

ELISA Kit Components	Amount	Cat/Part No.
Anti-Human BMP-7 Microwell Plate	8-well strips (12)	100-191
Human BMP-7 Control	0.65 ml	100-192
Human BMP-7 Standard 100 pg/ml	0.65 ml	100-193B
Human BMP-7 Standard 200 pg/ml	0.65 ml	100-193C
Human BMP-7 Standard 400 pg/ml	0.65 ml	100-193D
Human BMP-7 Standard 800 pg/ml	0.65 ml	100-193E
Human BMP-7 Standard 1200 pg/ml	0.65 ml	100-193F
Human BMP-7 Standard 1600 pg/ml	0.65 ml	100-193G
Anti-Human BMP-7 Detection Ab(100X)	0.15 ml	100-194
Streptavidin HRP Conjugate (100X)	0.15 ml	S-HRP100
Sample Diluent Concentrate (20X)	10 ml	SD-20T
Wash Solution Concentrate (100X)	10 ml	WB-100
TMB Substrate	12 ml	80091
Stop Solution	12 ml	80101
Product Manual	1 ea	M-100-190

## Human BMP-7

**For Quantitative Determination of Human Bone  
Morphogenetic Protein 7  
in Solution**

### Other ELISA kits available from ADI

**Mouse:** Albumin, IgA, IgG, IgG1, IgG2a, IgG3, IgG2b, IgM, Leptin, Acrp30, CRP, Haptoglobin, TNF-alpha, VEGF, SAP.

**Human:** BD-1, BD-2, BD-3, NP-1 **and:** Adiponectin (Acrp30 and gAcrp30), Albumin, Aldosterone, AFP, Angiogenin, Angiopoietin-2, beta-2M, C-peptide, CRP, Cox-2, Ferritin, PSA, fPSA, GH, IgG, IgM, IgA, Insulin, NSE, CA125, CA199, CA242, PAP, SHBG, LH, FSH, TSH, T3, T4, and Steroid ELISA kits (cortisol, E2, testosterone, progesterone etc).

**Rat:** Albumin, CRP, IgG, IgM, Alpha 1 Acid glycoprotein

**Bovine:** Albumin, IgG, IgM, Lactoferrin, Transferrin

**Monkey:** IgM, IgG, IgA, CRP, IgE

**Dog:** CRP, IgG, IgM

**Chicken:** IgY(G), IgM, Ovalbumin

**Cat:** IgG, IgM

**Rabbit:** CRP, IgG

**Goat:** IgG

**Pig:** Albumin, IgG, IgM

## INTENDED USE

The Human BMP-7 ELISA Kit is an in vitro immunoassay for research use in the quantification of Human BMP-7 in cultures of human cells and in appropriately qualified samples from serum, saliva, or other tissue fluids.

## INTRODUCTION

The Bone Morphogenetic Proteins belong to the Transforming Growth Factor (TGF- beta) super family, whose members are widely represented throughout the animal kingdom. The BMPs are important regulators of key events in the processes of bone formation during embryo genesis, postnatal growth, remodeling and regeneration of the skeleton, and function by binding to a receptor complex that is found on all normal cells and is composed of type-I and –II receptors.

BMP activities are modulated through gene expression, protein processing, and by interaction with antagonists. The interplay between BMPs and their antagonists, such as noggin and chordin, governs developmental and cellular processes as diverse as the establishment of the embryonic dorsal-ventral axis, induction of neuronal tissue, and formation of joints in the skeletal system and the neurogenesis in the adult brain.

BMP-7 is a 431-amino acid polypeptide that includes a secretory signal sequence, (Chr 20), expressed in the kidney, bladder, and brain. BMP-7 plays a role in calcium regulation and bone homeostasis, and induces cartilage and bone formation. It may be the osteoinductive factor responsible for the phenomenon of epithelial osteogenesis.

## PRINCIPLE OF THE TEST

The Human BMP-7 ELISA kit is based on the binding of human BMP-7 in samples to two antibodies, one immobilized on the microtiter wells, and the other conjugated to biotin, which then binds to a streptavidin horseradish peroxidase (HRP) conjugate. After a washing step, chromogenic substrate is added and color is developed by the enzymatic reaction of HRP on the TMB substrate, which is directly proportional to the amount of BMP-7 present in the sample. Stopping Solution is added to terminate the reaction, and absorbance at 450nm is then measured using an ELISA microtiter well reader. The concentration of BMP-7 in samples is calculated from a standard curve of purified recombinant human BMP-7 of designated concentration.

## STORAGE AND STABILITY

The microtiter well plate and all other reagents, if unopened, are stable at 2-8°C until the expiration date printed on the label. Stabilities of the working solutions are indicated under Reagent Preparation.

## PERFORMANCE CHARACTERISTICS & EXPECTED RESULTS

### Specificity

The antibodies used in this kit have been affinity purified using a purified recombinant human BMP-7 immunosorbent and have been shown by ELISA to react specifically with hBMP-7, and to have essentially no reactivity with the following recombinant human proteins: BMP-2, BMP-3, BMP-4, BMP-5, BMP-6, BMP-8, TGF-β1, TGF-β2 and TGF-β3.

### Normal Range

Assay of stored sera from twenty (20) individual adult humans showed no measurable BMP-7 at 1:5 dilution. Each laboratory should determine expected values of its own testing population.

### Precision

Samples containing low, medium and high concentrations of BMP-7 were assayed multiple times in the same assay (n=10) to provide within-assay precision, and as duplicates in multiple assays (n=6) to obtain between-assay reproducibility. Coefficient of variations (CVs) were calculated for the concentrations using a point-to-point curve-fitting program.

BMP-7 concentrations were measured with good within-assay (6.3 to 8.8 %CV) and between-assay (4.2 to 5.2 %CV) reproducibility.

Sample	IgG pg/ml	Intra-assay %CV	Inter-assay %CV
Low Sample	522	6.3	5.2
Mid Sample	665	8.8	5.1
High Sample	1025	8.6	4.2

## CALCULATION OF RESULTS

The results may be calculated using any immunoassay software package. The four-parameter curve-fit is recommended. If software is not available, Human BMP-7 concentrations may be determined as follows:

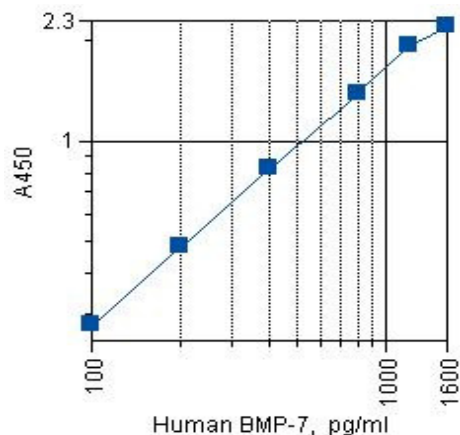
1. Calculate the mean OD of duplicate samples.
2. On graph paper plot the mean OD of the standards (y-axis) against the concentration (pg/ml) of Human BMP-7 (x-axis). Draw the best fit curve through these points to construct the standard curve. A point-to-point construction is most common and reliable.
3. The Human BMP-7 concentrations in unknown samples and controls can be determined by interpolation from the standard curve.
4. Multiply the values obtained for the samples by the dilution factor of each sample.
5. Samples producing signals higher than the 1600 pg/ml standard should be further diluted and re-assayed.

## TYPICAL RESULTS

The following data are for illustration purposes only. A complete standard curve should be run in every assay to determine sample values.

Wells	Standards, Control & Samples	A450 nm mean	BMP-7 pg/ml
1A, B	<b>Negative Diluent Control</b>	0.06	0
1C, D	100 pg/ml <b>Standard</b>	0.28	100
1E, F	200 pg/ml <b>Standard</b>	0.48	200
1G, H	400 pg/ml <b>Standard</b>	0.83	400
2A, B	800 pg/ml <b>Standard</b>	1.39	800
2C, D	1200 pg/ml <b>Standard</b>	1.93	1200
2E, F	1600 pg/ml <b>Standard</b>	2.22	1600
2G, H	<b>Positive Serum Control</b> [Value: 747 – 1387 pg/ml]	1.64	965
3A, B	<b>Sample</b> [Diluted 1:10] Calculated: 10-fold dilution x 592 pg/ml = <b>5.92 ng/ml</b> in serum	1.15	592

A typical assay Standard Curve (do not use for calculating sample values)



## KIT CONTENTS

**Ready For Use:** Store as indicated on labels.

Component	Part #	Amt	Contents
<b>Anti-Human BMP-7 Microwell Strip Plate</b>	100-191	8-well strips (12)	Coated with purified anti-human BMP-7 antibodies. Return unused strips to the pouch with desiccant; re-seal and store refrigerated.
<b>Positive Control [BMP-7]</b> range on label	100-192	0.65 ml	rhBMP-7 with stated concentration range; diluted in buffer with protein, detergents and ProClin 300 as stabilizers.
<b>Human BMP-7 Standards</b>			
100 pg/ml	100-193B	0.65 ml	Six (6) vials, each containing the specified concentration of rhBMP7; diluted in buffer with protein, detergents and ProClin 300 as stabilizers.
200 pg/ml	100-193C	0.65 ml	
400 pg/ml	100-193D	0.65 ml	
800 pg/ml	100-193E	0.65 ml	
1200 pg/ml	100-193F	0.65 ml	
1600 pg/ml	100-193G	0.65 ml	
<b>TMB Substrate</b>	80091	12 ml	Chromogenic substrate for HRP containing TMB and peroxide.
<b>Stop Solution</b>	80101	12 ml	1% sulfuric acid.

**To Be Reconstituted:** Store as indicated.

Component	Instructions for Use
<b>Sample Diluent Concentrate (20x)</b> Cat. No. SD-20T, 10ml	Dilute the entire volume, 10ml + 190ml with distilled or deionized water into a clean stock bottle. Label as <b>Working Sample Diluent</b> and store at 2-8°C until the kit lot expires or is used up.
<b>Anti-Human BMP-7 Detection Antibody Concentrate (100x)</b> Part No. 100-194, 0.15ml	Biotinylated anti-human BMP-7 in buffer with protein, detergents and ProClin 300 as stabilizers. Dilute fresh as needed; 10ul of concentrate to 1ml of <b>Working Sample Diluent</b> is sufficient for 1 8-well strip. Use within the working day and discard. Return concentrate to 2-8°C storage.
<b>Streptavidin-HRP Conjugate Concentrate (100x)</b> Part No. S-HRP100, 0.15ml	Peroxidase conjugated streptavidin antibody in buffer with protein, detergents and ProClin 300 as stabilizers. Dilute fresh as needed; 10ul of concentrate to 1ml of <b>Working Sample Diluent</b> is sufficient for 1 8-well strip. Use within the working day and discard. Return concentrate to 2-8°C storage.
<b>Wash Solution Concentrate (100x)</b> Cat. No. WB-100, 10ml	Dilute the entire volume, 10ml, to 1L with distilled or deionized water into a clean stock bottle. Label as <b>Working Wash Solution</b> and store at ambient temperature until kit is used entirely.

### Materials Required But Not Provided:

- Pipettors and pipettes that deliver 100ul and 1-10ml. A multi-channel pipetter is recommended.
- Disposable glass or plastic 5-15ml tubes for diluting samples, Detection Antibody Concentrate and Streptavidin-HRP Concentrate.
- Graduated cylinder to dilute Wash Concentrate and Sample Diluent concentrate; 200ml to 1L.
- Stock bottle to store diluted Wash Solution ; 200ml to 1L.
- Distilled or deionized water to dilute reagent concentrates.
- Microwell plate reader at 450 nm wavelength.

### PRECAUTIONS AND SAFETY INSTRUCTIONS

Standards, Controls, Sample Diluent, and Detection Antibody contain Proclin 300 (0.05%, v/v). Stop Solution contains 1% sulfuric acid. Follow good laboratory practices, and avoid ingestion or contact of any reagent with skin, eyes or mucous membranes. All reagents may be disposed of down a drain with copious amounts of water.

MSDS for TMB, sulfuric acid and Proclin 300, if not already on file, can be requested or obtained from the ADI website.

### SPECIMEN COLLECTION AND HANDLING

Culture medium, serum and other biological fluids may be used as samples with proper dilution to avoid solution matrix interference.

For **serum**, collect blood by venipuncture, allow clotting, and separate the serum by centrifugation at room temperature.

For **other samples**, including tissue culture media, clarify the sample by centrifugation and/or filtration prior to dilution in Working Sample Diluent. If samples will not be assayed immediately, stored refrigerated for up to a week, or frozen for long-term storage. Avoid freeze-thaw cycles.

### QUALITY CONTROL

**Sample Controls** A Positive Serum Control is provided with the kit, assigned with a BMP-7 concentration value range. Recovery in this range is an indicator of proper assay performance. Each lab should also assay internal control samples, which represent the lab's expected sample population and that are maintained stabilized. A Negative Diluent Control should also be run.

**Technique** Accurate and reproducible assay results rely on good lab technique regarding pipetting, plate washing and handling of samples and reagents.

**Equipment** Precision of results relies on uniform and effective washing techniques; an automatic washer is recommended. ELISA reader and pipettes should be properly calibrated.

### ASSAY PROCEDURE

Bring all reagents to room temperature (18-30° C) equilibration (at least 30 minutes).

DILUTE Samples at least 5-fold in Working Sample Diluent, e.g., 100ul sample + 400ul Diluent.

DO NOT dilute the Standards or Positive Control Serum.

ALL STEPS ARE PERFORMED AT ROOM TEMPERATURE. After each reagent addition, gently tap the plate to mix the well contents prior to beginning incubation.

- 1. Set-up**
  - Determine the number of wells for the assay run. Duplicates are recommended, to include 12 Standard wells and 2 wells for each sample and control to be assayed.
  - Remove the appropriate number of microwell strips from the pouch and return unused strips to the pouch. Reseal the pouch and store refrigerated.
  - Add 200-300ul Working Wash Solution to each well and let stand about 5 minutes before sample addition.
  - Aspirate or dump the liquid and pat the plate dry on a paper towel.
- 2. 1<sup>st</sup> Incubation** [100ul - 90min; 4 washes]
  - Add 100ul of standards, samples and controls each to pre-determined wells.
  - Tap the plate gently to mix reagents and incubate for 90 minutes.
  - Wash wells 4 times and pat dry on fresh paper towels. As an alternative, an automatic plate washer may be used. Improper washes may lead to falsely elevated signals and poor reproducibility.
- 3. 2<sup>nd</sup> Incubation** [100ul - 60min; 4 washes]
  - Add 100ul of Working Detection Antibody to each well.
  - Incubate for 60 minutes.
  - Wash wells 4 times as in step 2.
- 4. 3<sup>rd</sup> Incubation** [100ul - 30min; 5 washes]
  - Add 100ul of Working Streptavidin-HRP Conjugate to each well.
  - Incubate for 30 minutes.
  - Wash wells 5 times as in step 2.
- 5. Substrate Incubation** [100ul - 15min]
  - Add 100ul TMB Substrate to each well. The liquid in the wells will begin to turn blue.
  - Incubate for 15 minutes in the dark, e.g., place in a drawer or closet.

Note: If your microplate reader does not register optical density (OD) above 2.0, incubate for less time, or read OD at 405-410 nm (results are valid).
- 6. Stop Step** [Stop: 100ul]
  - Add 100ul of Stop Solution to each well.
  - Tap gently to mix. The enzyme reaction will stop; liquid in the wells will turn yellow.
- 7. Absorbance Reading**
  - Use any commercially available microplate reader capable of reading at 450nm wavelength. Use a program suitable for obtaining OD readings, and data calculations if available.
  - Read absorbance of the entire plate at 450nm using a single wavelength within 30 minutes after Stop Solution addition. If available, program to subtract OD at 630nm to normalize well background.