* (2011) *Clin. Sci.* **120**:493.
3. Gersh, B.J. *et al.* (2010) *Eur. Heart J.* **6**:642.
4. Zakyntinos, E. and N. Pappa (2009) *J. Cardiol.* **53**:317.

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PLATE LAYOUT

Use this plate layout to record standards and samples assayed.

