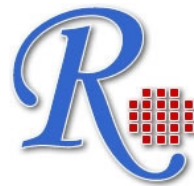


RayBio® Human Osteopontin (OPN) ELISA Kit

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

**RayBio® Human OPN ELISA
Kit Protocol**

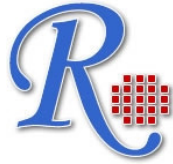
(Cat#: ELH-OPN-001)



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**RayBio® Human OPN
ELISA Kit Protocol**

TABLE OF CONTENTS

I.	Introduction.....	2
II.	Reagents.....	2
III.	Storage.....	3
IV.	Additional Materials Required.....	3
V.	Reagent Preparation.....	4
VI.	Assay Procedure.....	6
VII.	Assay Procedure Summary.....	7
VIII.	Calculation of Results	
A.	Typical Data.....	8
B.	Sensitivity.....	8
C.	Recovery.....	9
D.	Linearity.....	9
E.	Reproducibility.....	9
IX.	Specificity.....	10
X.	References.....	10
XI.	Troubleshooting Guide.....	11

I. INTRODUCTION

Osteopontin (OPN) is an extracellular matrix cell adhesion protein which is abundant in bone and which is synthesized by preosteoblasts, osteoblasts and osteoclastic cells that are localized in the mineralized phase of bone matrix. It is an acidic, phosphorylated, sialic acid-rich Ca²⁺ binding protein. Osteopontin contains a signal sequence and is a secreted protein. It is involved in recruiting and stimulating macrophages and lymphocytes as part of a nonspecific response to microbial infections. Murine macrophages cell lines and resident macrophages show various levels of expression of the osteopontin gene, which can be enhanced by a variety of macrophage stimulating agents.

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

3. Standards (Item C): 2 vials, recombinant human OPN.
4. Assay Diluent A (Item D): 30 ml of animal serum with 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 OPN (Item F): 2 vials of biotinylated anti-human OPN (each vial is enough to assay half microplate).
7. HRP-Streptavidin Concentrate (Item G): 200 μ l of 500x 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 and 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 MATERIALS REQUIRED

- 1 Microplate reader capable of measuring absorbance at 450 nm.
- 2 Shaker.
- 3 Precision pipettes to deliver 2 μ l to 1 ml volumes.
- 4 Adjustable 1-25 ml pipettes for reagent preparation.
- 5 100 ml and 1 liter graduated cylinders.
- 6 Absorbent paper.
- 7 Distilled or deionized water.

- 8 Log-log graph paper or computer and software for ELISA data analysis.
- 9 Tubes to prepare standard or sample dilutions.

V. REAGENT PREPARATION

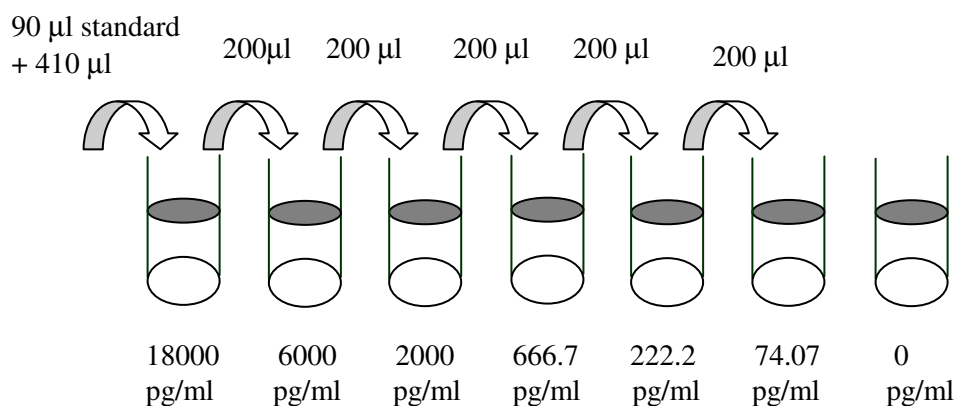
1. Bring all reagents and samples to room temperature (18 - 25°C) before use.
2. Sample dilution: If your samples need to be diluted, Assay Diluent A (Item D) is used for dilution of serum/plasma samples. 1x Assay Diluent B (Item E) is used for dilution of culture supernatants and urine.

Suggested dilution for normal serum/plasma: 3-100 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.

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 400 µl Assay Diluent A (for serum/plasma samples) or 1x Assay Diluent B (for cell culture medium and urine, Assay Diluent B should be diluted 5-fold with deionized or distilled water) into Item C vial to prepare a 100 ng/ml standard. **Dissolve the powder thoroughly by a gentle mix.** Add 90 µl OPN standard from the vial of Item C, into a tube with 410 µl Assay Diluent A or 1x Assay Diluent B to prepare a 18,000 pg/ml stock standard solution. Pipette 400 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. 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 µl 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 500-fold with 1x Assay Diluent B.

For example: Briefly spin the vial (Item G) and pipette up and down to mix gently. Add 20 µl of HRP-Streptavidin concentrate into a tube with 10 ml 1x Assay Diluent B to prepare a 500-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 shaking.
3. Discard the solution and wash 4 times with 1x Wash Solution (200 µl each).
4. Add 100 µl of 1x prepared biotinylated antibody (Reagent Preparation step 6) to each well. Incubate for 1 hour at room temperature with shaking .
5. Discard the solution and wash 4 times with 1x Wash Solution (200 µl each).
6. Add 100 µl of prepared Streptavidin solution (see Reagent Preparation step 7) to each well. Incubate for 45 minutes at room temperature with shaking.
7. Discard the solution and wash 5 times with 1x Wash Solution (200 µl each).
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 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 μ l standard or sample to each well.
Incubate 2.5 hours at room temperature or over night at 4°C.



3. Add 100 μ l prepared biotin antibody to each well.
Incubate 1 hour at room temperature.



4. Add 100 μ l prepared Streptavidin solution.
Incubate 45 minutes at room temperature.



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



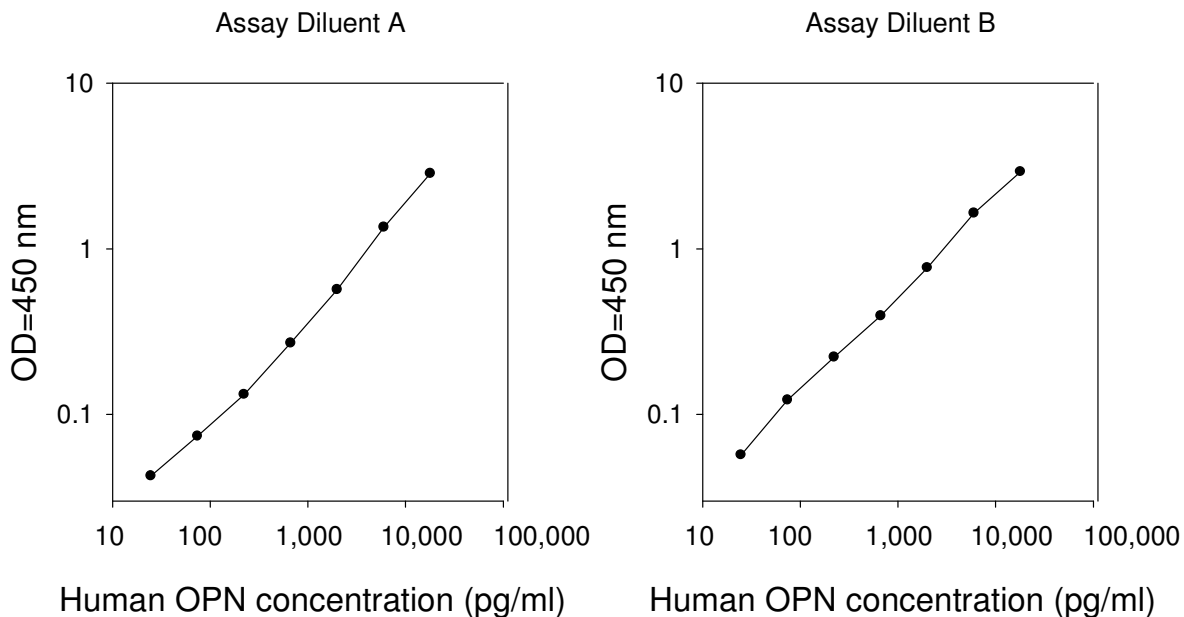
6. Add 50 μ l Stop Solution to each well.
Read at 450 nm immediately.

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 OPN is typically less than 50 pg/ml.

C. RECOVERY

Recovery was determined by spiking various levels of human OPN into human serum, plasma and cell culture media. Mean recoveries are as follows:

Sample Type	Average % Recovery	Range (%)
Serum	89.92	88-108
Plasma	92.41	90-109
Cell culture media	103.5	95-118

D. LINEARITY

Sample Type		Serum	Plasma	Cell Culture Media
1:2	Average % of Expected	87	92	102
	Range (%)	86-108	88-109	93-115
1:4	Average % of Expected	92	90	97
	Range (%)	88-107	87-108	91-111

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 following cytokines tested (human Angiogenin, BDNF, BLC, ENA-78, FGF-4, IL-1 α , IL-1 β , 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- γ , Leptin, MCP-1, MCP-2, MCP-3, MDC, MIP-1 α , MIP-1 β , MIP-1 δ , PARC, PDGF, RANTES, SCF, TARC, TGF- β , TIMP-1, TIMP-2, TNF- α , TNF- β , TPO, VEGF).

X. REFERENCES:

1. Brown LF et al Osteopontin expression and distribution in human carcinomas. *American Journal of Pathology* 145(3): 610-623 (1994);
2. Chen Y et al Calcium and collagen binding properties of osteopontin, bone sialoprotein, and bone acidic glycoprotein-75 from bone. *Journal of Biological Chemistry* 267(34): 24871-24878 (1992);
3. Senger DR and Perruzzi CA Cell migration promoted by a potent GRGDS-containing thrombin-cleavage fragment of osteopontin. *Biochimica Biophysica Acta* 1314(1-2): 13-24 (1996).

XI. TROUBLESHOOTING GUIDE

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

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