



## **Bovine BMP4 ELISA Kit**

Enzyme Immunoassay for the quantification of Bovine BMP4 in Bone tissue and cell culture supernatants.

Catalog number: ARG83133

Package: 96 wells

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For research use only. Not for use in diagnostic procedures.

## **TABLE OF CONTENTS**

<b>SECTION</b>	<b>Page</b>
INTRODUCTION.....	3
PRINCIPLE OF THE ASSAY .....	3
MATERIALS PROVIDED & STORAGE INFORMATION .....	4
MATERIALS REQUIRED BUT NOT PROVIDED.....	5
TECHNICAL HINTS AND PRECAUTIONS .....	5
SAMPLE COLLECTION & STORAGE INFORMATION.....	6
REAGENT PREPARATION.....	7
ASSAY PROCEDURE.....	9
CALCULATION OF RESULTS .....	10
EXAMPLE OF TYPICAL STANDARD CURVE .....	11
QUALITY ASSURANCE .....	11

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### **INTRODUCTION**

The protein encoded by this gene is a member of the bone morphogenetic protein family which is part of the transforming growth factor-beta superfamily. The superfamily includes large families of growth and differentiation factors. Bone morphogenetic proteins were originally identified by an ability of demineralized bone extract to induce endochondral osteogenesis in vivo in an extraskeletal site. This particular family member plays an important role in the onset of endochondral bone formation in humans, and a reduction in expression has been associated with a variety of bone diseases, including the heritable disorder Fibrodysplasia Ossificans Progressiva. Alternative splicing in the 5' untranslated region of this gene has been described and three variants are described, all encoding an identical protein. [provided by RefSeq, Jul 2008]

### **PRINCIPLE OF THE ASSAY**

This assay employs the quantitative sandwich enzyme immunoassay technique. An antibody specific for bone morphogenetic protein 4 has been pre-coated onto a microtiter plate. Standards or samples are pipetted into the wells and any bone morphogenetic protein 4 present is bound by the immobilized antibody. After washing away any unbound substances, a biotin-conjugated antibody specific for bone morphogenetic protein 4 is added to each well and incubate. Following a washing to remove unbound substances, streptavidin conjugated to Horseradish Peroxidase (HRP) is added to each microplate well and incubated. After washing away any unbound antibody-enzyme reagent, a substrate solution (TMB) is added to the wells and color develops in proportion to the amount of bone morphogenetic protein 4 bound in the initial step. The

## Bovine BMP4 ELISA Kit ARG83133

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color development is stopped by the addition of acid and the intensity of the color is measured at a wavelength of 450nm  $\pm$ 2nm. The concentration of bone morphogenetic protein 4 in the sample is then determined by comparing the O.D of samples to the standard curve.

### MATERIALS PROVIDED & STORAGE INFORMATION

Store the unopened kit at 2-8°C. Use the kit before expiration date.

NO	Component	Quantity	Storage information
C1	Antibody-coated microplate	8 X 12 strips	4°C.
C2	Standard (Lyophilized)	2 X 40 ng/vials	4°C
C3	Standard diluent buffer	30 ml (ready to use)	4°C
C4	Antibody conjugate concentrate	1 vial	4°C
C5	Antibody diluent buffer	12 ml (ready to use)	4°C
C6	HRP-Streptavidin concentrate	1 vial	4°C (Protect from light)
C7	HRP-Streptavidin diluent buffer	12 ml (ready to use)	4°C
C8	25X Wash buffer	20 ml	4°C
C9	TMB substrate	10 ml (ready to use)	4°C (Protect from light)
C10	STOP solution	10 ml (ready to use)	4°C
C11	Plate sealer	4 strips	Room temperature

## **MATERIALS REQUIRED BUT NOT PROVIDED**

- Microplate reader capable of measuring absorbance at 450nm
- Pipettes and pipette tips
- Deionized or distilled water
- 37°C oven or incubator
- Automated microplate washer (optional)

## **TECHNICAL HINTS AND PRECAUTIONS**

- Wear protective gloves, clothing, eye, and face protection especially while handling blood or body fluid samples.
- Store the kit at 2-8°C at all times.
- If crystals are observed in the 25X Wash buffer, warm to RT (not more than 50°C) until the crystals are completely dissolved.
- Ensure complete reconstitution and dilution of reagents prior to use.
- All materials should be equilibrated to room temperature (RT, 22-25°C) 20 min before use.
- All reagents should be mixed by gentle inversion or swirling prior to use. Do not induce foaming.
- Before using the kit, spin tubes and bring down all components to the bottom of tubes.
- Mix the contents of the microplate wells thoroughly by microplate shaker for 1 min or gently tap the plate to ensure good test results. Please mix carefully to avoid well-to-well contamination. Do not reuse microwells.
- The TMB Color developing agent should be colorless and transparent before using.

## Bovine BMP4 ELISA Kit ARG83133

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- Use reservoirs only for single reagents. This especially applies to the substrate reservoirs. Using a reservoir for dispensing a substrate solution that had previously been used for the conjugate solution may turn solution colored. Do not pour reagents back into vials as reagent contamination may occur.
- Do not let wells dry during assay; add reagents immediately after completing the rinsing steps.
- Avoid using reagents from different batches.
- It is highly recommended that the standards, samples and controls be assayed in duplicates.
- Change pipette tips between the addition of different reagent or samples.

### **SAMPLE COLLECTION & STORAGE INFORMATION**

The sample collection and storage conditions listed below are intended as general guidelines. Sample stability has not been evaluated.

**Bone tissue extract**- Extract demineralized bone samples in 4M Guanidine-HCl and protease inhibitors. Dissolve the final sample in 2M Guanidine-HCl. Assay immediately or aliquot and store samples at  $\leq -20^{\circ}\text{C}$  up to 1 month or  $-80^{\circ}\text{C}$  up to 6 months.

**Cell Culture Supernatants**- Remove particulates by centrifugation for 10 min at  $1500 \times g$  at  $4^{\circ}\text{C}$ . Collect the supernatants and assay immediately or aliquot & store samples at  $-20^{\circ}\text{C}$  up to 1 month or  $-80^{\circ}\text{C}$  up to 6 months. Avoid repeated freeze-thaw cycles.

Note:

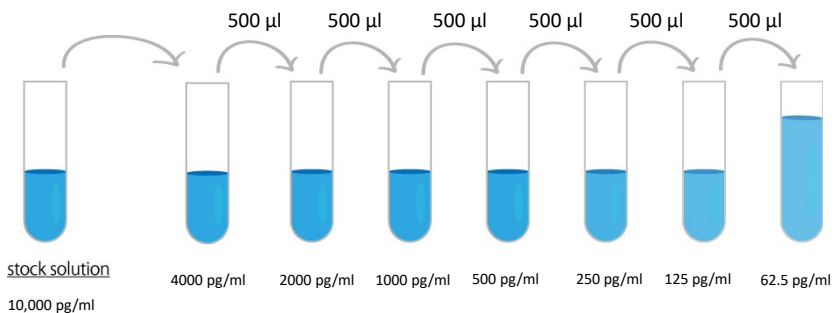
- a) Do not use haemolytic, icteric or lipaemic specimens.
- b) Samples containing sodium azide should not be used in the assay.

### REAGENT PREPARATION

- **1X Wash buffer:** Dilute **25X** Wash buffer (#C8) into distilled water to yield 1X Wash buffer. (E.g. 50 ml of 25X Wash buffer + 1200 ml of distilled water)  
The diluted Wash buffer is stable for 4 weeks at 2°C to 8°C.
- **1X Antibody conjugate:** 20 minutes before use, dilute **100X** antibody conjugate concentrate (#C4) into antibody diluent buffer (#C5) to yield 1X Detection antibody solution.
- **1X HRP-Streptavidin Solution:** 20 minutes before use, dilute **100X** HRP-Streptavidin concentrate solution (#C6) into HRP-Streptavidin diluent buffer (#C7) to yield 1X HRP-Streptavidin Solution buffer. Keep diluted HRP-Streptavidin Solution in dark before use.
- **Sample:** If the initial assay found samples contain bone morphogenetic protein 4 higher than the highest standard, the samples can be diluted with Standard diluent buffer (#C3) and then re-assay the samples. For the calculation of the concentrations this dilution factor has to be taken into account.  
**(It is recommended to do pre-test to determine the suitable dilution factor).**
- **Standards:** Reconstitute the standard (#C2) with **1 ml** standard diluent buffer (#C3) to yield a stock concentration of **10,000 pg/ml**. Keep the buffer in the vial for at least **15 min at RT** to make sure the standard is dissolved completely before making serial dilutions. The standard diluent buffer

## Bovine BMP4 ELISA Kit ARG83133

serves as zero standard (0 pg/ml), and the rest of the standard serial dilution can be diluted as according to the suggested concentration below: **4000 pg/ml, 2000 pg/ml, 1000 pg/ml, 500 pg/ml, 250 pg/ml, 125 pg/ml, 62.5 pg/ml**. DO NOT reuse the reconstituted standard.



Dilute bone morphogenetic protein 4 standard as according to the table below:

Standard	bone morphogenetic protein 4 Conc.	µl of Standard diluent	µl of standard
S7	4000 pg/ml	600	400 (10,000 pg/ml Stock)
S6	2000 pg/ml	500	500 (S7)
S5	1000 pg/ml	500	500 (S6)
S4	500 pg/ml	500	500 (S5)
S3	250 pg/ml	500	500 (S4)
S2	125 pg/ml	500	500 (S3)
S1	62.5 pg/ml	500	500 (S2)
S0	0	500	0



## **ASSAY PROCEDURE**

**All materials should be equilibrated to room temperature (RT) 20 min before use.**

Standards, samples and controls should be assayed in duplicates.

1. Remove excess microplate strips from the plate frame, return them to the foil pouch containing the desiccant pack, and reseal it.
2. Add **100 µl** of standards, samples and zero controls (standard diluent buffer) into wells, gently tap the plate to mix well. Incubate for **1.5 h at 37°C**.
3. Remove the cover and discard the liquid in the wells.
4. Add **100 µl** 1X Antibody conjugate into each well, gently tap the plate to mix well. Cover wells and incubate for **1 hour at 37°C**.
5. Aspirate each well and wash, repeating the process two times for a total **three washes**. Wash by filling each well with 1x Wash Buffer (300 µl) using a squirt bottle, manifold dispenser, or autowasher, keep the Wash Buffer in the wells for 30 sec before remove. Complete removal of liquid at each is essential to good performance. After the last wash, remove any remaining Wash Buffer by aspirating, decanting or blotting against clean paper towels.
6. Add **100 µl** of 1X HRP-Streptavidin solution to each well, gently tap the plate to mix well. Cover wells and incubate for **30 minutes at 37°C** in dark.
7. Aspirate each well and **wash as step 3**, but wash for **5 times**.
8. Add **90 µl** of TMB Reagent (#C9) to each well, gently tap the plate to mix well. Incubate for **15-25 minutes at 37°C** in dark.
9. Add **100 µl** of Stop Solution (#C10) to each well, gently tap the plate to mix well. The color of the solution should change from blue to yellow.

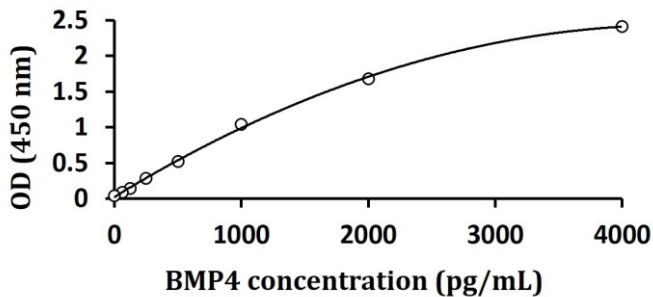
10. Read the OD with a microplate reader at **450 nm immediately**. It is recommended read the absorbance within 3 min after adding STOP solution.

## **CALCULATION OF RESULTS**

1. Calculate the average absorbance values for each set of standards, controls and patient samples.
2. Using linear graph paper, construct a standard curve by plotting the mean absorbance obtained from each standard against its concentration with absorbance value on the vertical (Y) axis and concentration on the horizontal (X) axis.
3. Using the mean absorbance value for each sample determine the corresponding concentration from the standard curve.
4. Automated method: The results in the IFU have been calculated automatically using a 4 PL (4 Parameter Logistics) curve fit. 4 Parameter Logistics is the preferred method. Other data reduction functions may give slightly different results.
5. arigo provides GainData®, an in-house development ELISA data calculator, for ELISA data result analysis. Please refer our GainData® website for details. (<https://www.arigobio.com/elisa-analysis>)
6. If the samples have been diluted, the concentration read from the standard curve must be further converted by the appropriate dilution factor according to the sample preparation procedure as described above.

## **EXAMPLE OF TYPICAL STANDARD CURVE**

The following data is for demonstration only and cannot be used in place of data generations at the time of assay.



## **QUALITY ASSURANCE**

### **Sensitivity**

The minimum detectable dose (MDD) of Bovine BMP4 ranged from 62.5 pg/ml - 4,000 pg/ml. The mean MDD was 5 pg/ml.

### **Specificity**

This assay recognizes natural and recombinant Bovine BMP4.

### **Intra-assay and Inter-assay precision**

The CV values of both intra and inter precision fall below 10%.