

FIDIS™ MULTISPECIES TGF-β1 KIT

English

REF

MX HG01121



RUO

INTRODUCTION

Advances in the field of cell biology have defined a complex and interdependent set of extracellular and intracellular signaling molecules that control normal cell function. Perturbations in signaling pathways may be important indicators, and possibly the root cause, of many diseases. Therefore, there is growing interest among clinicians as well as drug discovery groups in monitoring multiple components of signaling pathways simultaneously. Solid phase multiplex protein assays have become the primary tools of choice in these studies as they maximize efficiency by permitting several analytes to be profiled within individual samples.

bmd's Multiplex Bead Immunoassays are solid phase protein assays which use spectrally encoded antibody-conjugated beads as the solid support. The spectral beads are suitable for use in singleplex assays or may be mixed for multiplex assays according to the researcher's needs. Each assay is carefully designed and tested to assure that sensitivity, range and correlation are maximized. The assay is performed in a 96 well plate format and analyzed with a FIDIS™ instrument, which monitors the spectral properties of the capture beads while simultaneously measuring the quantity of associated fluorophore. Standard curves generated with this assay system extend over several orders of magnitudes of concentrations, while the sensitivity and quantitation of the assays are comparable to ELISAs (Enzyme Linked-Immuno-Sorbent Assays). Assay standards are calibrated to NIBSC reference preparations, when available, to assure accurate and reliable results.

This kit provides a series of combined reagents for the measurement of TGF-β1.

The **FIDIS™ Multispecies TGF-β1 assay** is designed for the quantitative determination of TGF-β1 in human, mouse, rat and monkey serum, plasma, and tissue culture supernatant. **This kit cannot be multiplexed due to sample treatment required.**

This kit has been configured for research use only and is not to be used in diagnostic procedures.

Read entire protocol before use.

PRINCIPLE OF THE METHOD

bmd's Multiplex Bead Immunoassays are solid phase sandwich immunoassays, which are designed to be analyzed with a FIDIS™ instrument. The spectral properties of 100 distinct bead regions can be monitored with the FIDIS™ instrument, a capability that affords this assay system the potential for measuring up to 100 different analytes in a single sample.

- Beads of defined spectral properties conjugated to analyte specific capture antibodies and samples (including standards of known analyte concentration, control specimens, and unknowns) are pipetted into the wells of a filter bottom microplate and incubated for 2 hours. During this first incubation, analytes bind to the capture antibodies on the beads.
- After washing the beads, analyte-specific biotinylated detector antibodies are added and incubated with the beads for 1 hour. During this second incubation, the analyte-specific biotinylated detector antibodies recognize their epitopes and bind to the appropriate immobilized analytes.
- After removal of excess biotinylated detector antibodies, streptavidin conjugated to the fluorescent protein, R-Phycoerythrin (Streptavidin-RPE), is added and incubated for 30 minutes. During this final incubation, the Streptavidin-RPE binds to the biotinylated detector antibodies associated with the immune complexes on the beads, forming a four-member solid phase sandwich.
- After washing to remove unbound Streptavidin-RPE, the beads are analyzed with the FIDIS™ instrument. By monitoring the spectral properties of the beads and the amount of associated R-Phycoerythrin (RPE) fluorescence, the concentration of one or more analytes can be determined.

MATERIAL REQUIRED BUT NOT PROVIDED

- FIDIS™ system. Please contact [bmd](#) for instrument and software placement services.
- [bmd](#) filtration manifold for bead washing.
- [bmd](#) data analysis and graphing software program.
- Sonicating water bath (e.g., Cole Parmer, Cat. # 08849-00).
- Orbital shaker (e.g., Fisher, Cat. # 14-271-9).
- Calibrated, adjustable, precision pipettes, preferably with disposable plastic tips. (A manifold multi-channel pipette is desirable.)
- Distilled or deionized water.
- Glass or plastic tubes.
- Beakers and graduated cylinders in various sizes.
- Aluminum foil.
- Extra filter plate covers.

REAGENTS PROVIDED

	MX HC01121
<i>Filter Plate, 96 wells per plate</i>	1 plate
<i>Multispecies TGF-β1 Antibody Bead Concentrate (10x).</i> Contains 0.05% sodium azide (0.25 mL per vial)	1 vial
<i>Multispecies TGF-β1 Biotinylated Antibody Concentrate (10x).</i> Contains 0.1% sodium azide; (1 mL per vial)	1 vial
<i>Multispecies TGF-β1 Standard.</i>	2 vials
<i>Wash Solution Concentrate (20x)</i> Contains 0.1% sodium azide; (15 mL per bottle)	1 bottle
<i>Assay Diluent.</i> Contains 0.1% sodium azide; (15 mL per bottle)	1 bottle
<i>Incubation Buffer.</i> Contains 0.1% sodium azide; (12 mL per bottle)	1 bottle
<i>Biotin Diluent.</i> Contains 3.3 mM thymol; (12 mL per bottle)	1 bottle
<i>Streptavidin-RPE Concentrate (10x).</i> Contains 0.1% sodium azide; (1 mL per vial)	1 vial
<i>Streptavidin-RPE Diluent.</i> Contains 3.3 mM thymol; (12 mL per bottle)	1 bottle

STABILITY AND STORAGE

- Store reagents and assay strips at +2°C/+8°C in their own package.
- Do not freeze

SAFETY

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.

This kit contains materials with small quantities of sodium azide. Sodium azide reacts with lead and copper plumbing to form explosive metal azides. Upon disposal, flush drains with a large volume of water to prevent azide accumulation. Avoid ingestion and contact with eyes, skin and mucous membranes. In case of contact, rinse affected area with plenty of water. Observe all federal, state and local regulations for disposal.

PROCEDURAL NOTES / LAB QUALITY CONTROL

1. Do not freeze any component of this kit. When not in use, kit components should be stored at +2°C to +8°C. All reagents should be brought to room temperature before use. (air-warm all reagents at room temperature for at least 30 minutes, or alternatively, in a room-temperature water bath for 20 minutes (except plate and standard vials)).
2. **The fluorescent beads are light-sensitive.** Protect the beads from light to avoid photobleaching of the embedded dye. Aluminum foil should be used to cover test tubes used in the assay. Filter plates containing beads should be shielded with an aluminium foil-wrapped plate cover. The amber vial does not provide full protection, and should therefore be kept covered in the box when not in use.
3. Do not expose beads to organic solvents.

4. Do not place filter plates on absorbent paper towels during loading or incubations, as liquid will be lost due to wicking. An extra plate cover serves as a good surface upon which to rest the filter plate. Following plate washing, excess liquid may be blotted from the bottom of the plate by pressing the plate on clean paper towels.
5. Do not invert the filter plates during the assay. The filter plates are designed to be used in conjunction with a vacuum manifold (DO NOT EXCEED 5 inches Hg) and emptied from the bottom.
6. When pipetting reagents, maintain a consistent order of addition from well-to-well. This method ensures equal incubation times for all wells.
7. Avoid touching the filter plate membrane with pipette tips to prevent tearing.
8. Do not use reagents after kit expiration date.
9. In-house controls should be run with every assay. If control values fall outside pre-established ranges, the accuracy of the assay is suspect.
10. Do not mix or substitute reagents with those from other lots or sources.

PREPARATION OF WASH SOLUTION

Upon storage at +2°C to +8°C, a precipitate may form in the 20x *Wash Solution Concentrate*. If this occurs, warm to +37°C and vortex until the precipitate is dissolved.

The *Wash Solution Concentrate* is provided as a 20x concentrate. To prepare the Working Wash Solution for use with a 96 well plate, transfer the entire contents of bottle to a 500 mL container and add 285 mL of deionized water. If not using an entire 96 well plate, smaller volumes of 1x Working Wash Solution can be made by mixing 1 part of 20x concentrate with 19 parts deionized water.

The Working Wash Solution is stable for up to two weeks when stored at +2°C to +8°C.

Note: To prepare smaller volumes of 1X Working Wash Solution, mix 1 part of 20X concentrate with 19 parts of deionized water. Mix well.

DIRECTIONS FOR WASHING

Incomplete washing will adversely affect assay outcome. All washing must be performed with the Wash Solution provided. All phases of the assay, including incubation steps, washing steps, and loading the beads into the FIDIS™ instrument, are performed in the filter bottom plate provided. Unused wells may be left dry during the assay and used at a later time.

1. To wash beads, place the filter plate on the vacuum manifold and aspirate the liquid with gentle vacuum (**do not exceed 5 mm Hg**). Excessive vacuum can cause the membrane to tear, resulting in antibody bead loss. Prevent any vacuum surge by opening and adjusting the vacuum on the manifold before placing the plate on the manifold surface.
2. Stop the vacuum pressure as soon as the wells are empty. Do not attempt to pull the plate off the vacuum manifold while the vacuum is still on or filter plate damage may occur. Release the vacuum prior to removing the plate.
3. If solution remains in the wells during vacuum aspiration, **do not detach the bottom of the 96 well filter plate**. In some cases, minor clogs in the filter plate may be dislodged by carefully pressing the bottom of the plate under the clogged well with the pointed end of a 15 mL plastic conical tube. Place the filter plate on a clean paper towel and use a gloved thumb or a 1 mL Pasteur pipette bulb to plunge the top of the clogged well. Empty all clogged wells entirely

before continuing the washes. **Note:** Do not attempt to repetitively pull vacuum on plates with clogged wells. This can compromise the unclogged wells and bead loss may occur.

- After all wells are empty, lightly tap or press the filter plate onto clean paper towels (hold the plate in the center for tapping) to remove excess fluid from the bottom of the filter plate. **Do not invert plate.**
- Following the last aspiration and plate taps, use a clean absorbent towel to blot the bottom of the filter plate before addition of next liquid phase or data acquisition step.
- Do not leave plate on absorbent surface when adding reagents.**

PREPARATION OF SAMPLE

- The **Multispecies TGF- β 1 assay requires a sample treatment step; refer to the Information Sheet included with this kit.**
- Serum, plasma, and tissue culture medium samples have been evaluated with [bmd](#)'s Multiplex Bead Assays. When possible, avoid the use of hemolyzed or lipemic sera. Suitable sample types are defined on the **INFORMATION SHEET** included in this kit.
- Samples should be collected in pyrogen/endotoxin-free polypropylene tubes. Centrifuge, separate, and transfer samples to polypropylene tubes for storage.
- Samples should be analyzed shortly after collection or frozen. Avoid multiple freeze-thaw cycles of frozen samples. Thaw completely and mix well (DO NOT VORTEX) prior to analysis.
- All samples need to be clarified by centrifugation (14,000 rpm for 10 minutes) and/or filtered prior to analysis to prevent clogging of the filter plates.
- Samples with concentrations that exceed the standard curve should be diluted and reanalyzed. Serum or plasma samples should be diluted in *Assay Diluent*. Tissue culture supernatants should be diluted in the corresponding tissue culture medium.

REAGENT PREPARATION

Preparation of Standard

Each kit comes with 2 complete sets of standard vials, so that 2 runs on the plate can be made with freshly prepared standards.

Reconstitute the protein standard within one hour of performing the assay. All standards are calibrated to NIBSC preparations, when available. Additional standards are available from [bmd](#). The standard included in this kit is provided as a premixed set of related markers.

Before performing standard mixing and serial dilutions confirm reconstitution volumes on the **INFORMATION SHEET** included in the Singleplex Bead Kit(s).

The concentrations of the protein components of the standard are indicated on the **INFORMATION SHEET** included in this kit. Standard dilutions may be performed in glass or plastic tubes.

When using serum or plasma samples, reconstitute the standard with *Assay Diluent* provided.

If using other sample types (e.g., tissue culture supernatant), reconstitute the standard with a mixture composed of 50% *Assay Diluent* and 50% of the matrix which most closely matches the sample type (50%/50% mixture).

For example: When the sample type is RPMI medium containing 5% FBS, the standards should be reconstituted in a mixture

composed of 50% *Assay Diluent* and 50% RPMI containing 5% FBS.

Reconstitution of Lyophilized Standards

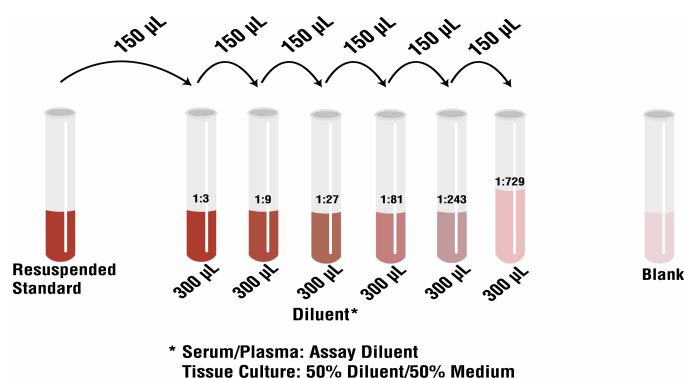
To the standard vial(s) add 1mL of the appropriate diluent (see above). Do not vortex. When mixing or reconstituting protein solutions, always avoid foaming.

Replace the vial stopper and allow the vial to stand undisturbed for 10 minutes.

Gently swirl and invert the vial 2-3 times to ensure complete reconstitution and allow the vial to sit for an additional 5 minutes.

Prepare the Standard Curve

The standard curve is made by serially diluting the reconstituted standard in *Assay Diluent* (serum and plasma samples) or a mixture of 50% *Assay Diluent* plus 50% culture medium. See diagram below. DO NOT VORTEX. Mix by pipetting up and down 5-10 times.



Discard all remaining reconstituted and diluted standards after completing assay. Return the *Assay Diluent* to the refrigerator.

Preparation of Antibody Conjugated Beads

Determine the number of wells required for the assay. Standard curves and samples may be run singly or in replicates, as desired.

The beads are provided as a 10x concentrate and must be diluted prior to use. The fluorescent beads are light-sensitive. **Protect antibody conjugated beads from light during handling.**

Immediately before dispensing, vortex the 10x bead concentrate for 30 seconds followed by sonication in a sonicating water bath for 30 seconds. To make a 1x stock, dilute 2.5 μ L from each 10x bead vial in 22.5 μ L Working Wash Solution per assay well. Each well requires 25 μ L of the diluted beads. See table below for examples of volumes to combine.

Note: Dilution factor is 1:11 for extra pipetting volume.

Number of Wells	Vol. 10x Capture Beads (Inflammatory 5-Plex)	Vol. 10x Capture Beads (Th1/Th2 5-Plex)	Vol. Working Wash Solution
24	0.06 mL	0.06 mL	0.54 mL
32	0.08 mL	0.08 mL	0.72 mL
40	0.10 mL	0.10 mL	0.90 mL
48	0.12 mL	0.12 mL	1.08 mL
56	0.14 mL	0.14 mL	1.26 mL
64	0.16 mL	0.16 mL	1.44 mL
72	0.18 mL	0.18 mL	1.62 mL
80	0.20 mL	0.20 mL	1.80 mL
88	0.22 mL	0.22 mL	1.98 mL
96	0.24 mL	0.24 mL	2.16 mL

ASSAY PROCEDURE

Recommendation : Reverse pipetting

To reduce bubbles and loss of reagents due to residual fluid left in pipette tips, use the recommended reverse pipetting technique.

- To reverse pipette, set the pipette to the appropriate volume needed. **Note:** Do not reverse pipette volumes <20 μ L.
- Press the push-button slowly to the first stop and then press on past it. **Note:** the amount past the first stop will depend on the volume of liquid available to aspirate from.
- Immerse the tip into the liquid, just below the meniscus.
- Release the push-button slowly and smoothly to the top resting position to aspirate the set volume of liquid.
- Place the end of the tip against the inside wall of the recipient vessel at an angle.
- Press the push button slowly and smoothly to the first stop. Some liquid will remain in the tip, this should not be dispensed.
- Remove the tip, keeping the pipette pressed to the first stop.

NOTE: Bring all reagents and samples to room temperature before use.

- Use an adhesive plate cover to seal any unused wells. Pre-wet the wells designated for the assay. Pipette 0.2 mL of *Working Wash Solution* into designated wells. Wait 15 to 30 seconds then aspirate the *Working Wash Solution* from the wells using the vacuum manifold. Wells not used during the assay should be kept dry for future use. An adhesive plate cover may be used to seal the unused wells.
- Vortex the diluted bead solution for 30 seconds, then sonicate for at least 30 seconds immediately prior to use in the assay.
- Pipette 25 μ L of the diluted bead solution into each well. Once the beads are added to the plate, keep the plate shielded from light.
- Add 0.2mL *Working Wash Solution* to the wells. Allow the beads to soak for 15 to 30 seconds, then remove the *Working Wash Solution* from the wells by aspiration with the vacuum manifold. Repeat this washing step. Blot the bottom of the filter plate on clean paper towels to remove residual liquid.
- Pipette 50 μ L *Incubation Buffer* into each well.
- To the wells designated for the standard curve, pipette 100 μ L of appropriate standard dilution.
- To the wells designated for the sample, pipette 50 μ L *Assay Diluent* followed by 50 μ L sample.
- Cover filter plate containing beads with an aluminium foil-wrapped plate cover. Incubate the plate for 2 hours at room temperature on an orbital shaker. Shaking should be sufficient to keep beads suspended during the incubation (500-600 rpm).
- Ten to fifteen minutes prior to the end of this incubation, prepare the biotinylated detector antibody in accordance with instructions below, then proceed to **Assay Procedure, Step 10**.

Preparation of Detector Antibody

The *Biotinylated Detector Antibody* is provided as a 10x concentrate and must be diluted prior to use. To prepare a 1x stock, dilute 10 μ L from each 10x *Biotinylated Detector Antibody Concentrate* vial in 90 μ L *Biotin Diluent* per assay well. Each well requires 100 μ L of the diluted Biotinylated Detector Antibody. See table below for examples of volumes to combine.

Note: Dilution factor is 1:11 for extra pipetting volume.

Number of Wells	Vol. 10x Biotinylated Detector antibody (Inflammatory 5-Plex)	Vol.10x Biotinylated Detector Antibody (Th1/Th2 5-Plex)	Vol. Biotin Diluent
24	0.24 mL	0.24 mL	2.16 mL
32	0.32 mL	0.32 mL	2.88 mL
40	0.40 mL	0.40 mL	3.60 mL
48	0.48 mL	0.48 mL	4.32 mL
56	0.56 mL	0.56 mL	5.04 mL
64	0.64 mL	0.64 mL	5.76 mL
72	0.72 mL	0.72 mL	6.48 mL
80	0.80 mL	0.80 mL	7.20 mL
88	0.88 mL	0.88 mL	7.92 mL
96	0.96 mL	0.96 mL	8.64 mL

- After the 2 hour capture bead incubation, remove the liquid from the wells by aspiration with the vacuum manifold. Add 0.2 mL *Working Wash Solution* to the wells. Allow the beads to soak for 15 to 30

seconds, then aspirate with the vacuum manifold. Repeat this washing step. Blot the bottom of the filter plate on clean paper towels to remove residual liquid.

- Add 100 μ L of prepared 1x *Biotinylated Detector Antibody* to each well and incubate the plate for 1 hour at room temperature on an orbital shaker. Shaking should be sufficient to keep the beads suspended during incubation (500-600 rpm). Prepare **FIDIS™** instrument during this incubation step.
- Ten to fifteen minutes prior to the end of the detector incubation step, prepare the *Streptavidin-RPE* in accordance with instructions below, then proceed to Assay Procedure, Step 13.

Preparation of Streptavidin-RPE

The *Streptavidin-RPE* is provided as a 10x concentrate and must be diluted prior to use. **Protect Streptavidin-RPE from light during handling.** Dilute 10 μ L 10x *Streptavidin-RPE* in 100 μ L *Streptavidin-RPE Diluent* per assay well. Each well requires 100 μ L of the *diluted Streptavidin-RPE*. See table below for examples of volumes to combine.

Note: Dilution factor is 1:11 for extra pipetting volume.

Number of Wells	Vol. 10x Streptavidin-RPE	Vol. Streptavidin-RPE Diluent
24	0.240 mL	2.4 mL
32	0.320 mL	3.2 mL
40	0.400 mL	4.0 mL
48	0.480 mL	4.8 mL
56	0.560 mL	5.6 mL
64	0.640 mL	6.4 mL
72	0.720 mL	7.2 mL
80	0.800 mL	8.0 mL
88	0.880 mL	8.8 mL
96	0.960 mL	9.6 mL

- Remove the liquid from the wells by aspiration with the vacuum manifold. Add 0.2mL *Working Wash Solution* to the wells. Allow the beads to soak for 15 to 30 seconds, then aspirate with the vacuum manifold. Repeat this washing step. Blot the bottom of the filter plate on clean paper towels to remove residual liquid.
- Add 100 μ L of prepared 1x *Streptavidin-RPE* to each well and incubate the plate for 30 minutes at room temperature on an orbital shaker. Shaking should be sufficient to keep the beads suspended during incubation (500-600 rpm).
- Prepare the FIDIS™ instrument during this incubation step. Please see **APPENDIX II** and **software user manual**.
- Remove the liquid from the wells by aspiration with the vacuum manifold. Wash the beads by adding 0.2mL *Working Wash Solution* to the wells; allow the beads to soak for 10 seconds, then aspirate with the vacuum manifold. Repeat this washing step two additional times for a total of 3 washes. Blot the bottom of the filter plate on clean paper towels to remove residual liquid.
- Add 100 μ L of *Working Wash Solution* to each well. Shake the plates on an orbital shaker (500-600 rpm) for 2-3 minutes to resuspend the beads. If the plates cannot be read on the day of the assay, they may be covered and stored in a dark location overnight at +2°C to +8°C for reading the following day without significant loss of fluorescent intensity. Aspirate *Working Wash Solution* from stored plates and add 100 μ L fresh *Working Wash Solution*. Place the plate on an orbital shaker 2-3 minutes prior to analysis.
- Uncover the plate; insert the plate into the XY platform of the FIDIS™ instrument, and analyze the samples.
- Determine the concentration of samples from the standard curve using curve fitting software. The four parameter algorithm usually provides the best fit. **IMPORTANT:** In addition to dilutions performed on the sample prior to running the assay, the sample concentration calculated from the standard curve must be multiplied by an additional factor of 2 to correct for the 1:2 dilution in Step 7.

LIMITATIONS OF THE PROCEDURE

Do not extrapolate the standard curve beyond the highest standard point; the dose-response is non-linear in this region and inaccurate. Dilute samples that are greater than the highest standard with *Assay Diluent* or appropriate matrix diluent; reanalyze these samples and multiply results by the appropriate dilution factor. The influence of various drugs, aberrant sera

(hemolyzed, hyperlipidemic, jaundiced, etc.) and the use of biological fluids in place of serum/plasma and tissue culture medium samples have not been thoroughly investigated. The rate of degradation of analytes in various matrices may not have been investigated. The immunoassay literature contains frequent references to aberrant signals seen with some sera, attributed to heterophilic antibodies.

This kit is for research use only.

Not for human therapeutic or diagnostic use.

PERFORMANCE CHARACTERISTICS

Please refer to analyte specific **INFORMATION SHEET** for performance claims.

APPENDIX II: INSTRUMENT SETUP

1. Assign the appropriate **Bead Region** (refer to the kit-specific **Information sheet**) to each analyte.
2. We recommend that the user **count 100 events/bead region**.
3. Set **Minimum Events** to 0.
4. Set **Sample Size** to 50 μ l.
5. Set **Flow Rate** to 60 μ l/minute.
6. For **FIDIS™** kits we recommend an initial **Double Discriminator (DD)** gate setting of 7,800-15,200. (This setting may vary among instruments and must be determined by the user.)
7. Collect **Median RFU**.

[Helpful bmd guides for FIDIS™ Cytokine users](#)

- Creating a Cytokine method, *April 2006*
- How to run Cytokine, *April 2006*

REFERENCES

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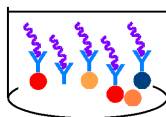
Pre-wet plate
Add 25µL 1x Antibody Coated Beads
200µL Wash Solution

↓ Wash 1 x 200µL

Sample type:

Standard

Serum/Tissue Culture Supernatant

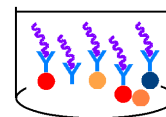


Add 50µL
Incubation Buffer

Add 100µL
Standard

Add 50µL
Incubation Buffer

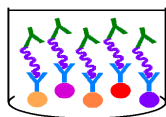
Add 50µL
Assay Diluent



Add 50µL
Sample

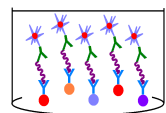


↓ Shake for 2 hours at R.T in the dark
Wash 2 x 200µL



Add 100µL 1 x Biotinylated Detector Antibody

↓ Shake for 1 hour at R.T in the dark
Wash 2 x 200µL

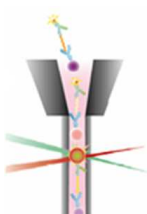


Add 100µL 1 x SAV-RPE

↓ Shake for 30 min. at RT in the dark
Wash 3 x 200µL

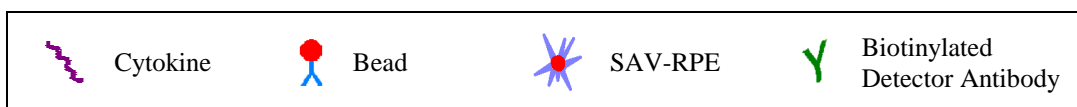
Add 100µL Wash Buffer

↓ Shake for 2-3 min



Read in FIDIS™ system

Total time: 3.5 hours



BioMédical Diagnostics SA

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