

BioAim Scientific Inc

# **Human MMP-9 EasyTest<sup>TM</sup> ELISA Kit**

Cat.No: 1010010

## **Instruction Manual**

For research use only

## **TABLE OF CONTENTS**

I.	INTRODUCTION.....	3
II.	MATERIALS SUPPLIED.....	4
III.	STORAGE.....	4
IV.	ADDITIONAL MATERIALS REQUIRED.....	4
V.	PRECAUTIONS.....	5
VI.	REAGENT PREPARATION.....	5
VII.	ASSAY PROCEDURE.....	7
VIII.	CALCULATION OF RESULTS.....	8
IX.	PERFORMANCE .....	9
X.	REFERENCES.....	10
XI.	TROUBLESHOOTING.....	11

## I. INTRODUCTION

Matrix metalloproteinases (MMPs) are a family of zinc-dependent endopeptidases that degrade extracellular matrix proteins. Human MMP-9 is secreted as a 92 kDa zymogen. Cleavage of Pro-MMP-9 results in the active enzyme with a mass of approximately 82 kDa. Pro-MMP-9 can be activated by MMP-3 or by certain bacterial proteinases. MMP-9 is inhibited by  $\alpha$ 2-macroglobulin or by TIMP-1, which binds to Pro-MMP-9 as well as to active MMP-9.

Pro-MMP-9 is secreted by monocytes, macrophages, neutrophils, keratinocytes, fibroblasts, osteoclasts, chondrocytes, skeletal muscle satellite cells, endothelial cells, and various tumor cells. Pro-MMP-9 expression is upregulated by TGF- $\beta$ 1, IL-1 $\beta$ , TGF- $\alpha$ , PDGF-AB, TNF- $\alpha$ , and IL-1 $\alpha$ . Substrates for MMP-9 include denatured collagen type I, native collagens, fibrinogen, vitronectin, IL-1 $\beta$ , and entactin.

MMP-9 is involved in inflammation, tissue remodeling, wound healing, mobilization of matrix bound growth factors and processing of cytokines. Its expression correlates with the desmoplasia that accompanies pancreatic cancer, with the metastasis to lymph nodes by human breast carcinoma cells and with the invasion of regional vessels in giant cell tumors of bones. MMP-9 may be elevated in gingival crevicular fluid and saliva in patients with gingivitis and periodontal diseases.

The BioAim Human MMP-9 EasyTest<sup>™</sup> ELISA kit can quantitatively measure MMP-9 in human serum or plasma. It is a simple and rapid technology for the quantitation of antigen in a range of sample matrices. The whole process takes less than 1.5 hours with high accuracy and precision. EasyTest<sup>™</sup> ELISA is faster and easier to perform than standard format ELISA with less reagent handling and fewer pipetting steps.

## **II. REAGENTS**

1. Human MMP-9 Microplate: 96 breakable wells (12strips x 8wells) coated with anti-human MMP-9.
2. 20x Wash Buffer Concentrate: 1 Vial, 25 ml.
3. 5x Assay Diluent: 1 vial, 15 ml.
4. Standards: 10µl/ vial, 2 vials, recombinant human MMP-9.
5. BioAim human MMP-9 Mix: 18µl/vial, 4 vials.
6. TBM Substrate solution: 1 Vial, 12 ml.
7. Stop Solution: 1 Vial, 8 ml of 0.2 M sulfuric acid.

## **III. STORAGE**

1. The kit can be stored for up to 6 months at 2° to 8°C from the date of shipment.
2. Standard can be stored at -20 °C or -80 °C. Use freshly prepared standard within 12 hours (stored at 2~8°C).
3. Opened Microplate Wells or reagents may be store for up to 1 month at 2 to 8°C. Return unused strip to the pouch containing desiccant pack, reseal along entire edge and keep in 2~8°C.
4. Avoid repeated freeze-thaw cycles.

## **IV. ADDITIONAL MATERIALS REQUIRED**

1. Distilled or deionized water.
2. Precision pipettes, with disposable plastic tips.
3. Beakers, flasks, cylinders necessary for preparation of reagents.
4. Microplate washing device (multichannel pipette or automated microplate washer).
5. Microplate shaker.
6. Microplate reader capable of reading at 450 nm.

## V. PRECAUTIONS

1. All reagents must be at room temperature (18 °C to 25 °C) before running assay.
2. Do not mix or substitute reagents with those from other lots or other sources.
3. Do not use kit reagents beyond expiration date on label.
4. Do not expose kit reagents to strong light during storage or incubation.
5. Use disposable pipette tips for each transfer to avoid microbial contamination or cross contamination of reagents.
6. Improper or insufficient washing at any stage of the procedure will result in either false positive or false negative results.
7. Avoid contact of stop solution with skin or eyes. If contact occurs, immediately flush area with copious amounts of water.
8. Do not use TMB substrate solution if it has begun to turn blue.
9. Do not expose bleach to work area during actual test procedure because of potential interference with enzyme activity.

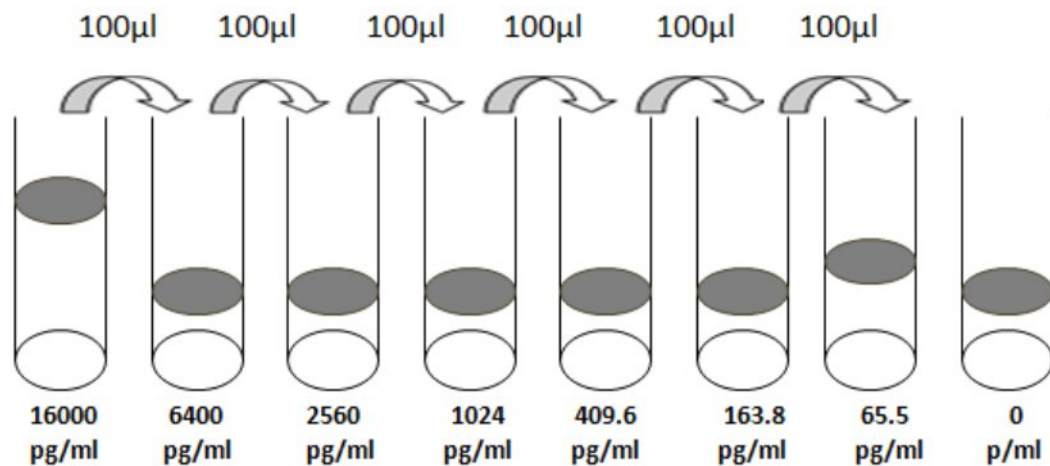
## VI. REAGENT PREPARATION

1. Bring all reagents and samples to room temperature (18~25°C) before use.
2. **Assay diluent**  
Dilute the concentrated assay diluent 1:5 with distilled water (e.g. 10ml plus 40ml).
3. **Wash Buffer**  
Dilute the concentrated wash buffer 1:20 with distilled water (e.g. 20ml plus 380ml).
4. **Sample**  
Levels of the target protein may vary among different specimens. Optimal dilution factors for each sample must be determined by the investigator.

The dilution scheme is only suggestion: the recommended starting dilution for serum and plasma is 1: 300.

## 5. Standard

- Briefly spin standard vial before use. Add 390  $\mu$ l 1x Assay Diluent to prepare a 50ng/ml standard. Gently vortex to mix.
- Take 160  $\mu$ l MMP-9 standard into a tube; then add 340  $\mu$ l 1x Assay Diluent to prepare a 16000 pg/ml stock standard solution.
- Add 150  $\mu$ l 1x Assay Diluent to 7 tubes. Label as 6400pg/ml, 2560pg/ml, 1024pg/ml, 409.6pg/ml, 163.8pg/ml, 65.5pg/ml and the last tube with 1x assay diluent is the blank as 0pg/ml.
- Perform serial dilutions by adding 100  $\mu$ l of each standard to the next tube and vortexing between each transfer (see figure below).



## 6. BioAim human MMP-9 Mix

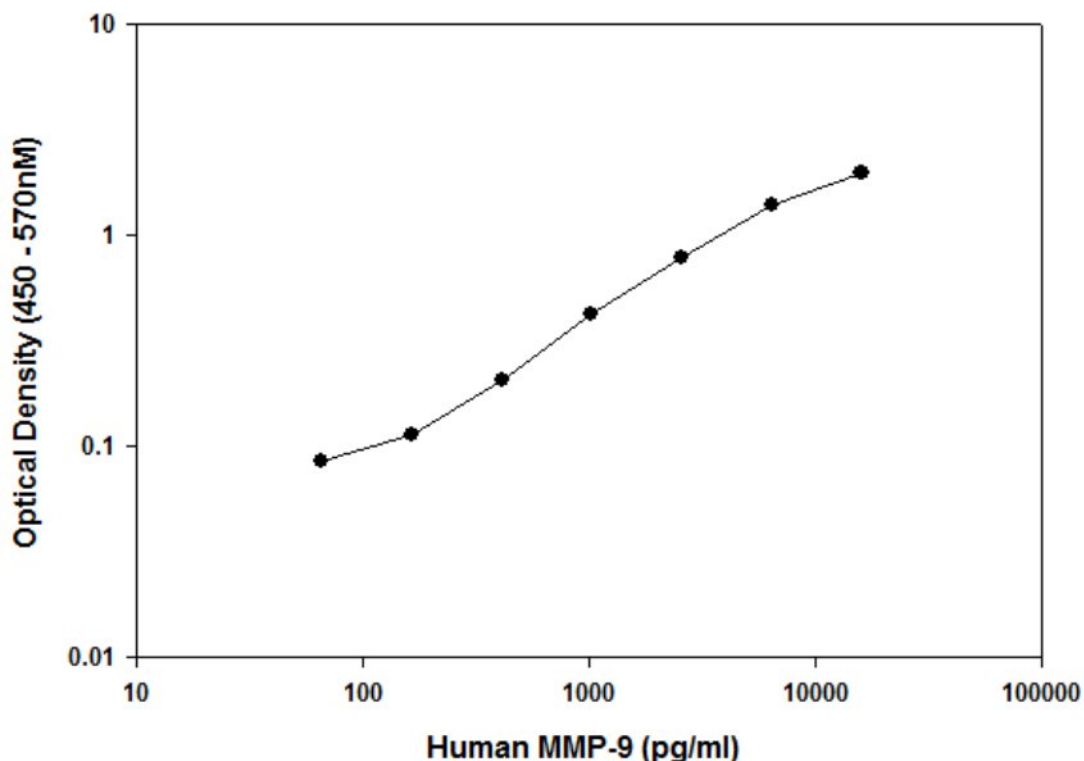
Within 15 minutes prior to use, briefly spin the vial. Add 1482  $\mu$ l of 1x Assay diluent to the vial and mix by pipetting. A vial mix can be used for around 30 wells.

## VII. ASSAY PROCEDURE

1. All reagents must be brought to room temperature (18-25°C) prior to use. Place the required number of microwells in the holder. It is recommended that all samples, standards, and blanks be run in duplicate.
2. Add 50 µl of 1x Assay Diluent into the blank wells.
3. Add 50 µl of each standard (*see reagent preparation step 5*) and samples into the designated wells. Gently shake/tap the plate for 5 seconds to mix.
4. Add 50 µl of BioAim MMP-9 Mix into all wells, including the blank wells.
5. Cover wells with plate sealer and incubate at room temperature (18~25°C) for 1 hour with gentle shaking.
6. Decant or aspirate contents of wells. Wash wells by filling with at least 300 µl/well prepared wash buffer followed by decanting/aspirating. Soak wells in wash buffer for 30 seconds to 1 minute for each wash. Repeat wash 4 times for a total of 5 washes. After the last wash, blot plate on absorbent paper to remove residual buffer. Thorough washing at this step is very important, complete removal of liquid is required for proper performance.
7. Pipette 100 µl of TMB Substrate Solution to each well. Incubate plate for 15 minutes at room temperature in the dark with gentle shaking.
8. Add 50 µl of stop solution to each well.
9. Read absorbance at 450nm within 30 minutes of stopping reaction. If wavelength correction is available, subtract the optical density readings at 570nm from readings at 450nm.

## VIII. CALCULATION OF RESULTS

1. Calculate the average absorbance values for each set of duplicate standards, samples and controls. Subtract the average zero standard optical density.
2. Create a standard curve by plotting the mean absorbance for each standard concentration on the ordinate against the MMP-9 concentration on log-log graph paper or using Sigma plot software. Draw a best fit curve through the points of the graph.
3. To determine the concentration of circulating MMP-9 for each sample, first find the mean absorbance value on the ordinate and extend a horizontal line to the standard curve. At the point of intersection, extend a vertical line to the abscissa and read the corresponding MMP-9 concentration.
4. A representative standard curve is shown below. This standard curve is for demonstration only. A standard curve must be run with each assay by operator.





## IX. PERFORMANCE

### A. Sensitivity

The minimum detectable dose of MMP-9 was determined to be 22pg/ml. This is defined as two standard deviations above the mean optical density of 20 replicates of the zero standards.

### B. Recovery

Recovery was determined by spiking various levels of Human MMP-9 into the diluted sample types listed below. Mean recoveries are as follows:

Sample Type	Average % recovery	Range %
Serum	90	79-106
Plasma	92	90-100

### C. Linearity

Sample	Dilution	% of expected
Seum	1:2	118
	1:4	94
	1:8	88
Plasma	1:2	116
	1:4	98
	1:8	103

### D. Specificity

No cross-reactivity was identified with the following cytokines: Adiponectin, Angiopoietin-1, BDNF, IL-1 beta, IL-2, IL-3, IL-4, IL-5, IL-7, IL-8, IL-9, IP-10, G-CSF, GM-CSF, IFN-gamma, Leptin, MCP-1, PDGF, RANTES, SCF, TGF-beta, TIMP-2, TNF-alpha, TNF-beta, and VEGF.

## E. Reproducibility

Intra-Assay CV%: <10%

Inter-Assay CV%: <15%

## X. REFERENCES

1. Wilhelm, S.M. et al. (1989) J. Biol. Chem. 264:17213.
2. Matrisian, L.M. (1992) BioEssays 14:455.
3. Birkedal-Hansen, H. et al. (1993) Crit. Rev. Oral Biol. Med. 4:197.
4. Ogata, Y. et al. (1992) J. Biol. Chem. 267:3581.
5. Lyons, J.G. et al. (1993) J. Biol. Chem. 268:19143.
6. Okamoto, T. et al. (1997) J. Biol. Chem. 272:6059.
7. Cullen, B. et al. (1997) Int. J. Biochem. Cell Biol. 29:241.
8. Hanemaaijer, R. et al. (1993) Biochem. J. 296:803.
9. Lyons, J.G. et al. (1991) Biochemistry 30:1449.
10. Ito, A. et al. (1996) J. Biol. Chem. 271:14657.
11. Birkedal-Hansen, H. (1993) J. Periodontol. (suppl.) 64:474.

## **XI. Troubleshooting**

Problem	Cause	Solution
1. Poor standard curve	1. Inaccurate pipetting 2. Improper standard dilution	1. check pipettes; 2. Ensure briefly spin the vial of standard, take the right amount to dilution.
2. Low signal	1. Too brief incubation time 2. Inadequate reagent volumes or improper dilution	1. ensure adequate incubation time; 2. Check pipettes and ensure corrected preparation.
3. Large CV	Inaccurate pipetting	1. Check pipettes; 2. Accurately perform each step.
4. High background	1. Plate is insufficiently washed; 2. Wash buffer contamination	1. Follow the manual correctly; if using a plate washer, check that all ports are working functionally; 2. Prepare fresh buffer.
5. Low sensitivity	1. ELISA kit improper storage 2. Stop solution	1. Follow the manual to store each component correctly; 2. Add enough stop solution to each well.

## **Bioaim Scientific Inc**

Unit 6, 27 Casebridge Court  
Scarborough, ON, M1B 4Y4  
Canada  
Tel: 416-286-6868  
[www.bioaimscientific.com](http://www.bioaimscientific.com)