

## Mouse/Rat Osteopontin/OPN Sandwich ELISA Kit Datasheet

Please read it entirely before use

**Catalogue Number:** KE10046

**Size:** 5\*96T

**Sensitivity:** 2.5 pg/mL

**Range:** 15.6-1000 pg/mL

**Usage:** For the quantitative detection of mouse/rat Osteopontin/OPN concentrations in serum, plasma, cell culture supernatant and urine.

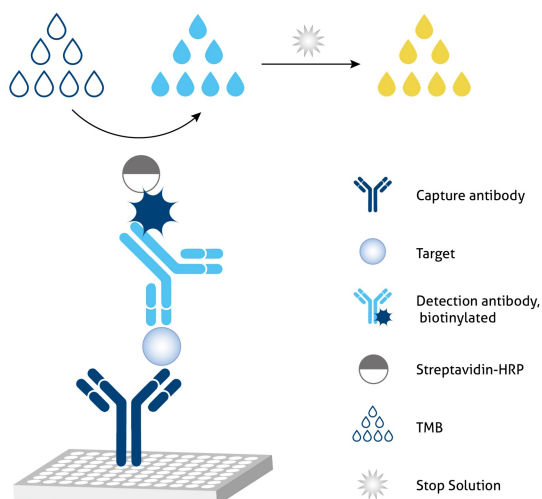
**This product is for research use only and not for use in human or animal therapeutic or diagnostic.**

<b>Table of content</b>	<b>page</b>
1. Background	3
2. Principle	3
3. Required Materials	3
4. Kit Components and Storage	4
5. Safety Notes	4
6. Sample Collection and Storage	4
7. Regent Preparation	5
8. Assay Procedure Summary	6
9. Validation Data	7
9.1 Standard curve	7
9.2 Precision	7
9.3 Recovery	8
9.4 Sample values	8
9.5 Sensitivity	8
9.6 Linearity	9
10. References	9

## 1. Background

Osteopontin (OPN), also known as SPP1, is a secreted glycoprophosphoprotein that belongs to the small integrin-binding ligand N-linked glycoprotein (SIBLING) family. Originally isolated from bone, OPN has been found in kidney, vascular tissues, biological fluids, and various tumor tissues. OPN can interact with CD44 and integrins and regulate diverse biological processes. It has a multifaceted role in bone development and remodeling, and is also involved in the inflammatory and immune response, oncogenesis and cancer progression.

## 2. Principle



### Sandwich ELISA structure (Detection antibody labeled with biotin)

A capture antibody is pre-coated onto the bottom of wells which binds to analyte of interest. A detection antibody labeled with biotin also binds to the analyte. Streptavidin-HRP binds to the biotin. TMB acts as the HRP substrate and the solution color will change from colorless to blue. A stop solution containing sulfuric acid turns solution yellow. The color intensity is proportional to the quantity of bound protein which is measurable at 450 nm with the correction wavelength set at 630 nm.

## 3. Required Materials

- 3.1 A microplate reader capable of measuring absorbance at 450 nm with the correction wavelength set at 630 nm.
- 3.2 Calibrated, adjustable precision pipettes and disposable plastic tips. A manifold multi-channel pipette is recommended for large assays.
- 3.3 Plate washer: automated or manual.
- 3.4 Absorbent paper towels.
- 3.5 Glass or plastic tubes to prepare standard and sample dilutions.
- 3.6 Beakers and graduated cylinders.
- 3.7 Log-log or semi-log graph paper or computer and software for ELISA data analysis. A four-parameter logistic (4-PL) curve-fit is recommended.

## 4. Kit Components and Storage

Microplate - antibody coated 96-well microplate (8 well × 12 strips)	5 plates	<b>Unopened Kit:</b> Store at 2-8°C for 6 months or -20°C for 12 months. <b>Opened Kit:</b> All reagents stored at 2-8°C for 7 days. <b>Please use a new standard for each assay.</b>
Protein standard - 1000 pg/bottle; lyophilized	10 bottles	
Detection antibody, biotinylated (100×) - 600 μ L/vial*	1 vial	
Streptavidin-horseradish peroxidase (HRP) (100×) - 600 μ L/vial*	1 vial	
Sample Diluent PT 4 - 150 mL/bottle	2 bottles	
Detection Diluent - 150 mL/bottle	1 bottle	
Wash Buffer Concentrate (20×) - 150 mL/bottle	1 bottle	
Tetramethylbenzidine Substrate (TMB) - 60 mL/bottle	1 bottle	
Stop Solution - 60 mL/bottle	1 bottle	
Plate Cover Seals	15 pieces	

\* Centrifugation immediately before use

## 5. Safety Notes

- 5.1 Avoid any skin and eye contact with Stop Solution and TMB. In case of contact, wash thoroughly with water.
- 5.2 Do not use the kit after the expiration date.
- 5.3 Do not mix or substitute reagents or materials from other kit lots or other sources.
- 5.4 Be sure to wear protective equipment such as gloves, masks and goggles during the experiment.
- 5.5 When using an automated plate washer, adding a 30 second soak period following the addition of Wash Buffer to improve assay precision

## 6. Sample Collection and Storage

- 6.1 Serum: Allow blood samples to clot for 30 minutes, followed by centrifugation for 15 minutes at 1000xg. Clear serum can be assayed immediately or aliquoted and stored at -20°C. Avoid repeated freeze-thaw cycles.
- 6.2 Plasma: Use EDTA, heparin, or citrate as an anticoagulant for plasma collection. Centrifuge for 15 minutes at 1000xg within 30 minutes of collection. The plasma can be assayed immediately or aliquoted and stored at -20°C. Avoid repeated freeze-thaw cycles.
- 6.3 Cell Culture Supernatant: Remove particulates by centrifugation for 5 minutes at 500xg and assay immediately or aliquot and store samples at ≤ -20°C. Avoid repeated freeze-thaw cycles.
- 6.4 Urine: Collect urine samples and centrifuge for 20 minutes at 1000xg. Collect the aqueous layer, assay immediately or aliquot and store samples at ≤ -20°C. Avoid repeated freeze-thaw cycles.

## 7. Regent Preparation

**7.1 Wash Buffer (1X):** If crystals have formed in the concentrate, warm to room temperature and mix gently until the crystals have completely dissolved. Add 30 mL of Wash Buffer Concentrate(20X) to 570 mL deionized or distilled water to prepare 1X Wash Buffer.

**7.2 Detection Antibody (1X):** Dilute 100X Detection Antibody 1:100 using Detection Diluent prior to assay. Suggested 1:100 dilution: 10  $\mu$  L 100X Detection Antibody + 990  $\mu$  L Detection Diluent (Centrifuge the 100X Detection Antibody solution for a few seconds prior to use).

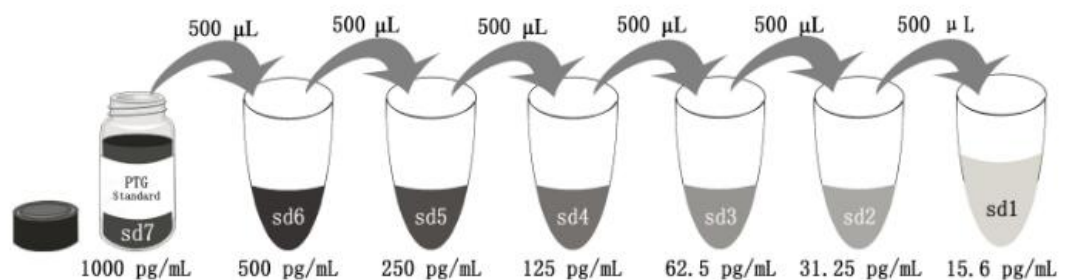
**7.3 Streptavidin-HRP (1X):** Dilute 100X Streptavidin-HRP 1:100 using Detection Diluent prior to assay. Suggested 1:100 dilution: 10  $\mu$  L 100X Streptavidin-HRP + 990  $\mu$  L Detection Diluent (Centrifuge the 100X Streptavidin-HRP solution for a few seconds prior to use).

**7.4 Sample Dilution:** Different samples should be diluted with corresponding Sample Diluent, samples may require further dilution if the readout values are higher than the highest standard OD reading. Variations in sample collection, processing and storage may affect the results of the measurement.

Recommended Dilution for different sample types: 1:200 or 1:400 is recommended for mouse serum and plasma; 1:100 or 1:200 is recommended for rat serum and plasma; 1:4,000 or 1:8,000 is recommended for mouse/rat urine.

### 7.5 Standard Serial Dilution:

Add 1 mL Sample Diluent PT 4 in protein standard.



Add # $\mu$ L of Standard diluted in the previous step	—	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L
# $\mu$ L of Sample Diluent PT 4	1000 $\mu$ L	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L	500 $\mu$ L
	"sd7"	"sd6"	"sd5"	"sd4"	"sd3"	"sd2"	"sd1"

## 8. Assay Procedure Summary

Bring all reagents to room temperature before use (Detection antibody and Streptavidin-HRP can be used immediately). To avoid cross-contamination, change pipette tips between additions of each standard level, between sample additions, and between reagent additions. Also, use separate reservoirs for each reagent.

8.1 Take out the required number of microplate strips and return excess strips to the foil pouch containing the drying reagent pack and reseal; store at 4°C immediately. Microplate strips should be used in one week.

8.2 Preset the layout of the microplate, including control group, standard group and sample group, add 100 µL of each standard and sample to the appropriate wells. (Make sure sample addition is uninterrupted and completed within 5 to 10 minutes, It is recommended to assay all standards, controls, and samples in duplicate).

8.3 Seal plate with cover seal, pressing it firmly onto top of microwells. Incubate the plate for 2 hours at 37°C.

8.4 Wash

1) Gently remove the cover seal. Discard the liquid from wells by aspirating or decanting. Remove any residual solution by tapping the plate a few times on fresh paper towels.

2) Wash 4 times with 1X Wash Buffer, using at least 350-400 µL per well. Following the last wash, firmly tap plates on fresh towels 10 times to remove residual Wash Buffer. Avoid getting any towel fibers in the wells or wells drying out completely.

8.5 Add 100 µL of 1X Detection Antibody solution (refer to Reagent Preparation 7.2) to each well. Seal plate with cover seal and incubate for 1 hour at 37°C.

8.6 Repeat wash step in 8.4.

8.7 Add 100 µL of 1X Streptavidin-HRP solution (refer to Reagent Preparation 7.3) to each well. Seal plate with cover seal and incubate the plate for 40 minutes at 37°C.

8.8 Repeat wash step in 8.4.

8.9 Signal development: Add 100 µL of TMB substrate solution to each well, protected from light. Incubate for 15 to 20 minutes. Substrate Solution should remain colorless until added to the plate.

8.10 Quenching color development: Add 100 µL of Stop Solution to each well in the same order as addition of the TMB substrate. Mix by tapping the side of the plate gently. NB: Avoid skin and eye contact with the Stop solution.

8.11 Read results: Immediately after adding Stop solution read the absorbance on a microplate reader at a wavelength of 450 nm. If possible, perform a double wavelength readout (450 nm and 630 nm).

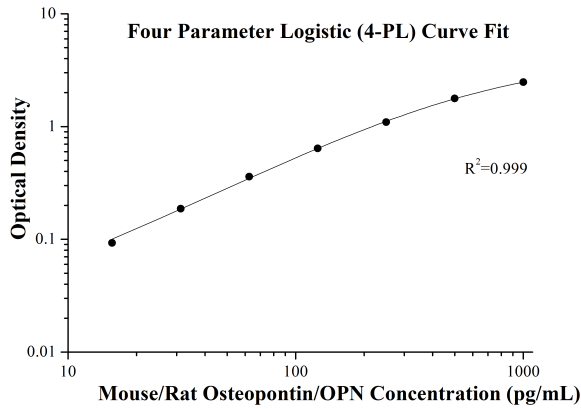
8.12 Data analysis: Calculate the average of the duplicate readings (OD value) for each standard and sample, and subtract the average of the zero standard absorbance. Construct a standard curve by plotting the mean absorbance for each standard on the y-axis against the concentration on the x-axis, use four-parameter logistic curve-fit (4-PL) analysis to do this. If the samples have been diluted, the OD readout from the standard curve must be multiplied by the dilution factor used.

Step	Reagent	Volume	Incubation	Wash	Notes
1	Standard and Samples	100 µL	120 min	4 times	Cover Wells incubate at 37°C
2	Diluent Antibody Solution	100 µL	60 min	4 times	Cover Wells incubate at 37°C
3	Diluent HRP Solution	100 µL	40 min	4 times	Cover Wells incubate at 37°C
4	TMB Substrate	100 µL	15-20 min	Do not wash	Incubate in the dark at 37°C
5	Stop Solution	100 µL	0 min	Do not wash	-
6	Read plate at 450 nm and 630 nm immediately after adding Stop solution. DO NOT exceed 5 minutes.				

## 9. Validation Data

### 9.1 Standard curve

These standard curves are provided for demonstration only. A standard curve should be generated for each set of samples assayed.



(pg/mL)	O.D	Average	Corrected
0	0.071 0.071	0.071	-
15.6	0.163 0.164	0.164	0.093
31.25	0.262 0.254	0.258	0.187
62.5	0.441 0.420	0.431	0.360
125	0.715 0.706	0.711	0.640
250	1.169 1.164	1.167	1.096
500	1.882 1.810	1.846	1.775
1000	2.561 2.522	2.542	2.471

### 9.2 Precision

**Intra-assay Precision** (Precision within an assay) Three samples of known concentration were tested 20 times on one plate to assess intra-assay precision.

**Inter-assay Precision** (Precision between assays) Three samples of known concentration were tested in 24 separate assays to assess inter-assay precision.

Intra-assay Precision				
Sample	n	Mean (pg/mL)	SD	CV%
1	20	25.5	0.6	2.4
2	20	108.3	2.0	1.8
3	20	429.9	8.7	2.0

Inter-assay Precision				
Sample	n	Mean (pg/mL)	SD	CV%
1	24	27.6	1.6	5.8
2	24	114.4	4.2	3.7
3	24	444.4	17.4	3.9

## 9.3 Recovery

The recovery of mouse/rat Osteopontin/OPN spiked to three different levels throughout the range of the assay in different samples was evaluated.

Sample Type		Average% of Expected	Range (%)
Mouse serum	1:400	87	81-92
	1:800	90	81-95
Mouse urine	1:4,000	108	99-120
	1:8,000	92	80-106
Mouse cell culture supernatant	1:2,000	105	99-120
	1:4,000	100	85-119
Rat serum	1:100	87	84-89
	1:200	88	81-93
Rat cell culture supernatant	1:4	90	84-99
	1:8	97	87-108

## 9.4 Sample values

Mouse and rat serum and urine samples were evaluated for the presence of mouse/rat Osteopontin/OPN in this assay.

Sample Type	Mean (ng/mL)	Range (ng/mL)
Mouse serum (n=26)	45.5	31.0-81.4
Mouse urine (n=8)	1,040.2	397.3-1,786.4
Rat serum(n=13)	7.6	5.6-10.5

**Mouse cell culture supernatant** - L-929 mouse fibroblast cells ( $1 \times 10^6$  cells/mL) were cultured for 3 days in MEM supplemented with 10% equine serum and stimulated with 2.5 ng/mL LPS. An aliquot of the cell culture supernatant was removed, assayed for mouse Osteopontin/OPN, and measured 184 ng/mL.

**Rat cell culture supernatant** - Rat lung conditioned media (2 lungs, 1-2 mm pieces) was cultured for 3 days in 30 mL of RPMI supplemented with 10% fetal bovine serum. An aliquot of the cell culture supernatant was removed, assayed for rat Osteopontin/OPN, and measured 193 pg/mL.

## 9.5 Sensitivity

The minimum detectable dose of mouse/rat Osteopontin/OPN is 2.5 pg/mL. This was determined by adding two standard deviations to the concentration corresponding to the mean O.D. of 20 zero standard replicates.



## 9.6 Linearity

To assess the linearity of the assay, samples were diluted with the appropriate **Sample Diluent** to produce samples with values within the dynamic range of the assay.

(The mouse serum samples were initially diluted 1:200. The mouse cell culture supernatant was initially diluted 1:500.

The mouse urine samples were initially diluted 1:2,000. The rat serum samples were initially diluted 1:25. The rat cell culture supernatant was initially diluted 1:2 )

Mouse samples		Serum	Urine	Cell culture supernatant
1:2	Average% of Expected	100	90	87
	Range (%)	-	87-93	86-89
1:4	Average% of Expected	106	100	100
	Range (%)	104-108	-	-
1:8	Average% of Expected	104	106	108
	Range (%)	86-117	102-109	106-111
1:16	Average% of Expected	101	113	119
	Range (%)	100-105	110-118	112-123

Rat samples		Serum	Cell culture supernatant
1:2	Average% of Expected	78	100
	Range (%)	75-80	-
1:4	Average% of Expected	100	111
	Range (%)	-	106-115
1:8	Average% of Expected	113	90
	Range (%)	109-118	75-110
1:16	Average% of Expected	99	
	Range (%)	98-101	

## 10. References

- Denhardt DT, et al. Osteopontin as a means to cope with environmental insults: regulation of inflammation, tissue remodeling, and cell survival. *J Clin Invest.* 107(9):1055-61 (2001).
- Fisher LW, et al. Flexible structures of SIBLING proteins, bone sialoprotein, and osteopontin. *Biochem Biophys Res Commun.* 280(2):460-5 (2001).
- Rittling SR, et al. Role of osteopontin in tumour progression. *Br J Cancer.* 90(10):1877-81 (2004).
- Rangaswami H, et al. Osteopontin: role in cell signaling and cancer progression. *Trends Cell Biol.* 16(2):79-87 (2006).