NADP-Malate Dehydrogenase

Microplate Assay Kit

User Manual

Catalog # CAK1141

(Version 1.4B)

Detection and Quantification of NADP-Malate Dehydrogenase Activity in Serum, Plasma, Tissue extracts, Cell lysate, Cell culture media and Other biological fluids Samples.

For research use only. Not for diagnostic or therapeutic procedures.

I. INTRODUCTION

In enzymology, a malate dehydrogenase (NADP+) (EC 1.1.1.82) is an enzyme that catalyzes the chemical reaction

$$\text{(S)-malate} + \text{NADP}^+ \rightarrow \text{oxaloacetate} + \text{NADPH} + \text{H}^+$$

Thus, the two substrates of this enzyme are (S)-malate and NADP+, whereas its 3 products are oxaloacetate, NADPH, and H+.

This enzyme belongs to the family of oxidoreductases, specifically those acting on the CH-OH group of donor with NAD^+ or $NADP^+$ as acceptor. The systematic name of this enzyme class is (S)-malate:$NADP^+$ oxidoreductase. Other names in common use include $NADP^+$-malic enzyme, $NADP^+$-malate dehydrogenase, malic dehydrogenase (nicotinamide adenine dinucleotide phosphate), malate $NADP^+$ dehydrogenase, $NADP^+$ malate dehydrogenase, $NADP^+$-linked malate dehydrogenase, and malate dehydrogenase ($NADP^+$). This enzyme participates in pyruvate metabolism and carbon fixation.

NADP-Malate Dehydrogenase Microplate Assay Kit provides a simple and direct procedure for measuring NADP-malate dehydrogenase activity in a variety of samples. In this kit, NADP-malate dehydrogenase catalyzed reduction of malate in which the formed NADPH reduces a formazan reagent. The rate of increase in the absorbency at 450 nm, is a measure of NADP-malate dehydrogenase activity.

II. KIT COMPONENTS

Component	Volume	Storage
96-Well Microplate	1 plate	
Assay Buffer	30 ml x 4	4 °C
Reaction Buffer	10 ml x 1	4 °C
Substrate	Powder x 1	-20 °C
Dye Reagent A	Powder x 1	4 °C
Dye Reagent B	1 ml x 1	4 °C
Standard	Powder x 1	-20 °C
Positive Control	Powder x 1	-20 °C
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Note:

Substrate: add 1 ml Reaction Buffer to dissolve before use.

Dye Reagent A: add 1 ml distilled water to dissolve before use, mix, store at 4°C.

Standard: add 1 ml distilled water to dissolve before use; then add 0.2 ml into 0.8 ml distilled water, the concentration will be 400 µmol/L.

Positive Control: add 1 ml assay buffer to dissolve before use, then add 0.1 ml into 0.8 ml assay buffer, mix. Aliquot & store at -80 °C. Use within one month.

III. MATERIALS REQUIRED BUT NOT PROVIDED

1. Microplate reader to read absorbance at 450 nm
2. Distilled water
3. Pipettor, multi-channel pipettor
4. Pipette tips
5. Mortar
6. Centrifuge
7. Timer
8. Ice

IV. SAMPLE PREPARATION

1. For cell and bacteria samples

Collect cell or bacteria into centrifuge tube, discard the supernatant after centrifugation, add 1 ml Assay buffer for 5×10^6 cell or bacteria, sonicate (with power 20%, sonicate 3s, interval 10s, repeat 30 times); centrifuged at 8000g 4 °C for 10 minutes, take the supernatant into a new centrifuge tube and keep it on ice for detection.

2. For tissue samples

Weigh out 0.1 g tissue, homogenize with 1 ml Assay buffer on ice, centrifuged at 8000g 4 °C for 10 minutes, take the supernatant into a new centrifuge tube and keep it on ice for detection.

3. For liquid samples

Detect directly.

V. ASSAY PROCEDURE

Warm all regents to room temperature before use.

Add following reagents into the microplate:

Reagent	Sample	Control	Standard	Blank	Positive Control
Reaction Buffer	80 µl	80 µl	--	--	80 µl
Sample	10 µl	--	--	--	--
Standard	--	--	100 µl	--	--
Distilled water	--	10 µl	--	100 µl	--
Positive Control	--	--	--	--	10 µl
Substrate	10 µl	10 µl	--	--	10 µl
Dye Reagent A	90 µl	90 µl	90 µl	90 µl	90 µl
Dye Reagent B	10 µl	10 µl	10 µl	10 µl	10 µl
Mix, keep in dark for 5 minutes at room temperature, record absorbance measured at 450 nm.					

Note:

1) Perform 2-fold serial dilutions of the top standards to make the standard curve.

2) For unknown samples, we recommend doing a pilot experiment & testing several doses to ensure the readings are within the standard curve range. If the enzyme activity is lower, please add more samples into the reaction system; or increase the reaction time; if the enzyme activity is higher, please dilute the sample, or decrease the reaction time.

3) Reagents must be added step by step, can not be mixed and added together.

VI. CALCULATION

Unit Definition: One unit of NADP-MDH activity is defined as the enzyme converts one 1 μmol of NADPH per minute.

1. According to the protein concentration of sample

$$\text{NADP-MDH (U/mg)} = (C_{Standard} \times V_{Standard}) \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank}) / (V_{Sample} \times C_{Protein}) / T$$

$$= 0.8 \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank}) / C_{Protein}$$

2. According to the weight of sample

$$\text{NADP-MDH (U/g)} = (C_{Standard} \times V_{Standard}) \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank}) / (V_{Sample} \times W / V_{Assay}) / T$$

$$= 0.8 \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank}) / W$$

3. According to the quantity of cells or bacteria

$$\text{NADP-MDH (U/10}^4\text{)} = (C_{Standard} \times V_{Standard}) \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank}) / (V_{Sample} \times N / V_{Assay}) / T$$

$$= 0.8 \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank}) / N$$

4. According to the volume of serum or plasma

$$\text{NADP-MDH (U/ml)} = (C_{Standard} \times V_{Standard}) \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank}) / V_{Sample} / T$$

$$= 0.8 \times (OD_{Sample} - OD_{Control}) / (OD_{Standard} - OD_{Blank})$$

$C_{Standard}$: the standard concentration, 400 μmol/L = 0.4 μmol/ml;

$V_{Standard}$: the volume of standard, 100 μl = 0.1 ml;

V_{Sample}: the volume of sample, 0.01 ml;

$C_{Protein}$: the protein concentration, mg/ml;

W: the weight of sample, g;

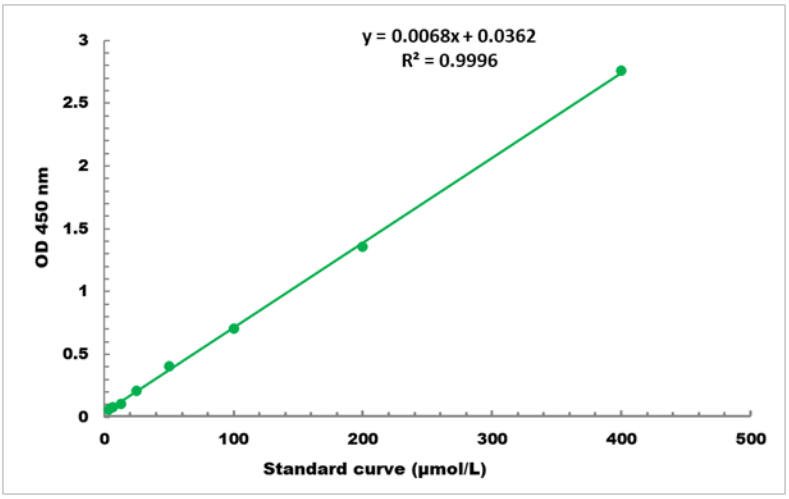
N: the quantity of cell or bacteria, N × 10^4;

V_{Assay}: the volume of Assay buffer, 1 ml;

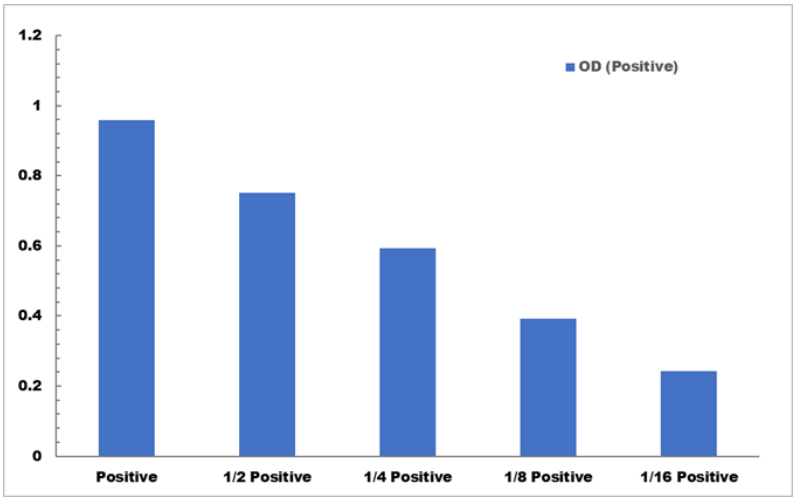
T: the reaction time, 5 minutes.

VII. TYPICAL DATA

The standard curve is for demonstration only. A standard curve must be run with each assay.



Detection Range: 4 μmol/L - 400 μmol/L



Positive Control reaction in 96-well plate assay with decreasing the concentration

VIII. TECHNICAL SUPPORT

For troubleshooting, information or assistance, please go online to www.cohesionbio.com or contact us at techsupport@cohesionbio.com

IX. NOTES