

## Human Matrix metalloproteinase 2 ELISA

Cat. No.: BA1023

Enzyme Immunoassay for the quantitative determination of Matrix metalloproteinase 2 (MMP-2) in human serum and plasma.

Matrix metalloproteinases (MMPs) are zinc-dependent endopeptidases, responsible for the integrity of the basement membrane (BM) via degradation of extracellular matrix and BM components.<sup>1</sup> MMPs are presented in various types of cells, including cardiomyocytes, cerebral neurons, hepatocytes, and many others, thus influencing various processes. MMP-2, also called gelatinase A, is reported to play a crucial intracellular role where it cleaves several sarcomeric proteins inside cardiac myocytes during oxidative stress-induced injury.<sup>2</sup> Elevated levels of MMP-2 (combined with MMP-9) are also associated with highly tumorigenic cancers, such as breast, gastric.

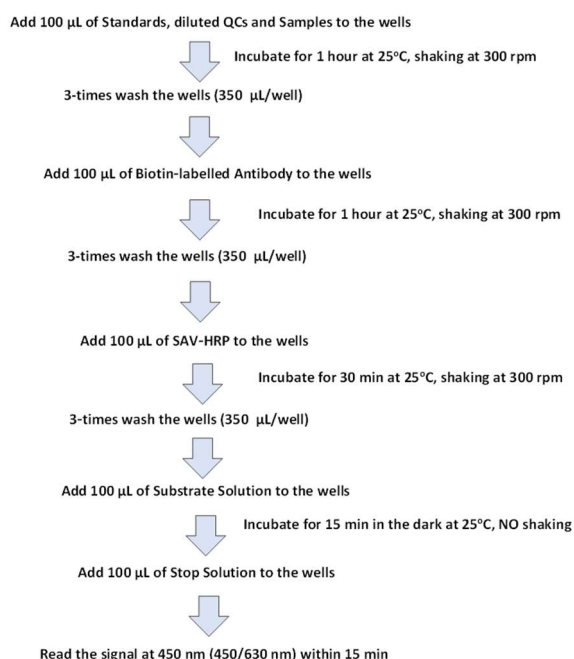
### PRINCIPLE OF MMP-2 ELISA

The microtiter plate is coated with the antibody specifically binding the Matrix metalloproteinase 2. The human serum or plasma is incubated in the plate with the capture antibody.

The specimen is washed out and the specifically bound protein is incubated with biotin-labelled detection antibody. Following another washing step, Streptavidin-HRP conjugate is added into the well.

Unbound reagent is then washed out. Horseradish peroxidase (HRP) bound in the complex reacts with the chromogenic substrate (TMB) creating the blue colour. The reaction is stopped by addition of STOP solution (H<sub>2</sub>SO<sub>4</sub>).

The absorbance values are measured at 450 nm (optionally 450/630 nm) and are proportional to the concentration of MMP-2 in the specimen. The concentration of MMP-2 in unknown samples is determined from the calibration curve which is created by plotting the absorbance values against the standard concentration values.



### Kit Contents

Item	Qty.
Antibody Coated Microtiter Plate	96 wells
Biotin-labelled Antibody	13 mL
Streptavidin-HRP Conjugate	13 mL
Master Standard (lyophilized)	1 vial
Quality Control A (human serum, lyophilized)	1 vial
Quality Control B (human serum, lyophilized)	1 vial
Dilution Buffer	2 x 13 mL
Wash Buffer 15x conc.	50 mL
Substrate Solution	13 mL
STOP Solution	13 mL

### MATERIAL REQUIRED BUT NOT SUPPLIED

1. Glassware and test tubes
2. Microtiter plate washer
3. Precision pipettes (various volumes) with tips
4. Orbital shaker
5. Microtiter plate reader capable of measuring absorbance at 450 nm or 450/630 nm with software for data generation

### WARNINGS AND PRECAUTIONS

1. For research use only
2. For professional laboratory use
3. The reagents with different lot numbers should not be mixed
4. To prevent cross sample contamination, use disposable labware and pipette tips
5. To protect laboratory stuff, wear protective gloves and protective clothing
6. The substrate solution should remain colourless, keep it protected from light
7. The test should be performed at standard laboratory conditions (temperature 25°C ± 2°C).

### STORAGE CONDITIONS

1. The kit must be stored at 2 – 8°C.
2. The opened components can be stored for one week at 2 – 8°C.

### PREPARATION OF REAGENTS

- Use new pipette tip for pipetting different reagents and samples to prevent cross-contamination.
- All reagents and samples should be allowed to reach the temperature 25°C ± 2°C.

### Preparation of Standards

Reconstitute lyophilized Human MMP-2 Standard in Dilution Buffer, for the volume information see the Certificate of Analysis. Let it rehydrate for 15 min prior to use. The concentration of human MMP-2 in Master Standard is 40 ng/mL.

Prepare set of Standard solution as follows:

Use the Master Standard for serial dilution (as below). Mix each tube thoroughly before the next transfer. The Dilution Buffer serves as Blank.

	Volume of Standard	Dilution Buffer	Concentration
Std1	Standard 40 ng/mL (lyophilized)	625 µL	40 ng/mL
Std2	250 µL of Std1	250 µL	20 ng/mL
Std3	250 µL of Std2	250 µL	10 ng/mL
Std4	250 µL of Std3	250 µL	5 ng/mL
Std5	250 µL of Std4	250 µL	2.5 ng/mL
Std6	250 µL of Std5	250 µL	1.25 ng/mL
Std7	250 µL of Std5	250 µL	0.625 ng/mL
Blank	-	200 µL	0 ng/mL

## Preparation of Quality Control A and B

Reconstitute the lyophilized human serum Quality Controls in deionized/distilled water, for the volume information see the Certificate of Analysis. Let the QCs rehydrate for 15 min and dilute them 1:50 in Dilution Buffer, prior to use, see Preparation of samples.

## Preparation of Wash Buffer 1x

Prepare a working solution of Wash Buffer by adding 50 mL of Wash Buffer 15x conc. to 700 mL of deionized/ distilled water (dH<sub>2</sub>O). Mix well. Store at 4°C for two weeks or at -20°C for long term storage.

## Preparation of samples

Human serum or plasma may be used with this assay. For long-term storage the samples should be frozen at minimum -70°C. Lipemic or haemolytic samples may cause false results.

Recommended dilution of samples is 1:50, i.e., 5 µL of sample + 245 µL of Dilution Buffer, for duplicates and for singlets.

Do not store the diluted samples.

## ASSAY PROCEDURE

1. Prepare the reagents as described in the previous chapter.
2. Pipette 100 µL of set of Standards, Quality Controls, diluted Samples and Dilution Buffer = Blank into each well. Incubate for **1 hour** at 25°C ±2°C, shaking at 300 rpm.
3. Wash the wells 3-times with 1x Wash Buffer (350 µL/well). When finished, tap the plate against the paper towel to remove the liquid completely.
4. Pipette 100 µL of Biotin-labelled Antibody into each well. Incubate for **1 hour** at 25°C ±2°C, shaking at 300 rpm.
5. Wash the wells as described in point 3.
6. Pipette 100 µL of Streptavidin-HRP into each well. Incubate for **30 min** at 25°C ±2°C, shaking at 300 rpm.
7. Wash the wells as described in point 3.
8. Pipette 100 µL Substrate solution, incubate for **15 min**, at 25°C ±2°C. Avoid exposure to the light during this step.
9. Pipette 100 µL of STOP solution.
10. Read the signal at 450 or 450/630 nm within 15 min.

## PERFORMANCE CHARACTERISTICS

Samples used in the tests were diluted 1:50 as recommended and assayed. The results are multiplied by the dilution factor.

### 1. Sensitivity

The limit of detection, defined as a concentration of human MMP-2 giving absorbance higher than absorbance of blank + 3 standard deviations, is better than 0.25 ng/mL of sample.

### 2. Precision

#### Intra-assay

Sample	Mean (ng/mL)	SD	CV (%)
1	175	5.1	3
2	208	4.3	2

#### Inter-assay (Run – to – run)

Sample	Mean (ng/mL)	SD	CV (%)
1	252	21.7	9
2	145	4.3	3

## 3. Accuracy

### Dilution linearity

Sample	Dilution	Measured concentration (ng/mL)	Expected concentration (ng/mL)	Yield (%)
1		175	-	-
	2x	96	88	110
	4x	50	44	114
	8x	21	22	97
2		150	-	-
	2x	80	75	107
	4x	43	37	114
	8x	19	19	99

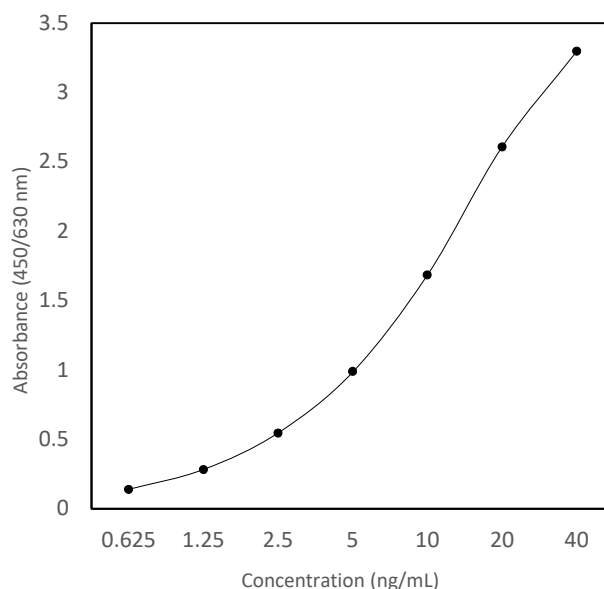
### Spiking Recovery

Sample	Spike (ng/ml)	Measured concentration (ng/mL)	Expected concentration (ng/mL)	Yield (%)
1	-	208	-	-
	250	453	458	99
	125	334	333	100
	62.5	270	270	100

### Typical standard curve

The standard curve needs to be measured in every test. Most of the microplate reader can automatically calculate the analyte concentration using 4-parameter algorithm or alternative functions to fit the standard points properly. The concentrations need to be multiplied by the dilution factor, either automatically by reader or manually.

Human MMP-2 Standard Curve



## RESOURCES

<sup>1</sup> Łukaszewicz-Zajac M, Mroczko B, Słowik A. Matrix metalloproteinases (MMPs) and their tissue inhibitors (TIMPs) in amyotrophic lateral sclerosis (ALS). *J Neural Transm (Vienna)*. 2014 Nov;121(11):1387-97. doi: 10.1007/s00702-014-1205-3. Epub 2014 Jul 22. PMID: 25047909; PMCID: PMC4210652.

<sup>2</sup> Bassiouni W, Ali MAM, Schulz R. Multifunctional intracellular matrix metalloproteinases: implications in disease. *FEBS J*. 2021 Dec;288(24):7162-7182. doi: 10.1111/febs.15701. Epub 2021 Jan 22. PMID: 33405316.