Human Liver Protein Panel

96 Well Plate Assay

Cat. # HLPP-57K

MILLIPLEX® MAP

HUMAN LIVER PROTEIN PANEL KIT
96 Well Plate Assay

HLPP-57K

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FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES

Human Liver Protein Bead Panel

Liver-secreted proteins play important roles in metabolic regulation. For example, liver-secreted proteins have been shown to regulate circulating lipoprotein levels, energy expenditure, glucose metabolism, and fatty acid uptake. In addition, some liver-secreted proteins may also serve as biomarkers for liver diseases and gastric cancer. Accurate measurement of liver proteins is critical to obtain understanding of their biological functions.

Millipore's MILLIPLEX MAP Human Liver Protein panel is the most versatile system available for Liver Protein research.

- MILLIPLEX MAP offers you the ability to:
    - Choose any combination of analytes from our panel of 9 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.

Millipore's MILLIPLEX MAP Human Liver Protein panel kit is to be used for the simultaneous quantification of AFP, ANGPTL3, ANGPTL4, ANGPTL6/AGF, HGF, FABP1/L-FABP, FGF-19, FGF-21, and FGF-23. This kit may be used for the analysis of all or any combination of the above analytes in tissue/cell lysate and culture supernatant samples and serum or plasma samples (**note:** when assaying ANGPTL6/AGF it is recommended that serum samples be used).

This kit is for research purposes only.

Please read entire protocol before use.

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

PRINCIPLE

MILLIPLEX® MAP & MILLIPLEX® *MAG* are 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 beads known as MagPlex ™-C microspheres.

- Luminex® uses proprietary techniques to internally color-code microspheres with two fluorescent dyes. Through precise concentrations of these dyes, 100 distinctly colored bead sets 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.
- The microspheres are allowed to pass rapidly through a laser which excites the internal dyes marking the microsphere set. A second laser excites PE, the fluorescent dye on the reporter molecule.
- Finally, high-speed digital-signal processors identify each individual microsphere and quantify the result of its bioassay based on fluorescent reporter signals.

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 RECONSITUTED 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
Human Liver Protein Panel Standard	HLPP-8057	lyophilized	1 vial
Human Liver Protein Panel Quality Controls 1 and 2	HLPP-6057	lyophilized	2 vials
Serum Matrix Note: Contains 0.08% Sodium Azide	MXHSM	lyophilized	1 vial
Set of one 96-Well Filter Plate with 2 sealers	MX-PLATE	----------	1 plate 2 sealers
Assay Buffer	LE-ABGLP	30 mL	1 bottle
10X Wash Buffer Note: Contains 0.05% Proclin	L-WB	30 mL	1 bottle
Human Liver Protein Panel Detection Antibodies	HLPP-1057	5.5 mL	1 bottle
Streptavidin-Phycoerythrin	L-SAPE7	5.5 mL	1 bottle
Bead Diluent	LHE-BD	3.5 mL	1 bottle
Mixing Bottle	----------	----------	1 bottle

Human Liver Protein Antibody-Immobilized Beads:

Bead/Analyte Name	Luminex Bead Region	Customizable 9 Analytes (20X concentration, 200 µL) Available	Cat. #
Anti-Human AFP Beads	7	✓	HAFP
Anti-Human ANGPTL3 Beads	31	✓	HANGPTL3
Anti-Human ANGPTL4 Beads	43	✓	HANGPTL4
Anti-Human ANGPTL6/AGFBeads	49	✓	HANGPTL6
Anti-Human HGF Beads	50	✓	HHGF
Anti-Human FABP1 Beads	54	✓	HFABP1
Anti-Human FGF-19 Beads	62	✓	HFGF19
Anti-Human FGF-21 Beads	85	✓	HFGF21
Anti-Human FGF-23 Beads	93	✓	HFGF23

MATERIALS REQUIRED BUT NOT PROVIDED

Reagents

1. Luminex Sheath Fluid (Luminex Catalogue #40-50000)

Instrumentation / Materials

1. Adjustable Pipettes with Tips capable of delivering 25 µL to 1000 µL
2. Multichannel Pipettes capable of delivering 5 µL to 50 µL or 25 µL to 200 µL
3. Reagent Reservoirs
4. Polypropylene Microfuge Tubes
5. Rubber Bands
6. Absorbent Pads
7. Laboratory Vortex Mixer
8. Sonicator (Branson Ultrasonic Cleaner Model # B200 or equivalent)
9. Titer Plate Shaker (Lab-Line Instruments Model #4625 or equivalent)
10. Vacuum Filtration Unit (Millipore Corporation, Vacuum Manifold, Catalog #MSVMHTS00, or equivalent; Vacuum Pump, Catalog #WP6111560, or equivalent)
11. Luminex 100™ IS,200™, HTS, or FLEXMAP 3D™ (Luminex Corporation)

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. On disposal, flush with a large volume of water to prevent azide build up.

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.

TECHNICAL GUIDELINES continued

- 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 ≤ -20°C for 1 month and at ≤ -80°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 100™ or Luminex 200™, adjust probe height according to the protocols recommended by Luminex to the kit solid plate using 4 alignment discs. When reading the assay on FLEXMAP 3D™, adjust probe height according to the protocols recommended by Luminex.
- 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 1:2, use the Serum Matrix provided in the kit for further dilution.
- 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 ≤ -20°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.
- Customers should determine the optimal dilution for their samples. Generally, serum samples will be diluted 1:2 in the Serum Matrix provided in the kit during plate setup under the "Immunoassay Procedure" section (i.e., per well 12.5 µL of Serum Matrix and 12.5 µL Serum sample added). When further dilution beyond 1:2 is required, continue to 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 ≤ -20°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.
- Customers should determine the optimal dilution for their samples. Generally, plasma samples will be diluted 1:2 in the Serum Matrix provided in the kit during plate setup under the "Immunoassay Procedure" section (i.e., per well 12.5 µL of Serum Matrix and 12.5 µL Plasma sample added). When further dilution beyond 1:2 is required, continue to 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 ≤ -20°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 12.5 µL per well of 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

Sonicate each antibody-bead vial for 30 seconds; vortex for 1 minute. Add 150 µL 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 one month.

Example 1: When using 6 antibody-immobilized beads, add 150 µL from each of the 6 bead vials to the Mixing Bottle. Then add 2.1 mL Bead Diluent.

Example 2: When using 9 antibody-immobilized beads, add 150 µL from each of the 9 bead vials to the Mixing Bottle. Then add 1.65 mL Bead Diluent.

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 ≤ -20°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 30 mL of 10X Wash Buffer with 270 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 1.0 mL Assay Buffer and 1.0 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 ≤ -20°C for up to one month.

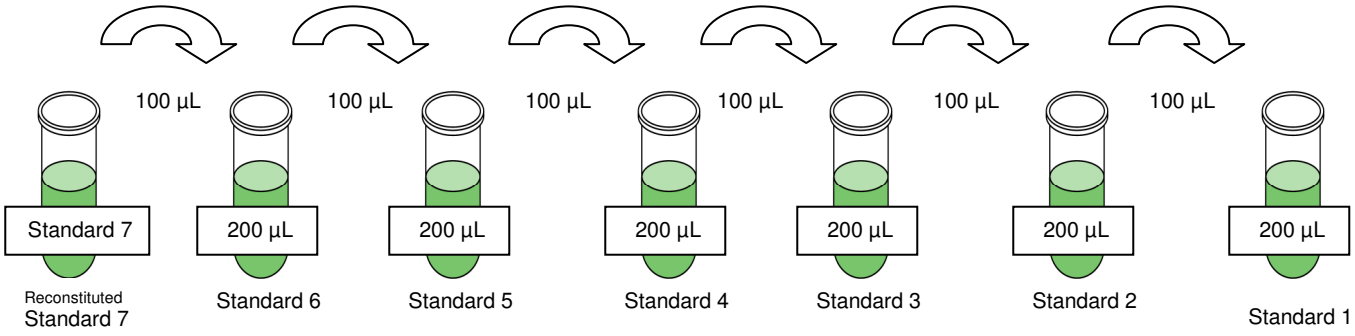
E. Preparation of Human Liver Protein Panel Standard

1) Prior to use, reconstitute the Human Liver Protein Panel Standard with 250 µL deionized water. Invert the vial several times to mix and vortex for 10 seconds. Allow the vial to sit for 5-10 minutes, vortex and transfer the contents to a polypropylene microfuge tube labeled “Standard 7”.

2) Label six polypropylene microfuge tubes “Standard 6”, “Standard 5”, “Standard 4”, “Standard 3”, “Standard 2”, and “Standard 1”, and add 200 µL of Assay Buffer to each of the six tubes. Perform 3-fold serial dilutions by adding 100 µL of the “Standard 7” to the “Standard 6” tube, mix well and transfer 100 µL of the “Standard 6” to the “Standard 5” tube, mix well and transfer 100 µL of the “Standard 5” to the “Standard 4” tube, mix well and transfer 100 µL of the “Standard 4” to the “Standard 3” tube, mix well and transfer 100 µL of the “Standard 3” to the “Standard 2” tube, mix well and transfer 100 µL of the “Standard 2” to the “Standard 1” tube, and mix “Standard 1” well. The “Standard 0” (Background Control) will be Assay Buffer.

Standard (Tube #)	**Volume of Deionized Water to Add**	**Volume of Standard to Add**
Standard 7 (reconstituted standard)	250 µL	0

Standard (Tube #)	**Volume of Assay Buffer to Add**	**Volume of Standard to Add**
Standard 6	200 µL	100 µL of Standard 7
Standard 5	200 µL	100 µL of Standard 6
Standard 4	200 µL	100 µL of Standard 5
Standard 3	200 µL	100 µL of Standard 4
Standard 2	200 µL	100 µL of Standard 3
Standard 1	200 µL	100 µL of Standard 2



After serial dilutions, the tubes should have the following concentrations for constructing standard curves.

Standard Tube #	AFP, FGF-19 (ng/mL)	ANGPTL3 (ng/mL)	ANGPTL4 (ng/mL)	ANGPTL6, FGF-23 (ng/mL)	HGF (ng/mL)	FABP1 (ng/mL)	FGF-21 (ng/mL)
1	0.14	0.69	5.49	1.37	0.07	0.27	0.01
2	0.41	2.06	16.46	4.12	0.21	0.82	0.04
3	1.23	6.17	49.38	12.35	0.62	2.47	0.12
4	3.70	18.52	148.15	37.04	1.85	7.41	0.37
5	11.11	55.56	444.44	111.11	5.56	22.22	1.11
6	33.33	166.67	1333.33	333.33	16.67	66.67	3.33
7	100	500	4000	1000	50	200	10

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), 1, 2, 3, 4, 5, 6, 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.
- 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. Remove Assay Buffer by vacuum. **(NOTE: DO NOT INVERT PLATE)**. Blot excess Assay Buffer from the bottom of the plate with an absorbent pad or paper towels.
3. Add 25 µL of each Standard or Control into the appropriate wells. Assay Buffer should be used for Standard 0 (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 12.5 µL of Sample into the appropriate wells.
7. Add 12.5 µL of appropriate matrix solution to the sample 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.
8. 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.)
9. Seal the plate with a plate sealer, cover it with the lid. Incubate with agitation on a plate shaker overnight (16-18 hr) at 4°C or 2 hours at room temperature (20-25° C). *An overnight incubation may improve assay sensitivity for some analytes.*

Add 200 µL Assay Buffer per well

↓ Shake 10 min, RT

↓ Vacuum

- 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 12.5 µL Samples to sample wells
- Add 12.5 µL appropriate matrix solution to sample wells
- Add 25 µL Beads to each well

↓ Incubate overnight at 4°C or 2 hours at RT with shaking

10. Gently remove fluid by vacuum. **(NOTE: DO NOT INVERT PLATE)**.
11. Wash plate 3 times with 200 µL/well of Wash Buffer, removing Wash Buffer by vacuum filtration between each wash. Blot excess Wash Buffer from the bottom of the plate with an absorbent pad or paper towels.
12. Add 50 µL of Detection Antibodies into each well. (Note: Allow the Detection Antibodies to warm to room temperature prior to addition.)
13. Seal, cover with lid and incubate with agitation on a plate shaker for 30 minutes at room temperature (20-25°C). **DO NOT VACUUM AFTER INCUBATION.**
14. Add 50 µL Streptavidin-Phycoerythrin to each well containing the 50 µL of Detection Antibodies.
15. Seal, cover with lid and incubate with agitation on a plate shaker for 30 minutes at room temperature (20-25°C).
16. Gently remove all contents by vacuum. **(NOTE: DO NOT INVERT PLATE)**.
17. Wash plate 3 times with 200 µL/well Wash Buffer, removing Wash Buffer by vacuum filtration between each wash. Wipe any excess buffer on the bottom of the plate with a tissue.
18. Add 100 µL of Sheath Fluid to all wells. Resuspend the beads on a plate shaker for 5 minutes.
19. Run plate on Luminex 10 0™, 200™ , HTS or FLEXMAP 3D™.
20. 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: Multiply the calculated concentration of the samples by the dilution factor, which is 2.)**

Vacuum and wash 3X with 200 µL Wash Buffer

Add 50 µL Detection Antibodies per well

Incubate for 30 minutes at RT

Do Not Vacuum

Add 50 µL Streptavidin-Phycoerythrin per well

Incubate for 30 minutes at RT

Vacuum and wash 3X with 200 µL Wash Buffer

Add 100 µL Sheath Fluid per well

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

EQUIPMENT SETTINGS

These specifications are for the Luminex 100™ IS v.1.7, Luminex 100™ IS v2.1/2.2, Luminex 200™ v2.3, xPONENT®, and Luminex HTS. Luminex instruments with other software (e.g. MasterPlex®, StarStation®, LiquiChip®, Bio-Plex®, LABScan®100) would need to follow instrument instructions for gate settings and additional specifications from the vendors.

Events:	50, per bead	
Sample Size:	50 µL	
Gate Settings:	8,000 to 15,000	
Reporter Gain:	Default (low PMT)	
Time Out:	60 seconds	
Bead Set:	Customizable 9-Plex Beads	
	AFP	7
	ANGPTL3	31
	ANGPTL4	43
	ANGPTL6/AGF	49
	HGF	50
	FABP1	54
	FGF-19	62
	FGF-21	85
	FGF-23	93

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 Millipore website www.millipore.com/techlibrary/index.do using the catalog number as the keyword.

ASSAY CHARACTERISTICS

Cross-Reactivity

Cross-reactivities for the AFP, ANGPTL3, ANGPTL6, HGF, FABP1, FGF-19, FGF-21, and FGF-23 assays were not detectable or negligible. ANGPTL6 standard had cross-reactivity with the ANGPTL4 assay of less than 2%.

Assay Sensitivities (minimum detectable concentrations, ng/mL)

Minimum Detectable Concentration (MinDC) is calculated by the StatLIA® Immunoassay Analysis Software from Brendan Technologies. 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. MinDC values were generated using magnetic bead assays (Catalog # HLPPMAG-57K)

Analyte	Overnight Protocol (n = 6 Assays)		2 Hour Protocol (n= 2 Assays)	
	MinDC (ng/mL)	MinDC+2SD (ng/mL)	MinDC (ng/mL)	MinDC+2SD (ng/mL)
AFP	0.095	0.144	0.105	0.147
ANGPTL3	0.562	0.725	0.405	0.759
ANGPTL4	1.316	2.150	1.250	1.391
ANGPTL6	0.433	0.847	0.850	0.991
HGF	0.011	0.018	0.013	0.020
FABP1	0.113	0.218	0.178	0.199
FGF-19	0.043	0.054	0.025	0.039
FGF-21	0.003	0.004	0.004	0.005
FGF-23	0.283	0.480	0.400	0.683

Precision

Intra-assay precision is generated from the mean of the %CV's from 8 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 6 different assays. The data was generated using magnetic bead assays (Catalog # HLPPMAG-57K)

Analyte	Overnight Protocol		2 Hour Protocol
	Intra-assay %CV	Inter-assay %CV	Intra-assay %CV
AFP	3.3	12.8	4.7
ANGPTL3	2.4	7.5	3.8
ANGPTL4	2.3	13.7	2.9
ANGPTL6	2.5	14.7	7.2
HGF	1.6	18.4	1.7
FABP1	2.2	16.2	21.8
FGF-19	1.8	16.1	5.0
FGF-21	1.5	12.4	2.8
FGF-23	2.0	14.8	5.5

Accuracy

Spike Recovery: The data represent mean percent recovery of spiked standards ranging from low, medium, and high concentration in serum matrix samples (n=5). The data was generated using magnetic bead assays (Catalog # HLPPMAG-57K)

Analyte	Overnight Protocol	2 Hour Protocol
	% Recovery in Serum Matrix	% Recovery in Serum Matrix
AFP	94.2	90.5
ANGPTL3	93.7	95.3
ANGPTL4	96.8	96.6
ANGPTL6	99.1	95.5
HGF	100.2	92.8
FABP1	96.6	103.2
FGF-19	98.0	102.6
FGF-21	98.8	94.4
FGF-23	96.6	92.4

TROUBLESHOOTING GUIDE

Problem	Probable Cause	Solution
Filter plate will not vacuum	Vacuum pressure is insufficient	Increase vacuum pressure such that 0.2mL buffer can be suctioned in 3-5 seconds
	Samples have insoluble particles	Centrifuge samples just prior to assay setup and use supernatant If high lipid concentration, after centrifugation, remove lipid layer and use supernatant.
	Sample too viscous	May need to dilute sample
Insufficient Bead Count	Vacuum pressure too high	Adjust vacuum pressure such that 0.2mL buffer can be suctioned in 3-5 seconds
	Bead mix prepared inappropriately	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.
	Samples cause interference due to particulate matter or viscosity	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.
	Probe height not adjusted correctly	With Luminex 100™ or Luminex 200™, adjust probe height according to the protocols recommended by Luminex to the kit solid plate using 4 alignment discs. With FLEXMAP 3D™, adjust probe height according to the protocols recommended by Luminex.
Plate leaked	Vacuum Pressure too high	Adjust vacuum pressure such that 0.2mL 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 4 alignment discs in well H6.
Background is too high	Background wells were contaminated	Avoid cross-well contamination by using sealer appropriately, and pipeting with Multichannel pipets without touching reagent in plate

	Matrix used has endogenous analyte or interference	Check matrix ingredients for cross reacting components (e.g. interleukin modified tissue culture medium)
	Insufficient washes	Increase number of washes
Beads not in region or gate	Luminex not calibrated correctly or recently	Calibrate Luminex based on Instrument Manufacturer's instructions, at least once a week or if temperature has changed by >3°C
	Gate Settings not adjusted correctly	Some Luminex instruments (e.g. Bioplex) require different gate settings than those described in the Kit protocol. Use Instrument default settings.
	Wrong bead regions in protocol template	Check kit protocol for correct bead regions or analyte selection
	Incorrect sample type used	Samples containing organic solvents or if highly viscous should be diluted or dialyzed as required
	Instrument not washed or primed	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.
	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	Add appropriate Detection Antibody and continue
	Streptavidin-Phycoerythrin was not added	Add Streptavidin-Phycoerythrin according to protocol. If Detection Antibody has already been vacuumed out, sensitivity may be low.
Low signal for standard curve	Detection Antibody may have been vacuumed out prior to adding Streptavidin Phycoerythrin	May need to repeat assay if desired sensitivity not achieved
	Incubations done at inappropriate temperatures, timings or agitation	Assay conditions need to be checked.
Signals too high, standard curves are saturated	Calibration target value set too high	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
	Plate incubation was too long with standard curve and samples	Use shorter incubation time.
Sample readings are out of range	Samples contain no or below detectable levels of analyte	If below detectable levels, it may be possible to use higher sample volume. Check with tech support for appropriate protocol modifications.
	Samples contain analyte concentrations higher than	Samples may require dilution and reanalysis for just that particular analyte

	highest standard point. Standard curve was saturated at higher end of curve.	 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 vacuumed out 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.

REPLACEMENT REAGENTS

Components	Catalog #
Human Liver Protein Panel Standard	HLPP-8057
Human Liver Protein Panel Quality Controls 1,2	HLPP-6057
Human Liver Protein Panel Detection Antibodies	HLPP-1057
Serum Matrix	MXHSM
Bead Diluent	LHE-BD
Assay Buffer	LE-ABGLP
Streptavidin-Phycoerythrin	L-SAPE7
96-Well Filter plate with 2 sealers	MX-PLATE
10X Wash Buffer	L-WB

Antibody-Immobilized Beads

Analyte	Bead #	Cat. #
AFP	7	HAFP
ANGPTL3	31	HANGPTL3
ANGPTL4	43	HANGPTL4
ANGPTL6/AGF	49	HANGPTL6
HGF	50	HHGF
FABP1	54	HFABP1
FGF-19	62	HFGF19
FGF-21	85	HFGF21
FGF-23	93	HFGF23

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:

- 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: (800) MILLIPORE

MAIL ORDERS: Millipore Corp.
6 Research Park Drive
St. Charles, Missouri 63304 U.S.A.

For International Customers:

To best serve our international 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 customerserviceEU@Millipore.com.

Conditions of Sale

All products are for research use only. They are not intended for use in clinical diagnosis or for administration to humans or animals. All products are intended for *in vitro* use only.

Material Safety Data Sheets (MSDS)

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

WELL MAP

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