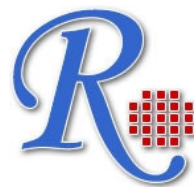


# RayBio® Human SDF-1 $\alpha$ ELISA Kit

**User Manual  
(Revised Mar 1, 2012)**

**RayBio® Human SDF-1 $\alpha$   
ELISA Kit Protocol**

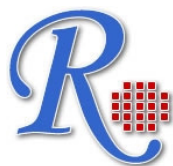
(Cat#: ELH-SDF1alpha-001)



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ELISA Kit Protocol**

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## I. INTRODUCTION

SDF-1 (Stromal cell-derived factor-1), also known as PBSF (pre-B-cell growth-stimulating factor), is a recently discovered protein belonging to the alpha chemokine (CXC) family of cytokines. SDF-1 $\alpha$  and SDF-1 $\beta$  are the first cytokines initially identified using the signal sequence trap cloning strategy from a human bone-marrow stromal cell line. SDF-1 has chemotactic activity on resting T lymphocytes and monocytes.

The RayBio® SDF-1 $\alpha$  ELISA (Enzyme-Linked Immunosorbent Assay) kit is an in vitro enzyme-linked immunosorbent assay for the quantitative measurement of human SDF-1 $\alpha$  in plasma (serum samples are not recommended for use in this assay (human SDF-1 $\alpha$  concentration is pretty low in normal plasma, it may not be detected in this assay), cell culture supernatants and urine. This assay employs an antibody specific for human SDF-1 $\alpha$  coated on a 96-well plate. Standards and samples are pipetted into the wells and SDF-1 $\alpha$  present in a sample is bound to the wells by the immobilized antibody. The wells are washed and biotinylated anti-human SDF-1 $\alpha$  antibody is added. After washing away unbound biotinylated antibody, HRP-conjugated streptavidin is pipetted to the wells. The wells are again washed, a TMB substrate solution is added to the wells and color develops in proportion to the amount of SDF-1 $\alpha$  bound. The Stop Solution changes the color from blue to yellow, and the intensity of the color is measured at 450 nm.

## II. REAGENTS

1. SDF-1 $\alpha$  Microplate (Item A): 96 wells (12 strips x 8 wells) coated with anti-human SDF-1 $\alpha$ .
2. Wash Buffer Concentrate (20x) (Item B): 25 ml of 20x concentrated solution.
3. Standards (Item C): 2 vials, recombinant human SDF-1 $\alpha$ .
4. Assay Diluent A (Item D): 30 ml, 0.09% sodium azide as preservative. For Standard/Sample (plasma) diluent.

5. Assay Diluent B (Item E): 15 ml of 5x concentrated buffer. For Standard/Sample (cell culture medium and urine) diluent.
6. Detection Antibody SDF-1 $\alpha$  (Item F): 2 vial of biotinylated anti-human SDF-1 $\alpha$  (each vial is enough to assay half microplate).
7. HRP-Streptavidin Concentrate (Item G): 200  $\mu$ l of 200x concentrated HRP-conjugated streptavidin.
8. TMB One-Step Substrate Reagent (Item H): 12 ml of 3,3',5,5'-tetramethylbenzidine (TMB) in buffered solution.
9. Stop Solution (Item I): 8 ml of 0.2 M sulfuric acid.

### **III. STORAGE**

May be stored for up to 6 months at 2° to 8°C from the date of shipment. Standard (recombinant protein) should be stored at -20°C or -80°C (recommended at -80°C) after reconstitution. Opened Microplate Wells or reagents may be store for up to 1 month at 2° to 8°C. Return unused wells to the pouch containing desiccant pack, reseal along entire edge.

Note: the kit can be used within one year if the whole kit is stored at -20°C. Avoid repeated freeze-thaw cycles.

### **IV. ADDITIONAL MATERIAL REQUIRED**

- 1 Microplate reader capable of measuring absorbance at 450 nm.
- 2 Precision pipettes to deliver 2  $\mu$ l to 1 ml volumes.
- 3 Adjustable 1-25 ml pipettes for reagent preparation.
- 4 100 ml and 1 liter graduated cylinders.
- 5 Absorbent paper.
- 6 Distilled or deionized water.
- 7 Log-log graph paper or computer and software for ELISA data analysis.
- 8 Tubes to prepare standard or sample dilutions.

## V. REAGENT PREPARATION

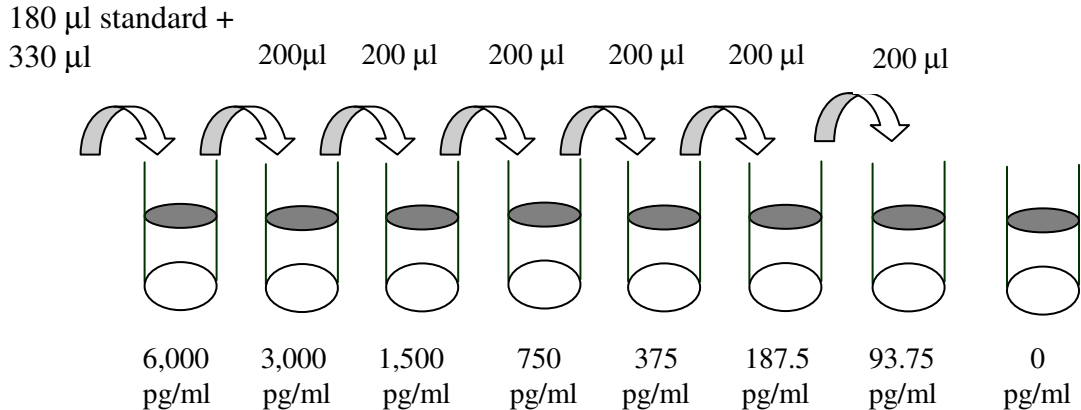
1. Bring all reagents and samples to room temperature (18 - 25°C) before use.
2. Sample preparation: If your samples need to be diluted, Assay Diluent A (Item D) should be used for dilution of plasma samples. 1x Assay Diluent B (Item E) should be used for dilution of culture supernatants and urine.

Suggested dilution for normal serum/plasma: 2 fold\*.

- \* Please note that levels of the target protein may vary between different specimens. Optimal dilution factors for each sample must be determined by the investigator.

Plasma: Collect plasma using heparin, EDTA or citrate as an anticoagulant. Centrifuge for 15 minutes at 1000 x g within 30 minutes of collection. An additional centrifugation step of the separated plasma at 10,000 x g for 10 minutes at 4° C is recommended for complete platelet removal (to measure circulating levels of SDF-1alpha, platelet-free plasma should be collected).

3. Assay Diluent B should be diluted 5-fold with deionized or distilled water.
4. Preparation of standard: Briefly spin the vial of Item C. Add 400 µl Assay Diluent A (for plasma samples) or 1x Assay Diluent B (for cell culture medium and urine) into Item C vial to prepare a 17 ng/ml standard. Dissolve the powder thoroughly by a gentle mix. Add 180 µl SDF-1α standard from the vial of Item C, into a tube with 330 µl Assay Diluent A or 1x Assay Diluent B to prepare a 6,000 pg/ml stock standard solution. Pipette 250 µl Assay Diluent A or 1x Assay Diluent B into each tube. Use the stock standard solution to produce a dilution series (shown below). Mix each tube thoroughly before the next transfer. Gently vortex to mix. Assay Diluent A or 1x Assay Diluent B serves as the zero standard (0 pg/ml).



5. If the Wash Concentrate (20x) (Item B) contains visible crystals, warm to room temperature and mix gently until dissolved. Dilute 20 ml of Wash Buffer Concentrate into deionized or distilled water to yield 400 ml of 1x Wash Buffer.
6. Briefly spin the Detection Antibody vial (Item F) before use. Add 100  $\mu$ l of 1x Assay Diluent B into the vial to prepare a detection antibody concentrate. Pipette up and down to mix gently (the concentrate can be stored at 4°C for 5 days). The detection antibody concentrate should be diluted 80-fold with 1x Assay Diluent B and used in step 4 of Part VI Assay Procedure.
7. Briefly spin the HRP-Streptavidin concentrate vial (Item G) and pipette up and down to mix gently before use. HRP-Streptavidin concentrate should be diluted 200-fold with 1x Assay Diluent B.

*For example: Briefly spin the vial (Item G) and pipette up and down to mix gently . Add 50  $\mu$ l of HRP-Streptavidin concentrate into a tube with 10 ml 1x Assay Diluent B to prepare a 200-fold diluted HRP-Streptavidin solution (don't store the diluted solution for next day use). Mix well*

## VI. ASSAY PROCEDURE:

1. Bring all reagents and samples to room temperature (18 - 25°C) before use. It is recommended that all standards and samples be run at least in duplicate.
2. Add 100 µl of each standard (see Reagent Preparation step 2) and sample into appropriate wells. Cover well and incubate for 2.5 hours at room temperature or over night at 4°C with gentle shaking.
3. Discard the solution and wash 4 times with 1x Wash Solution. Wash by filling each well with Wash Buffer (300 µl) using a multi-channel Pipette or autowasher. Complete removal of liquid at each step is essential to good performance. After the last wash, remove any remaining Wash Buffer by aspirating or decanting. Invert the plate and blot it against clean paper towels.
4. Add 100 µl of 1x prepared biotinylated antibody (Reagent Preparation step 6) to each well. Incubate for 1 hour at room temperature with gentle shaking.
5. Discard the solution. Repeat the wash as in step 3.
6. Add 100 µl of prepared Streptavidin solution (see Reagent Preparation step 7) to each well. Incubate for 45 minutes at room temperature with gentle shaking.
7. Discard the solution. Repeat the wash as in step 3.
8. Add 100 µl of TMB One-Step Substrate Reagent (Item H) to each well. Incubate for 30 minutes at room temperature in the dark with gentle shaking.
9. Add 50 µl of Stop Solution (Item I) to each well. Read at 450 nm immediately.

## VII. ASSAY PROCEDURE SUMMARY

1. Prepare all reagents, samples and standards as instructed.



2. Add 100  $\mu$ l standard or sample to each well.  
Incubate 2.5 hours at room temperature or over night at 4°C.



3. Add 100  $\mu$ l prepared biotinylated antibody to each well.  
Incubate 1 hour at room temperature.



4. Add 100  $\mu$ l prepared Streptavidin solution.  
Incubate 45 minutes at room temperature.



5. Add 100  $\mu$ l TMB One-Step Substrate Reagent to each well.  
Incubate 30 minutes at room temperature.



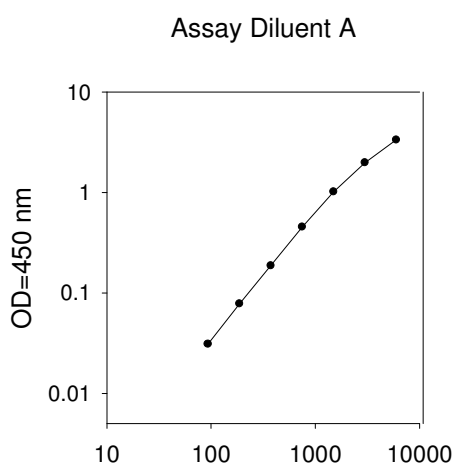
6. Add 50  $\mu$ l Stop Solution to each well.  
Read at 450 nm immediately.

## VIII. CALCULATION OF RESULTS

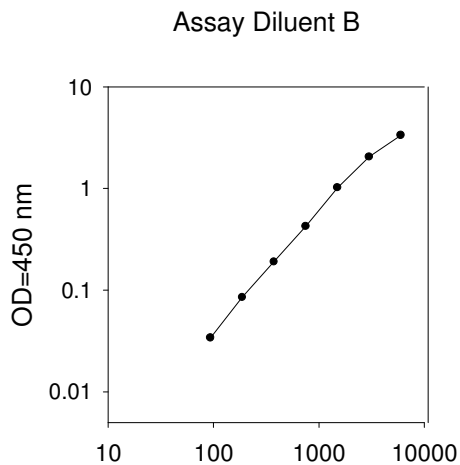
Calculate the mean absorbance for each set of duplicate standards, controls and samples, and subtract the average zero standard optical density. Plot the standard curve on log-log graph paper or using Sigma plot software, with standard concentration on the x-axis and absorbance on the y-axis. Draw the best-fit straight line through the standard points.

## A. TYPICAL DATA

These standard curves are for demonstration only. A standard curve must be run with each assay.



Human SDF-1-alpha concentration (pg/ml)



Human SDF-1-alpha concentration (pg/ml)

## B. SENSITIVITY

The minimum detectable dose of SDF-1 $\alpha$  is typically less than 80 pg/ml.

## C. RECOVERY

Recovery was determined by spiking various levels of human SDF-1 $\alpha$  into human plasma and cell culture media. Mean recoveries are as follows:

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Sample Type	Average % Recovery	Range (%)
Plasma	89.34	85-104
Cell culture media	94.63	86-104

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## D. LINEARITY

Sample Type		Plasma	Cell Culture Media
1:2	Average % of Expected Range (%)	93 83-102	95 84-104
1:4	Average % of Expected Range (%)	94 82-103	96 85-104

## E. REPRODUCIBILITY

Intra-Assay: CV<10%

Inter-Assay: CV<12%

## IX. SPECIFICITY

Cross Reactivity: This ELISA kit shows no cross-reactivity with any of the cytokines tested (*e.g.*, human Angiogenin, BDNF, BLC, ENA-78, FGF-4, IL-1 $\alpha$ , IL-1 $\beta$ , IL-2, IL-3, IL-4, IL-5, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12 p70, IL-12 p40, IL-13, IL-15, IL-309, IP-10, G-CSF, GM-CSF, IFN- $\gamma$ , Leptin, MCP-1, MCP-2, MCP-3, MDC, MIP-1 $\alpha$ , MIP-1  $\beta$ , MIP-1 $\delta$ , PARC, PDGF, RANTES, SCF, TARC, TGF- $\beta$ , TIMP-1, TIMP-2, TNF- $\alpha$ , TNF- $\beta$ , TPO, VEGF).

## **X. REFERENCES:**

1. Aiuti A et al. The chemokine SDF-1 is a chemoattractant for human CD34+ hematopoietic progenitor cells and provides a new mechanism to explain the mobilization of CD34+ progenitors to peripheral blood. *Journal of Experimental Medicine* 185(1): 111-120 (1997).
2. Broxmeyer HE et al. Effects of CC, CXC, C, and CX3C chemokines on proliferation of myeloid progenitor cells, and insights into SDF-1-induced chemotaxis of progenitors.
3. Nagasawa T et al. Defects of B cell lymphopoiesis and bone marrow myelopoiesis in mice lacking the C-X-C chemokine PBSF/SDF-1 *Nature (London)* 382: 635-638 (1996).

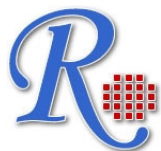
## XI. TROUBLESHOOTING GUIDE

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
1. Poor standard curve	<ol style="list-style-type: none"> <li>1. Inaccurate pipetting</li> <li>2. Improper standard dilution</li> </ol>	<ol style="list-style-type: none"> <li>1. Check pipettes</li> <li>2. Ensure briefly spin the vial of Item C and dissolve the powder thoroughly by a gentle mix.</li> </ol>
2. Low signal	<ol style="list-style-type: none"> <li>1. Too brief incubation times</li> <li>2. Inadequate reagent volumes or improper dilution</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure sufficient incubation time; assay procedure step 2 change to over night</li> <li>2. Check pipettes and ensure correct preparation</li> </ol>
3. Large CV	<ol style="list-style-type: none"> <li>1. Inaccurate pipetting</li> </ol>	<ol style="list-style-type: none"> <li>1. Check pipettes</li> </ol>
4. High background	<ol style="list-style-type: none"> <li>1. Plate is insufficiently washed</li> <li>2. Contaminated wash buffer</li> </ol>	<ol style="list-style-type: none"> <li>1. Review the manual for proper wash. If using an a plate washer, check that all ports are unobstructed.</li> <li>2. Make fresh wash buffer</li> </ol>
5. Low sensitivity	<ol style="list-style-type: none"> <li>1. Improper storage of the ELISA kit</li> <li>2. Stop solution</li> </ol>	<ol style="list-style-type: none"> <li>1. Store your standard at <math>&lt;-20^{\circ}\text{C}</math> after reconstitution, others at <math>4^{\circ}\text{C}</math>. Keep substrate solution protected from light</li> <li>2. Stop solution should be added to each well before measure</li> </ol>

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