



Mouse Cytokine/ Chemokine Magnetic Bead Panel

96-Well Plate Assay

**Cat. # MCYTOMAG-70K,
 MCYTOMAG-70K-PMX or
 MCYTMAG-70K-PX32**

MILLIPLEX[®] MAP

MOUSE CYTOKINE / CHEMOKINE MAGNETIC BEAD PANEL 96-Well Plate Assay

**# MCYTOMAG-70K or
MCYTOMAG-70K-PMX (premixed 25 plex)
#MCYTMAG-70K-PX32 (premixed 32 plex)**

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By purchasing this product, which contains fluorescently labeled microsphere beads authorized by Luminex Corporation (“Luminex”), you, the customer, acquire the right under Luminex’s patent rights, if any, to use this product or any portion of this product, including without limitation the microsphere beads contained herein, only with Luminex’s laser based fluorescent analytical test instrumentation marketed under the name of Luminex 100[™] IS, 200[™], HTS, FLEXMAP 3D[®], MAGPIX[®].

Mouse Cytokine/Chemokine Magnetic Bead Panel

INTRODUCTION

“Cytokine” is a general term used for a diverse group of soluble proteins and peptides which act as regulators under both normal and pathological conditions to modulate the functional activities of individual cells and tissues. These proteins also mediate direct interactions between cells and regulate processes taking place in the extracellular environment. Cytokines differ from hormones in that they act on a wider spectrum of target cells. Also, unlike hormones, they are not produced by specialized cells which are organized in specialized glands. The cytokine group of proteins includes lymphokines, interferons, colony stimulating factors and chemokines. Cytokine and chemokine research plays a significant role in achieving a deeper understanding of the immune system and its multi-faceted response to most antigens, as well as disease states such as inflammatory disease, allergic reactions, irritable bowel disease (IBD), sepsis, and cancer.

MILLIPLEX[®] MAP offers the broadest selection of analytes across a wide range of disease states and species. Once the analytes of interest have been identified, you can rely on the quality that we build into each kit to produce results you can trust. In addition to the assay characteristics listed in the protocol, other performance criteria evaluated during the validation process include: cross-reactivity, dilution linearity, kit stability, and sample behavior (e.g. detectability and stability).

Each MILLIPLEX[®] MAP panel and kit includes:

- Quality controls (QCs) provided to qualify assay performance
- Comparison of standard (calibrator) and QC lots to a reference lot to ensure lot-to-lot consistency
- Optimized serum matrix to mimic native analyte environment
- Detection antibody cocktails designed to yield consistent analyte profiles within panel

In addition each panel and kit meets stringent manufacturing criteria to ensure batch-to-batch reproducibility. The MILLIPLEX[®] MAP Mouse Cytokine / Chemokine Magnetic Bead Panel thus enables you to focus on the therapeutic potential of cytokines as well as the modulation of cytokine expression. Coupled with the Luminex xMAP[®] 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[®] MAP Mouse Cytokine / Chemokine Magnetic Bead Panel is part of the most versatile system available for cytokine and chemokine research. From our single to multiplex biomarker solutions, we partner with you to design, develop, analytically validate and build the most comprehensive library available for protein detection and quantitation.

- MILLIPLEX[®] MAP offers you:
 - The ability to select a 25-plex or 32-plex premixed kit or
 - The ability to choose any combination of analytes from our panel of 32 analytes to design a custom kit that better meets your needs.
 - A convenient “all-in-one” box format that gives you the assurance that you will have all the necessary reagents you need to run your assay.

EMD Millipore's MILLIPLEX[®] MAP Mouse Cytokine / Chemokine Magnetic Bead kit is to be used for the simultaneous quantification of the following 32 analytes in mouse tissue/cell lysate and culture supernatant samples and serum or plasma samples: Eotaxin, G-CSF, GM-CSF, IFN γ , IL-1 α , IL-1 β , IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-9, IL-10, IL-12 (p40), IL-12 (p70), IL-13, IL-15, IL-17, IP-10, KC, LIF, LIX, MCP-1, M-CSF, MIG, MIP-1 α , MIP-1 β , MIP-2, RANTES, TNF α , and VEGF.

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Please read entire protocol before use.

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

PRINCIPLE

MILLIPLEX[®] MAP is based on the Luminex xMAP[®] 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 bead (MagPlex[®]-C and non-magnetic bead (MicroPlex[®]) microspheres..

- Luminex uses proprietary techniques to internally color-code microspheres with multiple fluorescent dyes. Through precise concentrations of these dyes, distinctly colored bead sets of 500 5.6 μm non-magnetic or 80 6.45 μm magnetic polystyrene 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[®], flow cytometry-based instruments that integrate key xMAP[®] detection components, such as lasers, optics, advanced fluidics and high-speed digital signal processors.
 - The Luminex analyzer (MAGPIX[®]), a CCD-based instrument that integrates key xMAP[®] 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[®] acquisition software with sophisticated analysis capabilities of the new MILLIPLEX[®] 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[®] 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.
- Once the standards and controls have been reconstituted, immediately transfer contents into polypropylene vials. **DO NOT STORE RECONSTITUTED STANDARDS OR CONTROLS IN GLASS VIALS.** 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
Mouse Cytokine / Chemokine Standard	MXM8070	lyophilized	1 vial
Mouse Cytokine / Chemokine Standard	MXM8070-2	lyophilized	1 vial
Mouse Cytokine Quality Controls 1 and 2	MXM6070	lyophilized	2 vials
Mouse Cytokine Quality Controls 1 and 2	MXM6070-2	lyophilized	2 vials
Serum Matrix Note: Contains 0.08% Sodium Azide	MXMSM	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
Mouse Cytokine Detection Antibodies	MXM1070-1 or MXM1070-2 or MXM1070-3	3.2 mL	1 bottle
Streptavidin-Phycoerythrin	L-SAPE3 (Use with Cat. # MXM1070-1) or L-SAPE4 (Use with Cat. # MXM1070-2) or L-SAPE10 (Use with Cat. # MXM1070-3)	3.2 mL	1 bottle
Mixing Bottle (not provided with premixed panel)	-----	-----	1 bottle

Mouse Cytokine / Chemokine Antibody-Immobilized Premixed Magnetic Beads:

Premixed 25-plex Beads	MCYPMX25-MAG	3.5 mL	1 bottle
Premixed 32-plex Beads	MCYPMX32-MAG	3.5 mL	1 bottle

Included Mouse Cytokine / Chemokine Antibody-Immobilized Magnetic Beads are dependent on customizable selection of analytes within the panel (see next page).

Mouse Cytokine / Chemokine Antibody-Immobilized Magnetic Beads:

Bead/Analyte Name	Luminex Magnetic Bead Region	Customizable 32 Analytes (50X concentration, 90µL)		25-Plex Magnetic Premixed Beads	32-Plex Magnetic Premixed Beads
		Available	Cat. #		
Anti-Mouse Eotaxin Bead	14	✓	METXN-MAG		✓
Anti-Mouse G-CSF Bead	13	✓	MGCSF-MAG	✓	✓
Anti-Mouse GM-CSF Bead	15	✓	MGMCSF-MAG	✓	✓
Anti-Mouse IFN γ Bead	19	✓	MIFNG-MAG	✓	✓
Anti-Mouse IL-1 α Bead	21	✓	MIL1A-MAG	✓	✓
Anti-Mouse IL-1 β Bead	25	✓	MIL1B-MAG	✓	✓
Anti-Mouse IL-2 Bead	26	✓	MIL2-MAG	✓	✓
Anti-Mouse IL-3 Bead	29	✓	MIL3-MAG		✓
Anti-Mouse IL-4 Bead	28	✓	MIL4-MAG	✓	✓
Anti-Mouse IL-5 Bead	30	✓	MIL5-MAG	✓	✓
Anti-Mouse IL-6 Bead	34	✓	MCYIL6-MAG	✓	✓
Anti-Mouse IL-7 Bead	36	✓	MIL7-MAG	✓	✓
Anti-Mouse IL-9 Bead	38	✓	MIL9-MAG	✓	✓
Anti-Mouse IL-10 Bead	43	✓	MIL10-MAG	✓	✓
Anti-Mouse IL-12 (p40) Bead	45	✓	MIL12P40-MAG	✓	✓
Anti-Mouse IL-12 (p70) Bead	47	✓	MIL12P70-MAG	✓	✓
Anti-Mouse IL-13 Bead	52	✓	MIL13-MAG	✓	✓
Anti-Mouse IL-15 Bead	54	✓	MIL15-MAG	✓	✓
Anti-Mouse IL-17 Bead	56	✓	MIL17-MAG	✓	✓
Anti-Mouse IP-10 Bead	57	✓	MIP10-MAG	✓	✓
Anti-Mouse KC Bead	61	✓	MKC-MAG	✓	✓
Anti-Mouse LIF Bead	51	✓	MLIF-MAG		✓
Anti-Mouse LIX Bead	53	✓	MLIX-MAG		✓
Anti-Mouse MCP-1 Bead	62	✓	MCYMCP1-MAG	✓	✓
Anti-Mouse M-CSF Bead	67	✓	MMCSF-MAG		✓
Anti-Mouse MIG Bead	74	✓	MMIG-MAG		✓
Anti-Mouse MIP-1 α Bead	64	✓	MMIP1A-MAG	✓	✓
Anti-Mouse MIP-1 β Bead	66	✓	MMIP1B-MAG	✓	✓
Anti-Mouse MIP-2 Bead	73	✓	MMIP2-MAG	✓	✓
Anti-Mouse RANTES Bead	75	✓	MRNTS-MAG	✓	✓
Anti-Mouse TNF α Bead	77	✓	MCYTNFA-MAG	✓	✓
Anti-Mouse VEGF Bead	76	✓	MVEGF-MAG		✓

MATERIALS REQUIRED BUT NOT PROVIDED

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

Instrumentation / Materials

1. Adjustable Pipettes with Tips capable of delivering 25 μ L to 1000 μ L
2. Multichannel Pipettes capable of delivering 5 μ L to 50 μ L or 25 μ L to 200 μ 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 hand held magnetic separation block for magnetic beads is not available, one can use a microtiter filter plate (Millipore Catalog #MX-PLATE) to run the assay using a Vacuum Filtration Unit (Millipore Vacuum Manifold Catalog #MSVMHTS00 or equivalent with 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.

Note: See Full Labels of Hazardous components on next page.

Full labels of hazardous components in this kit:

Ingredient, Cat #		Full Label	
Mouse Cytokine Detection Antibodies	MXM1070-1 MXM1070-2 MXM1070-3		Warning. Causes serious eye irritation. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Mouse Cytokine/Chemokine Quality Control 1 & 2	MXM6070 MXM6070-2	 	Danger. Harmful if swallowed. Causes serious eye damage. Harmful to aquatic life with long lasting effects. Avoid release to the environment. Wear eye protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/ attention.
Mouse Cytokine/Chemokine Standard	MXM8070 MXM8070-2	 	Danger. Harmful if swallowed. Causes serious eye damage. Harmful to aquatic life with long lasting effects. Avoid release to the environment. Wear eye protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/ attention.
Serum Matrix	MXMSM		Harmful to aquatic life with long lasting effects. Avoid release to the environment.
Streptavidin-Phycoerythrin	L-SAPE3 L-SAPE4 L-SAPE10		Warning. Causes serious eye irritation. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
10X Wash Buffer	L-WB		Warning. May cause an allergic skin reaction. Wear protective gloves. IF ON SKIN: Wash with plenty of soap and water.

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.
- 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.
- After hydration, all standards and controls must be transferred to polypropylene tubes.
- 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 cytokines and chemokines.
- 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 μL Sheath Fluid in each well and 75 μL 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.

TECHNICAL GUIDELINES (continued)

- For serum/plasma samples that require further dilution beyond 1:2, 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

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.
- Serum samples should be diluted 1:2 in the Assay Buffer provided in the kit (i.e. one part serum sample into one part Assay Buffer). For example, in a tube, 30 μL of serum may be combined with 30 μL of Assay Buffer. When further dilution beyond 1:2 is required, use Serum Matrix 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.
- Plasma samples should be diluted 1:2 in the Assay Buffer provided in the kit (i.e. one part plasma sample into one part Assay Buffer). For example, in a tube, 30 μL of plasma may be combined with 30 μL of Assay Buffer. When further dilution beyond 1:2 is required, use Serum Matrix 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.

SAMPLE COLLECTION AND STORAGE (continued)

NOTE:

- A maximum of 25 μL per well of diluted 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 anticoagulant 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

If premixed beads are used, sonicate the premixed bead bottle 30 seconds and then vortex for 1 minute before use.

For individual vials of beads, sonicate each antibody-bead vial for 30 seconds; vortex for 1 minute. Add 60 μL from each antibody bead vial to the Mixing Bottle and bring final volume to 3.0 mL with Assay Buffer. Vortex the mixed beads well. Unused portion may be stored at 2-8°C for up to one 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 20 cytokine antibody-immobilized beads, add 60 μL from each of the 20 bead vials to the Mixing Bottle. Then add 1.8 mL Assay Buffer.

Example 2: When using 9 cytokine antibody-immobilized beads, add 60 μL from each of the 9 bead vials to the Mixing Bottle. Then add 2.46 mL Assay Buffer.

B. Preparation of Quality Controls

Before use, reconstitute Quality Control 1 and Quality Control 2 with 250 μL deionized water. Invert the vial several times to mix and vortex. Allow the vial to sit for 5-10 minutes and then transfer the controls to appropriately labeled polypropylene microfuge tubes. 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 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 2.0 mL Assay Buffer 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.

PREPARATION OF REAGENTS FOR IMMUNOASSAY (continued)

E. Preparation of Mouse Cytokine Standard

- 1.) Prior to use, reconstitute the Mouse Cytokine Standard with 250 μL deionized water to give a **Standard 6**. Invert the vial several times to mix. Vortex the vial for 10 seconds. Allow the vial to sit for 5-10 minutes and then transfer the standard to an appropriately labeled polypropylene microfuge tube. This will be used as the **Standard 6**; the unused portion may be stored at $\leq -20^{\circ}\text{C}$ for up to one month.
- 2.) Preparation of Working Standards

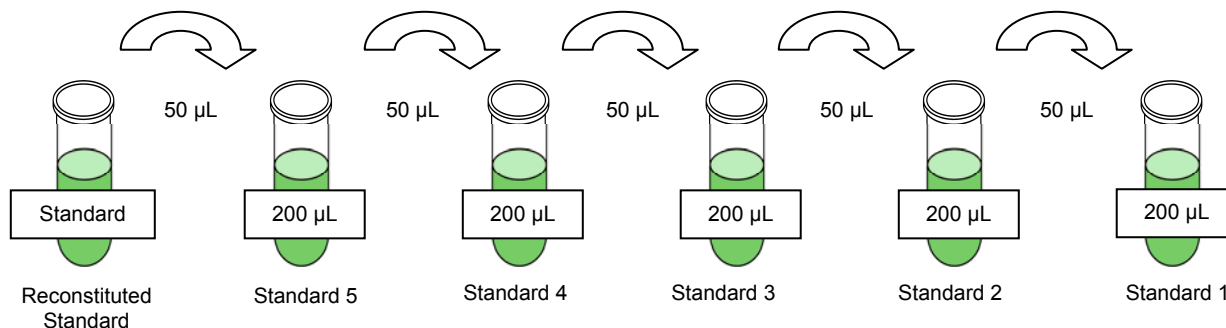
Label five polypropylene microfuge tubes Standard 1, Standard 2, Standard 3, Standard 4 and Standard 5. Add 200 μL of Assay Buffer to each of the five tubes. Prepare serial dilutions by adding 50 μL of the Standard 6 reconstituted standard to the Standard 5 tube, mix well and transfer 50 μL of the Standard 5 to the Standard 4 tube, mix well and transfer 50 μL of the Standard 4 to the Standard 3 tube, mix well and transfer 50 μL of the Standard 3 to Standard 2 tube, mix well and transfer 50 μL of the Standard 2 to the Standard 1 tube and mix well. The 0 pg/mL standard (Background) will be Assay Buffer.

Standard Concentration (pg/mL)	Volume of Deionized Water to Add	Volume of Standard to Add
Standard 6	250 μL	0

Standard Concentration (pg/mL)	Volume of Assay Buffer to Add	Volume of Standard to Add
Standard 5	200 μL	50 μL of Standard 6
Standard 4	200 μL	50 μL of Standard 5
Standard 3	200 μL	50 μL of Standard 4
Standard 2	200 μL	50 μL of Standard 3
Standard 1	200 μL	50 μL of Standard 2

Standard	IL-13 (pg/mL)	All other Analytes (pg/mL)
Standard 1	12.8	3.2
Standard 2	64	16
Standard 3	320	80
Standard 4	1600	400
Standard 5	8000	2000
Standard 6	40,000	10,000

Preparation of Standards



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),], Standard 1, Standard 2, Standard 3, Standard 4, Standard 5, and Standard 6],, 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 Wash 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 Wash 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 pg/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 Sample (diluted one part serum or plasma to one part Assay Buffer) into the appropriate wells.
 7. Vortex Mixing Bottle and add 25 µL of the Mixed or Premixed Beads to each well. (Note: During addition of Beads, shake bead bottle intermittently to avoid settling.)

Add 200 µL Wash Buffer
per well



Shake 10 min, RT

Decant

- Add 25 µL Standard or Control 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 diluted Samples to sample wells
- Add 25 µL Beads to each well

8. Seal the plate with a plate sealer. Wrap the plate with foil and incubate with agitation on a plate shaker overnight at 2-8°C. *Alternatively, incubate with agitation for 2 hours at room temperature (20-25°C). However, overnight incubation (16-18 hr) is required for optimal assay sensitivity, precision, and accuracy.*
9. Gently remove well contents and wash plate 2 times following instructions listed in the **PLATE WASHING** section.
10. Add 25 µL 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 1 hour at room temperature (20-25°C). **DO NOT ASPIRATE AFTER INCUBATION.**
12. Add 25 µL Streptavidin-Phycoerythrin to each well containing the 25 µL 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 150 µL of Sheath Fluid (or Drive Fluid if using MAGPIX®) to all wells. Resuspend the beads on a plate shaker for 5 minutes.
16. Run plate on Luminex 200™, HTS, FLEXMAP 3D™ or MAGPIX® with xPONENT software.
17. Save and analyze the Median Fluorescent Intensity (MFI) data using a 5-parameter logistic or spline curve-fitting method for calculating cytokine/chemokines concentrations in samples. (Note: For diluted samples, multiply the calculated concentration by the dilution factor.)



Incubate overnight at 2-8°C



Remove well contents and wash 2X with 200 µL Wash Buffer

Add 25 µL Detection Antibodies per well



Incubate 1 hour at RT

Do Not Aspirate

Add 25 µL Streptavidin-Phycoerythrin per well



Incubate for 30 minutes at RT



Remove well contents and wash 2X with 200 µL Wash Buffer

Add 150 µL Sheath Fluid or Drive Fluid per well

Read on Luminex (100 µL, 50 beads per bead set)

PLATE WASHING

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 μ 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 μ 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[®] 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 μ 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[™], HTS, FLEXMAP 3D[®], and MAGPIX[®] with xPONENT[®] software:

These specifications are for the Luminex 200[™], Luminex HTS, Luminex FLEXMAP 3D[®], and Luminex MAGPIX[®] with xPONENT[®] software. Luminex instruments with other software (e.g. MasterPlex[®], STarStation, LiquiChip, Bio-Plex Manager[™], LABScan[™] 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[™] and HTS instruments must be calibrated with the xPONENT[®] 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[®] instrument must be calibrated with the FLEXMAP 3D[®] Calibrator Kit (EMD Millipore Catalog #40-028) and performance verified with the FLEXMAP 3D[®] Performance Verification Kit (EMD Millipore Catalog #40-029). The Luminex MAGPIX[®] instrument must be calibrated with the MAGPIX[®] Calibration Kit (EMD Millipore Catalog #40-049) and performance verified with the MAGPIX[®] Performance Verification Kit (EMD Millipore Catalog #40-050).

NOTE: When setting up a Protocol using the xPONENT[®] 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 Cat.# MAG-PLATE, if additional plates are required for this purpose.

Events:	50, per bead	
Sample Size:	100 μ L	
Gate Settings:	8,000 to 15,000	
Reporter Gain:	Default (low PMT)	
Time Out:	60 seconds	
Bead Set:	Customizable 32-Plex Beads	
	G-CSF	13
	Eotaxin	14
	GM-CSF	15
	IFN γ	19
	IL-1 α	21
	IL-1 β	25
	IL-2	26
	IL-4	28
	IL-3	29
	IL-5	30
	IL-6	34
	IL-7	36
	IL-9	38
	IL-10	43
	IL-12 (p40)	45
	IL-12 (p70)	47
	LIF	51
	IL-13	52
	LIX	53
	IL-15	54
	IL-17	56
	IP-10	57
	KC	61
	MCP-1	62
	MIP-1 α	64
	MIP-1 β	66
	M-CSF	67
	MIP-2	73
	MIG	74
	RANTES	75
	VEGF	76
	TNF α	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 website www.emdmillipore.com 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, except for MIP-1 α / β . MIP-1 β cross-reacts with MIP-1 α beads 27%.

Assay Sensitivities (minimum detectable concentrations, pg/mL)

Minimum Detectable Concentration (MinDC) is calculated using MILLIPLEX[®] Analyst 5.1. 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.

Cytokine	Overnight Protocol (n = 6 Assays)		2 Hour Protocol (n = 2 Assays)	
	MinDC (pg/mL)	MinDC+2SD (pg/mL)	MinDC (pg/mL)	MinDC+2SD (pg/mL)
Eotaxin	1.8	2.2	2.6	3.4
G-CSF	1.7	2.7	2.8	2.9
GM-CSF	10.9	16.9	15.1	18.6
IFN γ	1.1	1.8	1.1	1.1
IL-1 α	10.3	18.8	7.0	15.9
IL-1 β	5.4	9.8	12.7	26.9
IL-2	1.0	2.0	0.6	0.7
IL-3	1.0	1.4	1.4	1.8
IL-4	0.4	0.5	0.3	0.3
IL-5	1.0	1.6	0.8	1.1
IL-6	1.1	2.0	2.1	3.3
IL-7	1.4	2.2	3.1	3.5
IL-9	17.3	28.1	33.3	46.3
IL-10	2.0	3.2	2.6	4.0
IL-12 (p40)	3.9	6.3	2.9	5.4
IL-12 (p70)	4.8	8.5	1.7	3.1
IL-13	7.8	20.0	*	*
IL-15	7.4	9.5	14.2	29.3
IL-17	0.5	0.8	0.7	1.3
IP-10	0.8	1.0	1.0	1.7
KC	2.3	4.5	2.0	4.0
LIF	1.0	1.3	2.2	2.8
LIX	22.1	33.2	51.0	79.4
MCP-1	6.7	12.6	4.1	6.4
M-CSF	3.5	6.1	4.1	4.7
MIG	2.4	3.2	5.8	8.7
MIP-1 α	7.7	12.5	29.3	33.3
MIP-1 β	11.9	21.0	17.9	20.2
MIP-2	30.6	46.5	26.9	36.5
RANTES	2.7	5.2	1.7	2.3
TNF α	2.3	3.4	3.1	7.1
VEGF	0.3	0.5	0.3	0.3

*Not recommend

ASSAY CHARACTERISTICS (continued)

Precision

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

*Not recommend

Cytokine	Overnight Protocol		2 Hour Protocol
	Intra-assay %CV	Inter-assay %CV	Intra-assay %CV
Eotaxin	2.1	4.4	4.4
G-CSF	2.6	5.1	3.0
GM-CSF	2.0	6.4	2.9
IFN γ	1.9	4.9	2.3
IL-1 α	4.4	4.7	4.2
IL-1 β	2.5	5.8	7.6
IL-2	1.5	3.8	2.5
IL-3	1.7	7.2	3.5
IL-4	1.7	5.1	3.3
IL-5	2.5	6.3	4.9
IL-6	2.3	5.4	4.0
IL-7	2.3	4.6	4.1
IL-9	2.7	4.9	6.6
IL-10	1.4	5.1	4.1
IL-12 (p40)	1.6	6.6	4.2
IL-12 (p70)	2.6	4.1	3.1
IL-13	2.5	≤15	*
IL-15	2.2	7.2	6.3
IL-17	2.0	5.8	2.9
IP-10	2.2	3.4	3.7
KC	3.3	6.0	6.0
LIF	3.3	2.9	5.3
LIX	2.5	8.3	12.5
MCP-1	1.9	4.3	4.4
M-CSF	2.7	5.7	5.1
MIG	3.2	4.7	4.9
MIP-1 α	1.5	5.5	5.7
MIP-1 β	1.9	4.6	2.8
MIP-2	2.9	6.8	2.8
RANTES	4.9	12.4	3.5
TNF α	2.6	9.3	4.1
VEGF	2.4	3.9	3.0

ASSAY CHARACTERISTICS (continued)

Accuracy

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

Cytokine	Overnight Protocol	2 Hour Protocol
	% Recovery in Serum Matrix	% Recovery in Serum Matrix
Eotaxin	98.1	94.1
G-CSF	91.6	96.0
GM-CSF	91.8	80.8
IFN γ	95.3	91.6
IL-1 α	92.1	98.7
IL-1 β	99.3	93.9
IL-2	91.2	90.3
IL-3	96.6	91.6
IL-4	95.0	95.4
IL-5	90.4	86.0
IL-6	92.2	92.4
IL-7	98.9	77.9
IL-9	101.6	94.4
IL-10	91.0	87.2
IL-12 (p40)	89.7	84.3
IL-12 (p70)	84.9	81.8
IL-13	106.5	99.2
IL-15	89.5	74.4
IL-17	96.7	91.6
IP-10	94.8	95.2
KC	93.3	96.9
LIF	97.2	97.2
LIX	93.1	93.0
MCP-1	95.0	81.1
M-CSF	89.5	91.8
MIG	92.5	98.3
MIP-1 α	96.7	86.1
MIP-1 β	96.4	90.5
MIP-2	90.5	94.9
RANTES	95.0	101.5
TNF α	94.0	91.3
VEGF	101.0	95.5

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 flush, Back flush and washes; or if needed probe should be removed and sonicated.</p> <p>When reading the assay on Luminex 200™, adjust probe height according to the protocols recommended by Luminex to the kit solid plate 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 pipeting with Multichannel pipets 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 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>Calibrate Luminex based on Instrument Manufacturer's instructions, at least once a week or if temperature has changed by >3°C.</p> <p>Some Luminex instruments (e.g. Bioplex) 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 4 times to rid of air bubbles, wash 4 times with sheath fluid or water if there is any remnant alcohol or sanitizing liquid.</p>

Beads not in region or gate (continued)	Beads were exposed to light	Keep plate and bead mix covered with dark lid or aluminum foil during all incubation steps.
Signal for whole plate is same as background	Incorrect or no Detection Antibody was added Streptavidin-Phycoerythrin was not added	Add appropriate Detection Antibody and continue. Add Streptavidin-Phycoerythrin according to protocol. If Detection Antibody has already been removed, sensitivity may be low.
Low signal for standard curve	Detection Antibody may have been removed prior to adding Streptavidin Phycoerythrin Incubations done at inappropriate temperatures, timings or agitation	May need to repeat assay if desired sensitivity not achieved. Assay conditions need to be checked.
Signals too high, standard curves are saturated	Calibration target value set too high Plate incubation was too long with standard curve and samples	With some Luminex Instrument (e.g. Bio-plex) Default target setting for RP1 calibrator is set at High PMT. Use low target value for calibration and reanalyze plate. Use shorter incubation time.
Sample readings are out of range	Samples contain no or below detectable levels of analyte Samples contain analyte concentrations higher than highest standard point. Standard curve was saturated at higher end of curve.	If below detectable levels, it may be possible to use higher sample volume. Check with tech support for appropriate protocol modifications. Samples may require dilution and reanalysis for just that particular analyte. See above.
High Variation in samples and/or standards	Multichannel pipet may not be calibrated Plate washing was not uniform Samples may have high particulate matter or other interfering substances Plate agitation was insufficient Cross well contamination	Calibrate pipets. Confirm all reagents are removed completely in all wash steps. See above. Plate should be agitated during all incubation steps using a vertical plate shaker at a speed where beads are in constant motion without causing splashing. Check when reusing plate sealer that no reagent has touched sealer. Care should be taken when using same pipet tips that are used for reagent additions and that pipet tip does not touch reagent in plate.

FOR FILTER PLATES ONLY		
Problem	Probable Cause	Solution
Filter plate will not vacuum	Vacuum pressure is insufficient	Increase vacuum pressure such that 0.2 mL buffer can be suctioned in 3-5 seconds.
	Samples have insoluble particles	Centrifuge samples just prior to assay setup and use supernatant.
	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 Sample too viscous	Adjust probe to 3 alignment discs in well H6. May need to dilute sample.

REPLACEMENT REAGENTS

Mouse Cytokine Standard
 Mouse Cytokine Quality Controls
 Serum Matrix
 Mouse Cytokine Detection Antibodies
 Streptavidin-Phycoerythrin

 Assay Buffer
 Set of two 96-Well plates with sealers
 10X Wash Buffer
 Mouse Cytokine/Chemokine 25 Plex Premixed
 Magnetic Bead Kit – BULK PACKAGED
 Mouse Cytokine/Chemokine 32 Plex Premixed
 Magnetic Bead Kit – BULK PACKAGED

Catalog

MXM8070; MXM8070-2
 MXM6070; MXM6070-2
 MXMSM
 MXM1070-1; MXM1070-2; or MXM1070-3
 L-SAPE3 (*Use with Cat. # MXM1070-1*),
 L-SAPE4 (*Use with Cat. # MXM1070-2*), or
 L-SAPE10 (*Use with Cat. # MXM1070-3*),
 L-AB
 MAG-PLATE
 L-WB
 MCYTMAG70PMX25BK

 MCYTMAG70PMX32BK

Antibody-Immobilized Magnetic Beads

<u>Cytokine</u>	<u>Bead #</u>	<u>Cat. #</u>
Eotaxin	14	METXN-MAG
G-CSF	13	MGCSF-MAG
GM-CSF	15	MGMCSF-MAG
IFN γ	19	MIFNG-MAG
IL-1 α	21	MIL1A-MAG
IL-1 β	25	MIL1B-MAG
IL-2	26	MIL2-MAG
IL-3	29	MIL3-MAG
IL-4	28	MIL4-MAG
IL-5	30	MIL5-MAG
IL-6	34	MCYIL6-MAG
IL-7	36	MIL7-MAG
IL-9	38	MIL9-MAG
IL-10	43	MIL10-MAG
IL-12 (p40)	45	MIL12P40-MAG
IL-12 (p70)	47	MIL12P70-MAG
IL-13	52	MIL13-MAG
IL-15	54	MIL15-MAG
IL-17	56	MIL17-MAG
IP-10	57	MIP10-MAG
KC	61	MKC-MAG
LIF	51	MLIF-MAG
LIX	53	MLIX-MAG
MCP-1	62	MCYMCP1-MAG
M-CSF	67	MMCSF-MAG
MIG	74	MMIG-MAG
MIP-1 α	64	MMIP1A-MAG
MIP-1 β	66	MMIP1B-MAG
MIP-2	73	MMIP2-MAG
RANTES	75	MRNTS-MAG
TNF α	77	MCYTNFA-MAG
VEGF	76	MVEGF-MAG
Premixed 25-plex Beads	---	MCYPMX25-MAG
Premixed 32-plex Beads	---	MCYPMX32-MAG

ORDERING INFORMATION

To place an order:

To assure the clarity of your custom kit order, please FAX the following information to our customer service department:

Include:

- Your name, telephone and/or fax number
- Customer account number
- Shipping and billing address
- Purchase order number
- Catalog number and description of product
- Quantity of kits
- Selection of MILLIPLEX[®] Analytes

FAX: (636) 441-8050

Toll-Free US: (866) 441-8400
(636) 441-8400

Mail Orders: EMD Millipore Corporation
6 Research Park Drive
St. Charles, Missouri 63304 U.S.A.

For European Customers:

To best serve our European customers in placing an order or obtaining additional information about MILLIPLEX[®] MAP products, please contact your multiplex specialist or sales representative or email our European Customer Service at:

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Finland	Asiakaspalvelu@merckgroup.com
Germany	GECustomerService@merckgroup.com
Ireland	IECustomerService@merckgroup.com
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Netherlands	BENLCustomerService@merckgroup.com
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ORDERING INFORMATION (continued)

Conditions of Sale

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

Material Safety Data Sheets (MSDS)

Material Safety Data Sheets for EMD Millipore products may be ordered by fax or phone or through our website at www.emdmillipore.com/techlibrary/index.do.

Technical Services

<http://www.emdmillipore.com/techservices>

To contact by phone

For North America: Toll-Free US: 1-(800) 221-1975 or 1-(781) 533-8045

Outside North America, contact your local office

<http://www.emdmillipore.com/offices>

WELL MAP

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