Rat Kidney Toxicity Magnetic Bead Panel 2

96-Well Plate Assay

Cat. # RKTX2MAG-37K

MILLIPLEX® MAP

RAT KIDNEY TOXICITY MAGNETIC BEAD PANEL 2
96-Well Plate Assay

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

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INTRODUCTION

Absorption, distribution, metabolism and excretion (ADME) parameters are critical to all stages of a fully integrated drug development program and are used to augment the interpretation of toxicological findings. As toxicity has been found to be the leading cause of drug failure, this area of research is expanding in search of more sensitive, rapid methods for determining organ-specific damage as quickly as possible. Drug-induced damage to kidney cells, also known as renal toxicity, results from drug excretion. The traditional methodology for determining renal toxicity has been to measure the blood urea nitrogen (BUN) and serum creatinine. These two tests only detect kidney damage a week after it begins to occur and only show that damage has occurred somewhere in the kidney.

To identify damage caused by various compounds, it might be necessary to screen panels of nephrotoxicity biomarkers, 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
- Assay results comparable 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® MAP** Rat Kidney Toxicity Magnetic Bead Panel 2 enables you to explore kidney damage in specific kidney tissues. 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 multiple analytes simultaneously, which can dramatically improve productivity.

EMD Millipore's MILLIPLEX® MAP Rat Kidney Toxicity Magnetic Bead Panel 2 kit is to be used for the simultaneous quantification of any or all of the following analytes in urine samples: Albumin, α-1-Acid Glycoprotein (AGP), β-2-Microglobulin (β2M), Cystatin C, EGF, and Lipocalin-2/NGAL.

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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 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.
- 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
Rat Kidney Toxicity Panel 2 Standard	RKTXMG2-8037-2	Lyophilized	1 vial
Rat Kidney Toxicity Panel 2 Quality Controls 1 and 2	RKTXMG2-6037-2	Lyophilized	2 vials
Set of one 96-Well Plate with 2 sealers	----------	----------	1 plate 2 sealers
Assay Buffer	L-AB1	30 mL	1 bottle
10X Wash Buffer Note: Contains 0.05% Proclin	L-WB	30 mL	2 bottles
Bead Diluent	LA-BD	4.0 mL	1 bottle
Rat Kidney Toxicity Panel 2 Biotinylated Albumin (only supplied if Albumin is a requested analyte)	RKTXMG-BTAB	3.2 mL	1 bottle
Rat Kidney Toxicity Panel 2 Detection Antibodies	RKTXMG2-1037-2	5.5 mL	1 bottle
Streptavidin-Phycoerythrin	L-SAPE	5.5 mL	1 bottle
Mixing Bottle	----------	----------	1 bottle

Included Rat Kidney Toxicity Magnetic Bead Panel 2 Antibody-Immobilized Beads are dependent on customizable selection of analytes within the panel (see below).

Rat Kidney Toxicity Magnetic Bead Panel 2 Antibody-Immobilized Magnetic Beads:

Bead/Analyte Name	Luminex® Magnetic Bead Region	Customizable 6 Analytes (20X concentration, 200 µL) Available	Cat. #
Anti-Rat Albumin Bead	12	✓	RALBMN-MAG
Anti-Rat AGP Bead	14	✓	RAGP-MAG
Anti-Rat β2M Bead	18	✓	RB2MG-MAG
Anti-Rat Cystatin C Bead	25	✓	RCYSTNC-MAG
Anti-Rat EGF Bead	27	✓	RKTEGF-MAG
Anti-Rat Lipocalin-2/NGAL Bead	29	✓	RLPCLN2-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 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. 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 (Bio-Tek ELx405, EMD Millipore Catalog # 40-015 or equivalent) or Hand-held 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 (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.
- 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 ≤ -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® 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® to the kit solid plate using 1 alignment disc. When reading the assay on MAGPIX®, adjust probe height according to the protocols recommended by Luminex® to the kit solid plate using 2 alignment discs.
- For urine samples that require further dilution beyond 1:500, use the assay buffer provided in the kit.
- Vortex all reagents well before adding to plate.

SAMPLE COLLECTION AND STORAGE

A. Preparation of Urine Samples:

- Centrifuge samples briefly to pellet debris. 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.
- Urine samples should be diluted 1:500 in the Assay Buffer provided in the kit. For example, in a tube, 10 µL of urine may be combined with 90 µL Assay Buffer to give a 1:10 dilution then, in a new tube, 5 µL of the 1:10 dilution may be combined with 245 µL Assay Buffer to give a 1:500 dilution. When further dilution beyond 1:500 is required, use Assay Buffer as the diluent.

NOTE:

- A maximum of 25 µL per well of 1:500 diluted urine can 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

For individual vials of 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. (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 3 antibody-immobilized beads, add 150 µL from each of the 3 bead vials to the Mixing Bottle. Then add 2.55 mL Bead Diluent.

Example 2: When using 6 antibody-immobilized beads, add 150 µL from each of the 6 bead vials to the Mixing Bottle. Then add 2.10 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. 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 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.

E. Preparation of Rat Kidney Toxicity Magnetic Bead Panel 2 Standard

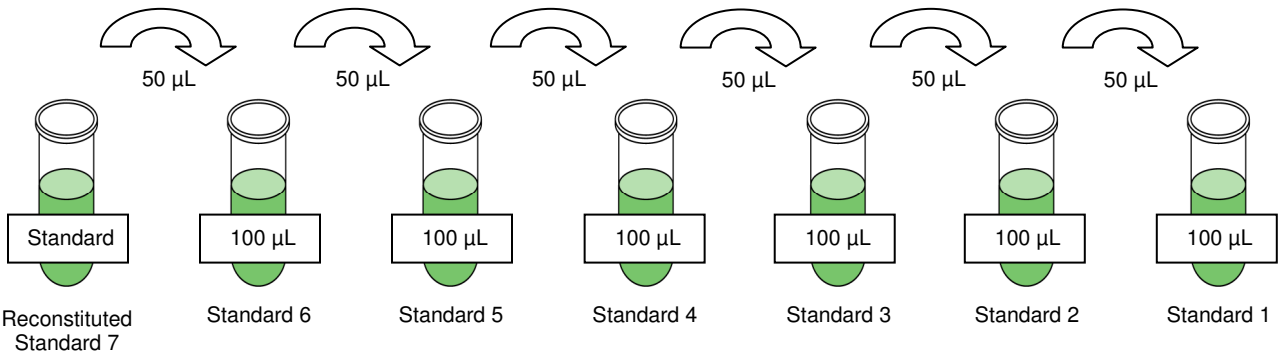
1.) Prior to use, reconstitute the Rat Kidney Toxicity Panel 2 Standard with 250 µL deionized water (refer to table below for analyte concentrations). Invert the vial several times to mix. Vortex the vial for 10 seconds. Allow the vial to sit for 5-10 minutes. This will be used as Standard 7; the unused portion may be stored at ≤ -20°C for up to one month.

2). Preparation of Working Standards

Label 6 polypropylene microfuge tubes Standard 1 through Standard 6. Add 100 µL of Assay Buffer to each of the 6 tubes. Prepare serial dilutions by adding 50 µL of the reconstituted Standard 7 to the Standard 6 tube, mix well and transfer 50 µL of Standard 6 to the Standard 5 tube, mix well and transfer 50 µL of Standard 5 to the Standard 4 tube, mix well and transfer 50 µL of Standard 4 to the Standard 3 tube, mix well and transfer 50 µL of Standard 3 to the Standard 2 tube, mix well and transfer 50 µL of Standard 2 to the Standard 1 tube and mix well. The 0 ng/mL standard (Background) will be Assay Buffer.

Standard Tube #	Volume of Deionized Water to Add	Volume of Standard to Add
Standard 7	250 µL	0

Standard Tube #	Volume of Assay Buffer to Add	Volume of Standard to Add
Standard 6	100 µL	50 µL of Standard 7
Standard 5	100 µL	50 µL of Standard 6
Standard 4	100 µL	50 µL of Standard 5
Standard 3	100 µL	50 µL of Standard 4
Standard 2	100 µL	50 µL of Standard 3
Standard 1	100 µL	50 µL of Standard 2



After dilution, each tube has the following concentrations for each analyte:

Standard	Albumin (ng/mL)	AGP (ng/mL)	β2M (ng/mL)
Standard 1	11	1.4	0.5
Standard 2	33	4.1	1.4
Standard 3	99	12.4	4.3
Standard 4	296	37.0	13.0
Standard 5	889	111.1	38.9
Standard 6	2,667	333.3	116.7
Standard 7	8,000	1,000.0	350.0

Standard	Cystatin C (ng/mL)	EGF (ng/mL)	Lipocalin-2/NGAL (ng/mL)
Standard 1	0.01	0.003	0.01
Standard 2	0.03	0.008	0.04
Standard 3	0.10	0.025	0.12
Standard 4	0.30	0.074	0.37
Standard 5	0.89	0.222	1.11
Standard 6	2.67	0.667	3.33
Standard 7	8.00	2.000	10.00

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 1:500 diluted Sample to the sample wells.
5. If measuring Albumin, add 25 µL of Biotinylated Albumin to each well. If Albumin is not one of the selected analytes, add 25 µL of Assay Buffer instead to each well.
6. 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.)
7. Seal the plate with a plate sealer. Wrap the plate with foil and incubate with agitation on a plate shaker overnight (16-18 hours) at 4°C.

Add 200 µL Assay Buffer per well

↓ Shake 10 min, RT

↓ Decant

- Add 25 uL Assay Buffer to background wells
- Add 25 µL Standard or Control to appropriate wells
- Add 25 µL 1:500 diluted Samples to sample wells
- Add 25 µL Biotinylated Albumin (if Albumin is a selected analyte) or 25 µL Assay Buffer (if Albumin is excluded) to each well
- Add 25 µL Beads to each well

↓ Incubate overnight at 4°C

8. Gently remove well contents and wash plate 2 times following instructions listed in the **PLATE WASHING** section.

9. Add 50 µL of Detection Antibodies into each well. (Note: Allow the Detection Antibodies to warm to room temperature prior to addition.)

10. 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.**

11. Add 50 µL Streptavidin-Phycoerythrin to each well containing the 50 µL of Detection Antibodies.

12. Seal, cover with foil and incubate with agitation on a plate shaker for 30 minutes at room temperature (20-25°C).

13. Gently remove well contents and wash plate 2 times following instructions listed in the **PLATE WASHING** section.

14. Add 125 µL of Sheath Fluid (or Drive Fluid if using MAGPIX®) to all wells. Resuspend the beads on a plate shaker for 5 minutes.

15. Run plate on Luminex® 200™, HTS, FLEXMAP 3D® or MAGPIX® with xPONENT software.

16. 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 µL Wash Buffer

Add 50 µL Detection Antibodies per well

Incubate 1 hour at RT

Do Not Aspirate

Add 50 µL Streptavidin-Phycoerythrin per well

Incubate for 30 minutes at RT

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

Add 125 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 hand-held magnet or magnetic plate washer.

A.) For hand-held magnet, 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 uL 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.) For magnetic plate washer, let plate "soak" on magnet for 60 seconds to allow complete settling of the magnetic beads. Remove well contents by aspiration. Wash plate with 200 µL/well of Wash Buffer, letting beads "soak" for 60 seconds and removing Wash Buffer by aspiration after each wash. Repeat wash steps as recommended in Assay Procedure. **Note:** If using the recommended plate washer for magnetic beads (Bio-Tek ELx405) follow the appropriate equipment settings outlined in **EQUIPMENT SETTINGS.**

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 µL/well of Wash Buffer, removing Wash Buffer by vacuum filtration after each wash. Repeat wash steps as recommended in the Assay Procedure.

EQUIPMENT SETTINGS

Bio-Tek ELx405:
The general recommended wash protocol (Link Protocol) is as follows:

Soak Program:	Wash Program:
Soak →	Aspirate→Dispense→Soak→Aspirate→Dispense→Soak→Aspirate

1.) Soak program:

1. Soak duration: 60 sec
2. Shake before soak?: NO

2.) Wash program:

Method:

1. Number of cycles: 2
2. Soak/shake: YES
3. Soak duration: 60 sec
4. Shake before soak: NO
5. Prime after soak: NO

EQUIPMENT SETTINGS (continued)

Dispense:

1. Dispense volume: 200 µL/well
2. Dispense flow rate: 5
3. Dispense height: 130 (16.51 mm)
4. Horizontal disp pos: 00 (0 mm)
5. Disable Aspirate: YES
6. Bottom Wash first?: NO
7. Prime before start?: NO

Aspiration:

1. Aspirate height: 35 (4.445 mm)
2. Horizontal Asp Pos: 30 (1.372 mm)
3. Aspiration rate: 06 (15.0 mm/sec)
4. Aspiration delay: 0
5. Crosswise Aspir: NO
6. Final Aspir: YES
7. Final Aspir delay: 0 (0 msec)

3.) Link program: (**Note:** this is the program to use during actual plate washing). Link together the Soak and Wash programs outlined above.

Note: After the final aspiration, there will be approximately 25 µL 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 ELx405, please refer to the manufacturer's recommendations for programming instructions.

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, LABScan100) 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: 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:	100 µL	
Gate Settings:	8,000 to 15,000	
Reporter Gain:	Default (low PMT)	
Time Out:	60 seconds	
Bead Set:	Customizable 6-Plex Beads	
	Albumin	12
	AGP	14
	β2M	18
	Cystatin C	25
	EGF	27
	Lipocalin-2/NGAL	29

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 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. 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 = 13 Assays)		2 Hour Protocol (n = 5 Assays)	
	MinDC (ng/mL)	MinDC+2SD (ng/mL)	MinDC (ng/mL)	MinDC+2SD (ng/mL)
Albumin	2.102	5.851	1.476	2.829
AGP	0.350	0.845	0.269	0.661
β2M	0.101	0.252	0.155	0.295
Cystatin C	0.003	0.009	0.003	0.007
EGF	0.005	0.009	0.007	0.012
Lipocalin-2/NGAL	0.002	0.005	0.003	0.008

Precision

Intra-assay precision is generated from the mean of the %CVs from 8 reportable results across two different concentrations of analytes in a single assay. Inter-assay precision is generated from the mean of the %CVs across two different concentrations of analytes across 10 different assays.

Analyte	Overnight Protocol		2 Hour Protocol
	Intra-assay %CV	Inter-assay %CV	Intra-assay %CV
Albumin	<10	<15	<10
AGP	<15	<20	<15
β2M	<10	<15	<10
Cystatin C	<10	<15	<10
EGF	<10	<15	<10
Lipocalin-2/NGAL	<10	<15	<10

Accuracy

Spike Recovery: The data represent mean percent recovery of spiked standards ranging from low, medium, and high concentration in urine samples (n=8).

Analyte	Overnight Protocol	2 Hour Protocol
	% Recovery in Urine Samples	% Recovery in Urine Samples
Albumin	107	99
AGP	119	101
β2M	105	101
Cystatin C	100	99
EGF	102	102
Lipocalin-2/NGAL	100	101

TROUBLESHOOTING GUIDE

Problem	Probable Cause	Solution
Insufficient Bead Count	Plate Washer aspirate height set too low	Adjust aspiration height according to manufacturers' instructions.
	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	When reading the assay on 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® to the kit solid plate using 1 alignment disc. When reading the assay on MAGPIX®, adjust probe height according to the protocols recommended by Luminex® to the kit solid plate using 2 alignment discs.
Background is too high	Background wells were contaminated	Avoid cross-well contamination by using sealer appropriately, and pipetting with Multichannel pipettes without touching reagent in plate.
	Insufficient washes	Increase number of washes.
Beads not in region or gate	Luminex® instrument 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 removed, sensitivity may be low.
Low signal for standard curve	Detection Antibody may have been removed 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® Instruments (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 highest standard point.	Samples may require dilution and reanalysis for just that particular analyte.
	Standard curve was saturated at higher end of curve.	See above.
High Variation in samples and/or standards	Multichannel pipette may not be calibrated	Calibrate pipettes.
	Plate washing was not uniform	Confirm all reagents are removed completely in all wash steps.
	Samples may have high particulate matter or other interfering substances	See above.
	Plate agitation was insufficient	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.
	Cross-well contamination	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.
FOR FILTER PLATES ONLY		
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	Adjust probe to 3 alignment discs in well H6.
	Sample too viscous	May need to dilute sample.

REPLACEMENT REAGENTS	**Catalog #**
Rat Kidney Toxicity Panel 2 Standard	RKTXMG2-8037-2
Rat Kidney Toxicity Panel 2 Quality Controls 1 and 2	RKTXMG2-6037-2
Bead Diluent	LA-BD
Rat Kidney Toxicity Panel 2 Biotinylated Albumin (only supplied if Albumin is a requested analyte)	RKTXMG-BTAB
Rat Kidney Toxicity Panel 2 Detection Antibodies	RKTXMG2-1037-2
Streptavidin-Phycoerythrin	L-SAPE
Assay Buffer	L-AB1
Set of two 96-Well plates with sealers	MAG-PLATE
10X Wash Buffer	L-WB

Antibody-Immobilized Magnetic Beads

Analyte	Bead #	Cat. #
Albumin	12	RALBMN-MAG
AGP	14	RAGP-MAG
β2M	18	RB2MG-MAG
Cystatin C	25	RCYSTNC-MAG
EGF	27	RKTEGF-MAG
Lipocalin-2/NGAL	29	RLPCLN2-MAG

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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									