

**Human Sepsis  
Magnetic Bead Panel 4**

**96-Well Plate Assay**

**Cat. # HSP4MAG-63K**

# MILLIPLEX<sup>®</sup> MAP

## MILLIPLEX<sup>®</sup> MAP Human Sepsis Magnetic Bead Panel 4

### 96-Well Plate Assay

#### # HSP4MAG-63K

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#### **For Research Use Only. Not for Use in Diagnostic Procedures.**

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# Human Sepsis Magnetic Bead Panel 4

## INTRODUCTION

Sepsis or SIRS (systemic inflammatory response syndrome) results from infection, whether bacterial, viral, fungal or parasitic. According to the CDC, sepsis is the second leading cause of death in non-coronary ICU patients in the U.S. This hyper-reaction to infection interrupts homeostasis through an uncontrolled inflammatory response, including glucocorticoids and catecholamines, mediators of the humoral immune response, as well as pro-inflammatory cytokines. Severe sepsis occurs when hypotension or hypoperfusion to one or more organs leads to organ dysfunction, which, in turn, can cause septic shock, multiple organ dysfunction syndrome (MODS) and death.

Apoptosis plays a critical role in the development of severe sepsis and MODS. Studies involving critically ill patients have demonstrated that increased apoptosis of lymphoid organs and other organ tissues contributes to immune suppression, the body's failure to respond to an antigen and organ dysfunction. The same pro-inflammatory cytokines and humoral mediators also contribute to the development of acquired immune defects. During sepsis, lymphocyte apoptosis can be initiated by the release of glucocorticoids and "death" cytokines. Understanding this has caused a shift in interest toward therapies aimed at inhibiting apoptosis and reversing immune suppression.

To identify specific sepsis it might be necessary to screen panels of sepsis often requiring some level of automation and/or high throughput. Magnetic Beads can make the process of automation and high throughput screening easier with features such as walk-away washing. Advantages even outside automation include:

- More flexible plate and plate washer options
- Improved performance with turbid serum/plasma samples
- Assay results equivalent to non-magnetic beads
- Automated washing eliminates technical obstacles (i.e., clogging of wells that contain viscous samples) which may result during vacuum manifold/manual washing

Therefore, the **MILLIPLEX<sup>®</sup> MAP** Human Sepsis Magnetic Bead Panel 4 enables you to focus on the therapeutic potential of sepsis. Coupled with the Luminex xMAP<sup>®</sup> platform in a magnetic bead format, you receive the advantage of ideal speed and sensitivity, allowing quantitative multiplex detection of dozens of analytes simultaneously, which can dramatically improve productivity.

EMD Millipore's MILLIPLEX<sup>®</sup> MAP Human Sepsis Magnetic Bead Panel 4 is the most versatile system available for sepsis research.

- MILLIPLEX<sup>®</sup> MAP offers you the ability to:
  - Select a 3-Plex or
  - Choose any combination of analytes from our panel of **3** analytes to design a custom kit that better meets your needs.
- A convenient "all-in-one" box format gives you the assurance that you will have all the necessary reagents you need to run your assay.

EMD Millipore's MILLIPLEX<sup>®</sup> MAP Human Sepsis Magnetic Bead Panel 4 is a 3-plex kit to be used for the simultaneous quantification of any or all of the following analytes in serum and plasma samples: FGF-13, Olfactomedin-4 (OLFM-4) and MMP-8.

***For Research Use Only. Not for Use in Diagnostic Procedures.***

***Please read entire protocol before use.***

***It is important to use same assay incubation conditions throughout your study.***

## PRINCIPLE

MILLIPLEX<sup>®</sup> MAP is based on the Luminex xMAP<sup>®</sup> technology — one of the fastest growing and most respected multiplex technologies offering applications throughout the life-sciences and capable of performing a variety of bioassays including immunoassays on the surface of fluorescent-coded magnetic beads known as MagPlex<sup>®</sup>-C microspheres.

- Luminex uses proprietary techniques to internally color-code microspheres with two fluorescent dyes. Through precise concentrations of these dyes, distinctly colored bead sets of 500 5.6 µm polystyrene microspheres or 80 6.45 µm magnetic microspheres can be created, each of which is coated with a specific capture antibody.
- After an analyte from a test sample is captured by the bead, a biotinylated detection antibody is introduced.
- The reaction mixture is then incubated with Streptavidin-PE conjugate, the reporter molecule, to complete the reaction on the surface of each microsphere.
- EMD Millipore provides three Luminex instruments to acquire and analyze data using two detection methods:
  - The Luminex analyzers Luminex 200™ and FLEXMAP 3D<sup>®</sup>, flow cytometry-based instruments that integrate key xMAP<sup>®</sup> detection components, such as lasers, optics, advanced fluidics and high-speed digital signal processors.
  - The Luminex analyzer (MAGPIX<sup>®</sup>), a CCD-based instrument that integrates key xMAP<sup>®</sup> capture and detection components with the speed and efficiency of magnetic beads.
- Each individual microsphere is identified and the result of its bioassay is quantified based on fluorescent reporter signals. EMD Millipore combines the streamlined data acquisition power of Luminex xPONENT<sup>®</sup> acquisition software with sophisticated analysis capabilities of the new MILLIPLEX<sup>®</sup> Analyst 5.1, integrating data acquisition and analysis seamlessly with all Luminex instruments.

The capability of adding multiple conjugated beads to each sample results in the ability to obtain multiple results from each sample. Open-architecture xMAP<sup>®</sup> technology enables multiplexing of many types of bioassays reducing time, labor and costs over traditional methods.

## STORAGE CONDITIONS UPON RECEIPT

- Recommended storage for kit components is 2 - 8°C.
- For long-term storage, freeze reconstituted standards and controls at ≤ -20°C. Avoid multiple (>2) freeze/thaw cycles.
- **DO NOT FREEZE Antibody-Immobilized Beads, Detection Antibody, and Streptavidin-Phycoerythrin.**

## REAGENTS SUPPLIED

**Note: Store all reagents at 2 – 8°C**

Reagents Supplied	Catalog Number	Volume	Quantity
Human Sepsis Panel 4 Standard	HSP4-8063-4	Lyophilized	1 vial
Human Sepsis Panel 4 Quality Controls 1 and 2	HSP4-6063-4	Lyophilized	2 vials
Serum Matrix Note: Contains 0.08% Sodium Azide	CPT-SM	Lyophilized	1 vial
Set of one 96-Well Plate with 2 sealers	-----	-----	1 plate 2 sealers
Assay Buffer	L-AB	30 mL	1 bottle
10X Wash Buffer Note: Contains 0.05% Proclin	L-WB	30 mL	2 bottles
Human Sepsis Panel 4 Detection Antibodies	HSP4-1063-4	5.5 mL	1 bottle
Streptavidin-Phycoerythrin	L-SAPE13	5.5 mL	1 bottle
Mixing Bottle	-----	-----	1 bottle
Bead Diluent	LBD	3.5 mL	1 bottle

**Included Human Sepsis Panel 4 Antibody-Immobilized Beads are dependent on customizable selection of analytes within the panel.**

Bead/Analyte Name	Luminex Magnetic Bead Region	Customizable 3 Analytes 20X concentration, 200 µL) Available Cat. #	
		✓	
Anti-FGF13 Bead	21	✓	HFGF13-MAG
Anti-Olfactomedin4 Bead	39	✓	HOLFM4-MAG
Anti-Human MMP8 Bead	77	✓	HMMP8-MAG

## **MATERIALS REQUIRED BUT NOT PROVIDED**

### Reagents

1. Luminex Sheath Fluid (Luminex Catalog #40-50000) or Luminex Drive Fluid (Luminex Catalog #MPXDF-4PK)

### Instrumentation / Materials

1. Adjustable Pipettes with Tips capable of delivering 25  $\mu$ L to 1000  $\mu$ L
2. Multichannel Pipettes capable of delivering 5  $\mu$ L to 50  $\mu$ L or 25  $\mu$ L to 200  $\mu$ L
3. Reagent Reservoirs
4. Polypropylene Microfuge Tubes
5. Rubber Bands
6. Aluminum Foil
7. Absorbent Pads
8. Laboratory Vortex Mixer
9. Sonicator (Branson Ultrasonic Cleaner Model #B200 or equivalent)
10. Titer Plate Shaker (Lab-Line Instruments Model #4625 or equivalent)
11. Luminex 200™, HTS, FLEXMAP 3D®, or MAGPIX® with xPONENT® software by Luminex Corporation
12. Automatic Plate Washer for magnetic beads (BioTek® 405 LS and 405 TS, EMD Millipore Catalog #40-094, #40-095, #40-096, #40-097 or equivalent) or Handheld Magnetic Separation Block (EMD Millipore Catalog #40-285 or equivalent).

Note: If a plate washer or handheld magnetic separation block for magnetic beads is not available, one can use a microtiter filter plate (EMD Millipore Catalog #MX-PLATE) to run the assay using a Vacuum Filtration Unit (EMD Millipore Vacuum Manifold Catalog #MSVMHTS00 or equivalent with EMD Millipore Vacuum Pump Catalog #WP6111560 or equivalent).

## **SAFETY PRECAUTIONS**

- All blood components and biological materials should be handled as potentially hazardous. Follow universal precautions as established by the Centers for Disease Control and Prevention and by the Occupational Safety and Health Administration when handling and disposing of infectious agents.
- Sodium Azide or Proclin has been added to some reagents as a preservative. Although the concentrations are low, Sodium Azide and Proclin may react with lead and copper plumbing to form highly explosive metal azides. Dispose of unused contents and waste in accordance with international, federal, state, and local regulations.

## **TECHNICAL GUIDELINES**

To obtain reliable and reproducible results, the operator should carefully read this entire manual and fully understand all aspects of each assay step before running the assay. The following notes should be reviewed and understood before the assay is set up.

- FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.
- Do not use beyond the expiration date on the label.
- Do not mix or substitute reagents with those from other lots or sources.

## TECHNICAL GUIDELINES (continued)

- The Antibody-Immobilized Beads are light sensitive and must be protected from light at all times. Cover the assay plate containing beads with opaque plate lid or aluminum foil during all incubation steps.
- It is important to allow all reagents to warm to room temperature (20-25°C) before use in the assay.
- Incomplete washing can adversely affect the assay outcome. All washing must be performed with the Wash Buffer provided.
- The standards prepared by serial dilution must be used within 1 hour of preparation. Discard any unused standards except the standard stock which may be stored at  $\leq -20^{\circ}\text{C}$  for 1 month and at  $\leq -80^{\circ}\text{C}$  for greater than one month.
- If samples fall outside the dynamic range of the assay, further dilute the samples with the appropriate diluent and repeat the assay.
- Any unused mixed Antibody-Immobilized Beads may be stored in the Mixing Bottle at 2-8°C for up to one month.
- During the preparation of the standard curve, make certain to mix the higher concentration well before making the next dilution. Use a new tip with each dilution.
- The plate should be read immediately after the assay is finished. If, however, the plate cannot be read immediately, seal the plate, cover with aluminum foil or an opaque lid, and store the plate at 2-8°C for up to 24 hours. Prior to reading, agitate the plate on the plate shaker at room temperature for 10 minutes. Delay in reading a plate may result in decreased sensitivity for some analytes.
- The titer plate shaker should be set at a speed to provide maximum orbital mixing without splashing of liquid outside the wells. For the recommended plate shaker, this would be a setting of 5-7 which is approximately 500-800 rpm.
- Ensure that the needle probe is clean. This may be achieved by sonication and/or alcohol flushes.
- When reading the assay on Luminex 200™, adjust probe height according to the protocols recommended by Luminex to the kit solid plate or to the recommended EMD Millipore filter plates using 3 alignment discs. When reading the assay on MAGPIX®, adjust probe height according to the protocols recommended by Luminex to the kit solid plate or to the recommended EMD Millipore filter plates using 2 alignment discs. When reading the assay on FLEXMAP 3D®, adjust probe height according to the protocols recommended by Luminex to the kit solid plate using 1 alignment disc. For FLEXMAP 3D® when using the solid plate in the kit, the final resuspension should be with 150  $\mu\text{L}$  Sheath Fluid in each well and 75  $\mu\text{L}$  should be aspirated.
- For cell culture supernatants or tissue extraction, use the culture or extraction medium as the matrix solution in background, standard curve and control wells. If samples are diluted in assay buffer, use the assay buffer as matrix.
- For serum/plasma samples that require further dilution beyond neat samples use the Serum Matrix provided in the kit.
- For cell/tissue homogenate, the final cell or tissue homogenate should be prepared in a buffer that has a neutral pH, contains minimal detergents or strong denaturing detergents, and has an ionic strength close to physiological concentration. Avoid debris, lipids, and cell/tissue aggregates. Centrifuge samples before use.
- Vortex all reagents well before adding to plate.

## SAMPLE COLLECTION AND STORAGE

Since analyte values may differ between serum and plasma samples, it is recommended to use either serum or plasma in any particular study.

### A. Preparation of Serum Samples:

- Allow the blood to clot for at least 30 minutes before centrifugation for 10 minutes at 1000xg. Remove serum and assay immediately or aliquot and store samples at  $\leq -20^{\circ}\text{C}$ .
- Avoid multiple  $>2$  freeze/thaw cycles.
- When using frozen samples, it is recommended to thaw the samples completely, mix well by vortexing and centrifuge prior to use in the assay to remove particulates.
- It is recommended to use neat samples in the assay.
- When further dilution beyond neat samples is required, use Matrix Solution as the diluent.

### B. Preparation of Plasma Samples:

- Plasma collection using EDTA as an anti-coagulant is recommended. Centrifuge for 10 minutes at 1000xg within 30 minutes of blood collection. Remove plasma and assay immediately or aliquot and store samples at  $\leq -20^{\circ}\text{C}$ .
- Avoid multiple  $>2$  freeze/thaw cycles.
- When using frozen samples, it is recommended to thaw the samples completely, mix well by vortexing and centrifuge prior to use in the assay to remove particulates.
- It is recommended to use neat samples in the assay. When further dilution beyond neat samples is required, use Matrix Solution as the diluent.

### C. Preparation of Tissue Culture Supernatant:

- Centrifuge the sample to remove debris and assay immediately or aliquot and store samples at  $\leq -20^{\circ}\text{C}$ .
- Avoid multiple ( $>2$ ) freeze/thaw cycles.
- Tissue culture supernatant may require a dilution with an appropriate control medium prior to assay. Tissue/cell extracts should be done in neutral buffers containing reagents and conditions that do not interfere with assay performance. Excess concentrations of detergent, salt, denaturants, high or low pH, etc. will negatively affect the assay. Organic solvents should be avoided. The tissue/cell extract samples should be free of particles such as cells or tissue debris.

### NOTE:

- A maximum of 25  $\mu\text{L}$  per well of neat serum or plasma can be used. Tissue culture or other media may also be used.
- All samples must be stored in polypropylene tubes. **DO NOT STORE SAMPLES IN GLASS.**
- Avoid debris, lipids and cells when using samples with gross hemolysis or lipemia.
- Care must be taken when using heparin as an anti-coagulant since an excess of heparin will provide falsely high values. Use no more than 10 IU heparin per mL of blood collected.



## PREPARATION OF REAGENTS FOR IMMUNOASSAY

### A. Preparation of Antibody-Immobilized Beads

For individual vials of beads, sonicate each antibody-bead vial for 30 seconds; vortex for 1 minute. Add 150  $\mu$ L from each antibody-bead vial to the Mixing Bottle and bring final volume to 3.0 mL with Bead Diluent. Vortex the mixed beads well. Unused portion may be stored at 2-8°C for up to 1 month. (Note: Due to the composition of magnetic beads, you may notice a slight color in the bead solution. This does not affect the performance of the beads or the kit.)

Example 1: When using 2 antibody-immobilized beads, add 150  $\mu$ L from each of the 2 bead vials to the Mixing Bottle. Then add 2.7 mL Bead Diluent.

Example 2: When using 3 antibody-immobilized beads, add 150  $\mu$ L from each of the 3 bead vials to the Mixing Bottle. Then add 2.55 mL Bead Diluent.

### B. Preparation of Quality Controls

Before use, reconstitute Quality Control 1 and Quality Control 2 with 250  $\mu$ L deionized water. Invert the vial several times to mix and vortex. Allow the vial to sit for 5-10 minutes. Unused portion may be stored at  $\leq 20^{\circ}\text{C}$  for up to one month.

### C. Preparation of Wash Buffer

Bring the 10X Wash Buffer to room temperature and mix to bring all salts into solution. Dilute 60 mL of 10X Wash Buffer (two bottles) with 540 mL deionized water. Store the unused portion at 2-8°C for up to one month.

### D. Preparation of Serum Matrix

**This step is required for serum or plasma samples only.**

Add 1 mL deionized water to the bottle containing lyophilized Serum Matrix. Mix well. Allow at least 10 minutes for complete reconstitution. Leftover reconstituted Serum Matrix should be stored at  $\leq -20^{\circ}\text{C}$  for up to one month.

### E. Preparation of Human Sepsis Panel 4 Standard

1) Prior to use, reconstitute the Human Sepsis Panel 4 Standard with 250  $\mu$ L deionized water. Invert the vial several times to mix. Vortex the vial for 10 seconds. Allow the vial to sit for 5-10 minutes. This will be used as the stock standard (Standard 7); the unused portion may be stored at  $\leq -20^{\circ}\text{C}$  for up to one month.

#### 2) Preparation of Working Standards

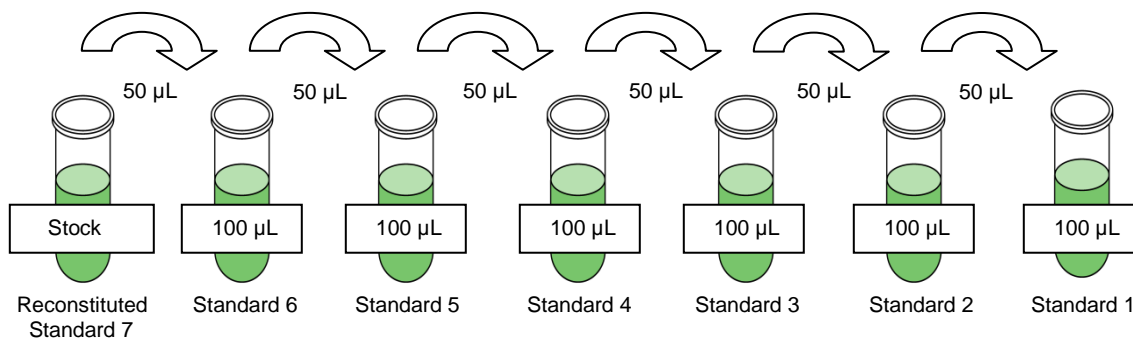
Label 6 polypropylene microfuge tubes as Standard 6, Standard 5, Standard 4, Standard 3, Standard 2 and Standard 1. Add 100  $\mu$ L of Assay Buffer to each of the 6 tubes. Prepare serial dilutions by adding 50  $\mu$ L of the reconstituted standard (Standard 7) to the Standard 6 tube, mix well and transfer 50  $\mu$ L of the Standard 6 to the Standard 5 tube, mix well and transfer 50  $\mu$ L of the Standard 5 to the Standard 4 tube, mix well and transfer 50  $\mu$ L of the Standard 4 to Standard 3 tube, mix well and transfer 50  $\mu$ L of the Standard 3 to the Standard 2 tube, mix

well and transfer 50  $\mu$ L of the Standard 2 to Standard 1 tube. The 0 ng/mL standard (Background) will be Assay Buffer.

### PREPARATION OF REAGENTS FOR IMMUNOASSAY (continued)

Standard	Volume of Deionized Water to Add	Volume of Standard to Add
Standard 7	250 $\mu$ L	0

Standard Number	Volume of Assay Buffer to Add	Volume of Standard to Add
Standard 6	100 $\mu$ L	50 $\mu$ L of Standard 7
Standard 5	100 $\mu$ L	50 $\mu$ L of Standard 6
Standard 4	100 $\mu$ L	50 $\mu$ L of Standard 5
Standard 3	100 $\mu$ L	50 $\mu$ L of Standard 4
Standard 2	100 $\mu$ L	50 $\mu$ L of Standard 3
Standard 1	100 $\mu$ L	50 $\mu$ L of Standard 2



Standard	FGF-13 (ng/mL)	OLFM-4 (ng/mL)	MMP-8 (ng/mL)
Standard 1	1.37	0.34	0.14
Standard 2	4.12	1.03	0.41
Standard 3	12.35	3.09	1.23
Standard 4	37.04	9.26	7.41
Standard 5	111.11	27.78	11.11
Standard 6	333.33	83.33	33.33
Standard 7	1000	250	100

## IMMUNOASSAY PROCEDURE

- Prior to beginning this assay, it is imperative to read this protocol completely and to thoroughly understand the Technical Guidelines.
- Allow all reagents to warm to room temperature (20-25°C) before use in the assay.
- Diagram the placement of Standards [0 (Background), Standards 1 through 7, Controls 1 and 2, and Samples on Well Map Worksheet in a vertical configuration. (Note: Most instruments will only read the 96-well plate vertically by default.) It is recommended to run the assay in duplicate.
- If using a filter plate, set the filter plate on a plate holder at all times during reagent dispensing and incubation steps so that the bottom of the plate does not touch any surface.

1. Add 200 µL of Assay Buffer into each well of the plate. Seal and mix on a plate shaker for 10 minutes at room temperature (20-25°C).
2. Decant Assay Buffer and remove the residual amount from all wells by inverting the plate and tapping it smartly onto absorbent towels several times.
3. Add 25 µL of each Standard or Control into the appropriate wells. Assay Buffer should be used for 0 ng/mL standard (Background).
4. Add 25 µL of Assay Buffer to the sample wells.
5. Add 25 µL of appropriate matrix solution to the background, standards, and control wells. When assaying serum or plasma, use the Serum Matrix provided in the kit. When assaying tissue culture or other supernatant, use proper control culture medium as the matrix solution.
6. Add 25 µL of Neat Sample into the appropriate wells.
7. Vortex Mixing Bottle and add 25 µL of the Mixed Beads to each well. (Note: During addition of Beads, shake bead bottle intermittently to avoid settling.)
8. Seal the plate with a plate sealer. Wrap the plate with foil and incubate with agitation on a plate shaker for 16-20 hours (overnight) at 2-8° C.

Add 200 µL Assay Buffer per well



Shake 10 min, RT

Decant

- Add 25 µL Standard and Controls to appropriate wells
- Add 25 µL Assay Buffer to background and sample wells
- Add 25 µL appropriate matrix solution to background, standards, and control wells
- Add 25 µL neat Samples to sample wells
- Add 25 µL Beads to each well



Incubate 16-20 hours (overnight) at 2-8° C.

9. Gently remove well contents and wash plate 2 times following instructions listed in the **PLATE WASHING** section.
10. Add 50  $\mu\text{L}$  of Detection Antibodies into each well. (Note: Allow the Detection Antibodies to warm to room temperature prior to addition.)
11. Seal, cover with foil and incubate with agitation on a plate shaker for one hour at room temperature (20-25°C). **DO NOT ASPIRATE AFTER INCUBATION.**
12. Add 50  $\mu\text{L}$  Streptavidin-Phycoerythrin to each well containing the 50  $\mu\text{L}$  of Detection Antibodies.
13. Seal, cover with foil and incubate with agitation on a plate shaker for 30 minutes at room temperature (20-25°C).
14. Gently remove well contents and wash plate 2 times following instructions listed in the **PLATE WASHING** section.
15. Add 100  $\mu\text{L}$  of Sheath Fluid (or Drive Fluid if using MAGPIX<sup>®</sup>) to all wells. Resuspend the beads on a plate shaker for 5 minutes.
16. Run plate on Luminex 200<sup>™</sup>, HTS, FLEXMAP 3D<sup>®</sup> or MAGPIX<sup>®</sup> with xPONENT<sup>®</sup> software.
17. Save and analyze the Median Fluorescent Intensity (MFI) data using a 5-parameter logistic or spline curve-fitting method for calculating analyte concentrations in samples. (Note: For diluted samples, multiply the calculated concentration by the dilution factor.)



Remove well contents and wash 2X with 200  $\mu\text{L}$  Wash Buffer

Add 50  $\mu\text{L}$  Detection Antibodies per well



Incubate one hour at RT

Do Not Aspirate

Add 50  $\mu\text{L}$  Streptavidin-Phycoerythrin per well

Incubate for 30 minutes at RT



Remove well contents and wash 2X with 200  $\mu\text{L}$  Wash Buffer

Add 100  $\mu\text{L}$  Sheath Fluid or Drive Fluid per well

Read on Luminex 50  $\mu\text{L}$ , 50 beads per bead set)

## PLATE WASHING

If using a solid plate, use either a handheld magnet or magnetic plate washer.

### 1.) Solid Plate

If using a solid plate, use either a handheld magnet or magnetic plate washer.

- A.) Handheld magnet (**EMD Millipore Catalog #40-285**) - Rest plate on magnet for 60 seconds to allow complete settling of magnetic beads. Remove well contents by gently decanting the plate in an appropriate waste receptacle and gently tapping on absorbent pads to remove residual liquid. Wash plate with 200  $\mu$ L of Wash Buffer by removing plate from magnet, adding Wash Buffer, shaking for 30 seconds, reattaching to magnet, letting beads settle for 60 seconds and removing well contents as previously described after each wash. Repeat wash steps as recommended in Assay Procedure.
- B.) Magnetic plate washer (**EMD Millipore Catalog #40-094, #40-095, #40-096 and #40-097**) - Please refer to specific automatic plate washer manual for appropriate equipment settings. Please note that after the final aspiration, there will be approximately 25  $\mu$ L of residual wash buffer in each well. This is expected when using the BioTek plate washer and this volume does not need to be aspirated from the plate.

If using an automatic plate washer other than BioTek<sup>®</sup> 405 LS or 405 TS, please refer to the manufacturer's recommendations for programming instructions.

### 2.) Filter Plate (EMD Millipore Catalog #MX-PLATE)

If using a filter plate, use a vacuum filtration manifold to remove well contents. Wash plate with 200  $\mu$ L/well of Wash Buffer, removing Wash Buffer by vacuum filtration after each wash. Repeat wash steps as recommended in the Assay Procedure.

## EQUIPMENT SETTINGS

Luminex 200<sup>™</sup>, HTS, FLEXMAP 3D<sup>®</sup>, and MAGPIX<sup>®</sup> with xPONENT<sup>®</sup> software:

These specifications are for the Luminex 200<sup>™</sup>, Luminex HTS, Luminex FLEXMAP 3D<sup>®</sup>, and Luminex MAGPIX<sup>®</sup> with xPONENT<sup>®</sup> software. Luminex instruments with other software (e.g. MasterPlex<sup>®</sup>, STarStation, LiquiChip, Bio-Plex Manager<sup>™</sup>, LABScan<sup>™</sup> 100) would need to follow instrument instructions for gate settings and additional specifications from the vendors for reading Luminex magnetic beads.

For magnetic bead assays, the Luminex 200<sup>™</sup> and HTS instruments must be calibrated with the xPONENT<sup>®</sup> 3.1 compatible Calibration Kit (EMD Millipore Catalog #40-275) and performance verified with the Performance Verification Kit (EMD Millipore Catalog #40-276). The Luminex FLEXMAP 3D<sup>®</sup> instrument must be calibrated with the FLEXMAP 3D<sup>®</sup> Calibrator Kit (EMD Millipore Catalog #40-028) and performance verified with the FLEXMAP 3D<sup>®</sup> Performance Verification Kit (EMD Millipore Catalog #40-029). The Luminex MAGPIX<sup>®</sup> instrument must be calibrated with the MAGPIX<sup>®</sup> Calibration Kit (EMD Millipore Catalog #40-049) and performance verified with the MAGPIX<sup>®</sup> Performance Verification Kit (EMD Millipore Catalog #40-050).

**NOTE: When setting up a Protocol using the xPONENT<sup>®</sup> software, you must select MagPlex as the Bead Type in the Acquisition settings.**

**NOTE: These assays cannot be run on any instruments using Luminex IS 2.3 or Luminex 1.7 software.**

## EQUIPMENT SETTINGS (continued)

The Luminex probe height must be adjusted to the plate provided in the kit. Please use Catalog #MAG-PLATE, if additional plates are required for this purpose.

Events:	50, per bead	
Sample Size:	50 $\mu$ L	
Gate Settings:	8,000 to 15,000	
Reporter Gain:	Default (low PMT)	
Time Out:	60 seconds	
Bead Set:	Customizable 3-Plex Beads	
	FGF-13	21
	OLFM-4	39
	MMP-8	77

## QUALITY CONTROLS

The ranges for each analyte in Quality Control 1 and 2 are provided on the card insert or can be located at the EMD Millipore Corporation website [www.millipore.com/techlibrary/index.do](http://www.millipore.com/techlibrary/index.do) using the catalog number as the keyword.

## ASSAY CHARACTERISTICS

### Cross-Reactivity

There was no or negligible cross-reactivity between the antibodies for an analyte and any of the other analytes in this panel.

### Assay Sensitivities (minimum detectable concentrations, ng/mL)

Minimum Detectable Concentration (MinDC) is calculated using **Milliplex Analyst Software**. It measures the true limits of detection for an assay by mathematically determining what the empirical MinDC would be if an infinite number of standard concentrations were run for the assay under the same conditions.

Analyte	Overnight Protocol (n = 8] Assays)		2 Hour Protocol (n = 3 Assays)	
	MinDC (ng/mL)	MinDC+2SD (ng/mL)	MinDC (ng/mL)	MinDC+2SD (ng/mL)
<b>FGF-13</b>	0.91	2.2	0.52	0.86
<b>OLFM-4</b>	0.13	0.22	0.08	0.09
<b>MMP-8</b>	0.03	0.10	0.14	0.47

## ASSAY CHARACTERISTICS (continued)

### Precision

Intra-assay precision is generated from the mean of the %CV's from 6 reportable results across two different concentrations of analytes in a single assay. Inter-assay precision is generated from the mean of the %CV's across two different concentrations of analytes across 8 different assays.

Analyte	Overnight Protocol		2 Hour Protocol
	Intra-assay %CV	Inter-assay %CV	Intra-assay %CV
FGF-13	<10%	<15%	<10%
OLFM-4	<10%	<15%	<10%
MMP-8	<10%	<15%	<10%

### Accuracy

Spike Recovery: The data represent mean percent recovery of spiked standards ranging from low, medium, and high concentration in serum matrices (n=6).

Analyte	Overnight Protocol
	% Recovery in Serum Matrix
FGF-13	105.5
OLFM-4	102.2
MMP-8	95.8

## TROUBLESHOOTING GUIDE

Problem	Probable Cause	Solution
Insufficient bead count	<p>Plate washer aspirate height set too low</p> <p>Bead mix prepared inappropriately</p> <p>Samples cause interference due to particulate matter or viscosity</p> <p>Probe height not adjusted correctly</p>	<p>Adjust aspiration height according to manufacturers' instructions.</p> <p>Sonicate bead vials and vortex just prior to adding to bead mix bottle according to protocol. Agitate bead mix intermittently in reservoir while pipetting this into the plate.</p> <p>See above. Also sample probe may need to be cleaned with alcohol flushes, back flushes and washes; or, if needed, probe should be removed and sonicated.</p> <p>When reading the assay on Luminex 200™, adjust probe height to the kit solid plate or to the recommended EMD Millipore filter plates using 3 alignment discs. When reading the assay on MAGPIX®, adjust probe height to the kit solid plate or to the recommended EMD Millipore filter plates using 2 alignment discs. When reading the assay on FLEXMAP 3D®, adjust probe height to the kit solid plate using 1 alignment disc. For FLEXMAP 3D® when using the solid plate in the kit, the final resuspension should be with 150 µL Sheath Fluid in each well and 75 µL should be aspirated.</p>
Background is too high	<p>Background wells were contaminated</p> <p>Matrix used has endogenous analyte or interference</p> <p>Insufficient washes</p>	<p>Avoid cross-well contamination by using sealer appropriately and pipetting with multichannel pipettes without touching reagent in plate.</p> <p>Check matrix ingredients for cross-reacting components (e.g. interleukin modified tissue culture medium).</p> <p>Increase number of washes.</p>
Beads not in region or gate	<p>Luminex instrument not calibrated correctly or recently</p> <p>Gate settings not adjusted correctly</p> <p>Wrong bead regions in protocol template</p> <p>Incorrect sample type used</p> <p>Instrument not washed or primed</p> <p>Beads were exposed to light</p>	<p>Calibrate Luminex instrument based on manufacturer's instructions, at least once a week or if temperature has changed by &gt;3°C.</p> <p>Some Luminex instruments (e.g. Bio-Plex®) require different gate settings than those described in the kit protocol. Use instrument default settings.</p> <p>Check kit protocol for correct bead regions or analyte selection.</p> <p>Samples containing organic solvents or if highly viscous should be diluted or dialyzed as required.</p> <p>Prime the Luminex instrument 4 times to rid it of air bubbles, wash 4 times with sheath fluid or water if there is any remnant alcohol or sanitizing liquid.</p> <p>Keep plate and bead mix covered with dark lid or aluminum foil during all incubation steps.</p>



Signal for whole plate is same as background	<p>Incorrect or no Detection Antibody was added</p> <p>Streptavidin-Phycoerythrin was not added</p>	<p>Add appropriate Detection Antibody and continue.</p> <p>Add Streptavidin-Phycoerythrin according to protocol. If Detection Antibody has already been removed, sensitivity may be low.</p>
Low signal for standard curve	<p>Detection Antibody may have been removed prior to adding Streptavidin-Phycoerythrin</p> <p>Incubations done at inappropriate temperatures, timings or agitation</p>	<p>May need to repeat assay if desired sensitivity not achieved.</p> <p>Assay conditions need to be checked.</p>
Signals too high, standard curves are saturated	<p>Calibration target value set too high</p> <p>Plate incubation was too long with standard curve and samples</p>	<p>With some Luminex instruments (e.g. Bio-Plex<sup>®</sup>) default target setting for RP1 calibrator is set at high PMT. Use low target value for calibration and reanalyze plate.</p> <p>Use shorter incubation time.</p>
Sample readings are out of range	<p>Samples contain no or below detectable levels of analyte</p> <p>Samples contain analyte concentrations higher than highest standard point</p> <p>Standard curve was saturated at higher end of curve</p>	<p>If below detectable levels, it may be possible to use higher sample volume. Check with technical support for appropriate protocol modifications.</p> <p>Samples may require dilution and reanalysis for just that particular analyte.</p> <p>See above.</p>
High variation in samples and/or standards	<p>Multichannel pipette may not be calibrated</p> <p>Plate washing was not uniform</p> <p>Samples may have high particulate matter or other interfering substances</p> <p>Plate agitation was insufficient</p> <p>Cross-well contamination</p>	<p>Calibrate pipettes.</p> <p>Confirm all reagents are removed completely in all wash steps.</p> <p>See above.</p> <p>Plate should be agitated during all incubation steps using an orbital plate shaker at a speed where beads are in constant motion without causing splashing.</p> <p>Check when reusing plate sealer that no reagent has touched sealer. Care should be taken when using same pipette tips that are used for reagent additions and that pipette tip does not touch reagent in plate.</p>
<b>FOR FILTER PLATES ONLY</b>		
Filter plate will not vacuum	<p>Vacuum pressure is insufficient</p> <p>Samples have insoluble particles</p>	<p>Increase vacuum pressure such that 0.2 mL buffer can be suctioned in 3-5 seconds.</p> <p>Centrifuge samples just prior to assay set-up and use supernatant.</p>

	High lipid concentration	After centrifugation, remove lipid layer and use supernatant.
Plate leaked	Vacuum pressure too high	Adjust vacuum pressure such that 0.2 mL buffer can be suctioned in 3-5 seconds. May need to transfer contents to a new (blocked) plate and continue.
	Plate set directly on table or absorbent towels during incubations or reagent additions	Set plate on plate holder or raised edge so bottom of filter is not touching any surface.
	Insufficient blotting of filter plate bottom causing wicking	Blot the bottom of the filter plate well with absorbent towels after each wash step.
	Pipette touching plate filter during additions	Pipette to the side of plate.
	Probe height not adjusted correctly	Adjust probe to 3 alignment discs in well H6.
	Sample too viscous	May need to dilute sample.

## REPLACEMENT REAGENTS

## Catalog #

Human Sepsis Panel 4 Standard	HSP4-8063-4
Human Sepsis Panel 4 Quality Controls 1 & 2	HSP4-6063-4
Serum Matrix	CPT-SM
Human Sepsis Panel 4 Detection Antibodies	HSP4-1063-4
Streptavidin-Phycoerythrin	L-SAPE13
Assay Buffer	L-AB
Set of two 96-Well plates with sealers	MAG-PLATE
10X Wash Buffer	L-WB
Bead Diluent	LBD

## Antibody-Immobilized Magnetic Beads

<u>Analyte</u>	<u>Bead #</u>	<u>Cat. #</u>
Anti-FGF13 Bead	21	HFGF13-MAG
Anti-Olfactomedin4 Bead	39	H0LFM4-MAG
Anti-Human MMP8 Bead	77	HMMP8-MAG

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Include:

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### WELL MAP

	1	2	3	4	5	6	7	8	9	10	11	12
A	0 Standard (Background)	<b>Standard 4</b>	QC-1 Control	Etc								
B	0 Standard (Background)	<b>Standard 4</b>	QC-1 Control	Etc								
C	<b>Standard 1</b>	<b>Standard 5</b>	QC-2 Control									
D	<b>Standard 1</b>	<b>Standard 5</b>	QC-2 Control									
E	<b>Standard 2</b>	<b>Standard 6</b>	Sample 1									
F	<b>Standard 2</b>	<b>Standard 6</b>	Sample 1									
G	<b>Standard 3</b>	<b>Standard 7</b>	Sample 2									
H	<b>Standard 3</b>	<b>Standard 7</b>	Sample 2									