

# **RayBio® Human G-CSF ELISA Kit**

**User Manual  
(Revised Oct 1, 2009)**

**RayBio® Human G-CSF  
ELISA Kit Protocol**

(Cat#: ELH-GCSF-001)



**RayBiotech, Inc.**

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Protein Array System And Service**

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RayBiotech, Inc.

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## I. INTRODUCTION

G-CSF (Granulocyte colony stimulating factor), which is an O-glycosylated 19.6 kDa glycoprotein, is secreted by monocytes, macrophages and neutrophils after cell activation. G-CSF is produced also by stromal cells, fibroblasts, and endothelial cells. It stimulates the proliferation and differentiation of hematopoietic progenitor cells committed to the neutrophil/granulocyte lineage in a dose-dependent manner. A combination of IL-4 with G-CSF has been shown to lead to synergistic suppression of the growth of some human leukemic cell lines. The main and most important clinical application of G-CSF is probably the treatment of transient phases of leukopenia following chemotherapy and/or radiotherapy.

The RayBio® Human G-CSF ELISA (Enzyme-Linked Immunosorbent Assay) kit is an *in vitro* enzyme-linked immunosorbent assay for the quantitative measurement of human G-CSF in serum, plasma, cell culture supernatants and urine. This assay employs an antibody specific for human G-CSF coated on a 96-well plate. Standards and samples are pipetted into the wells and G-CSF present in a sample is bound to the wells by the immobilized antibody. The wells are washed and biotinylated anti-human G-CSF 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 G-CSF 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. G-CSF Microplate (Item A): 96 wells (12 strips x 8 wells) coated with anti-human G-CSF.
2. Wash Buffer Concentrate (20x) (Item B): 25 ml of 20x concentrated solution.
3. Standards (Item C): 2 vials, recombinant human G-CSF.

4. Assay Diluent A (Item D): 30 ml, 0.09% sodium azide as preservative. For Standard/Sample (serum/plasma) diluent.
5. Assay Diluent B (Item E): 15 ml of 5x concentrated buffer. For Standard/Sample (cell culture medium/urine) diluent.
6. Detection Antibody GCSF (Item F): 2 vial of biotinylated anti-human GCSF (each vial is enough to assay half microplate).
7. HRP-Streptavidin concentrate (Item G): 8  $\mu$ l of 13,000x 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 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**

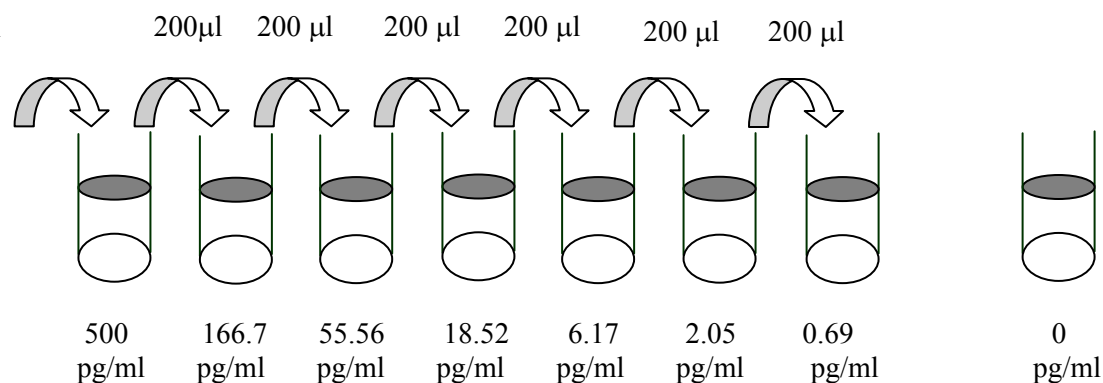
- 1 Microplate reader capable of measuring absorbance at 450 nm.
- 2 Precision pipettes to deliver 2  $\mu$ l to 1 ml volumes.
- 3 Adjustable 1-25 ml pipettes for reagent preparation.
- 4 100 ml and 1 liter graduated cylinders.
- 5 Absorbent paper.
- 6 Distilled or deionized water.
- 7 Log-log graph 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 dilution: If your samples need to be diluted, Assay Diluent A (Item D) is used for dilution of serum/plasma samples, and Assay Diluent B (Item E) is used for dilution of culture supernatants and urine.
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** and then add 800  $\mu\text{l}$  Assay Diluent A (for serum/plasma samples) or 1x Assay Diluent B (for cell culture medium and urine) into Item C vial to prepare a 10 ng/ml standard. **Dissolve the powder thoroughly by a gentle mix.** Add 30  $\mu\text{l}$  G-CSF standard from the vial of Item C, into a tube with 570  $\mu\text{l}$  Assay Diluent A or 1x Assay Diluent B to prepare a 500 pg/ml stock standard solution. Pipette 400  $\mu\text{l}$  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. Assay Diluent A or 1x Assay Diluent B serves as the zero standard (0 pg/ml).

30  $\mu\text{l}$  standard +

570  $\mu\text{l}$



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 13,000-fold with 1x Assay Diluent B.

*For example: Briefly spin the vial (Item G) and pipette up and down to mix gently . Add 2  $\mu$ l of HRP-Streptavidin concentrate into a tube with 198.0  $\mu$ l 1x Assay Diluent B to prepare a 100-fold diluted HRP-Streptavidin solution (don't store the diluted solution for next day use). Mix through and then pipette 100  $\mu$ l of prepared 100-fold diluted solution into a tube with 13 ml 1x Assay Diluent B to prepare a final 13,000 fold diluted HRP-Streptavidin solution.*

## **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  $\mu$ l 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  $\mu$ l) 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  $\mu$ l 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  $\mu$ l 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  $\mu$ l 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  $\mu$ l 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 biotin 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.



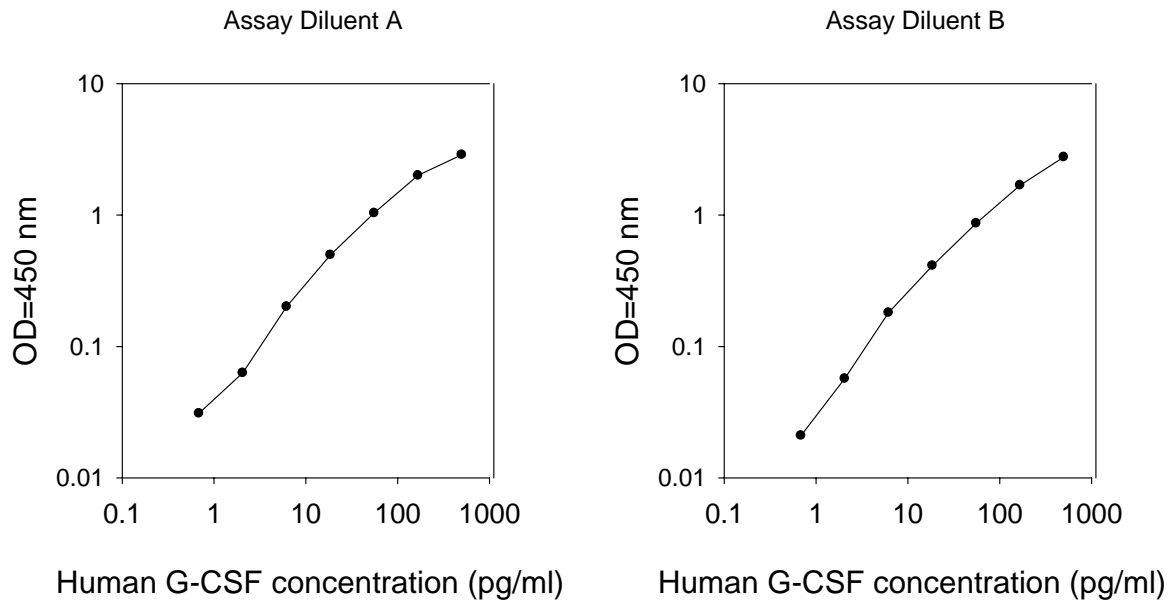
6. Add 50  $\mu$ l Stop Solution to each well.  
Read at 450 nm immediately.

## **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.



## B. SENSITIVITY

The minimum detectable dose of G-CSF is typically less than 1 pg/ml.

## C. RECOVERY

Recovery was determined by spiking human G-CSF into human serum, plasma and cell culture media. Mean recoveries are as follows:

Sample Type	Average % Recovery	Range (%)
Serum	83.45	72-94
Plasma	74.76	67-87
Cell culture media	76.56	68-90

## D. LINEARITY

Sample Type		Serum	Plasma	Cell Culture Media
1:2	Average % of Expected	128.8	134.7	109.3
	Range (%)	117-136	120-139	98-117
1:4	Average % of Expected	134.3	137.8	108.1
	Range (%)	123-139	124-143	97-115

## E. REPRODUCIBILITY

Intra-Assay: CV<10%

Inter-Assay: CV<12%

## IX. SPECIFICITY

Cross Reactivity: This ELISA kit shows no cross-reactivity with the following cytokines tested: 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, 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. Demetri GD and Griffin JD. Granulocyte colony-stimulating factor and its receptor. *Blood* 78: 2791-2808 (1991).
2. Moore MAS. The clinical use of colony stimulating factors. *Annual Review of Immunology* 9: 159-91 (1991).
3. Maekawa T et al. Synergistic suppression of the clonogenicity of U937 leukemic cells by combinations of recombinant human interleukin 4 and granulocyte colony-stimulating factor. *Experimental Hematology* 20: 1201-7 (1992).

## 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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**Notes:**

This product is for research use only.



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