



Glutaminase Microplate Assay Kit

User Manual

Catalog # ASK1065

Detection and Quantification of Glutaminase (GLS) Activity in Tissue extracts, Cell lysate Samples.

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

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**I. INTRODUCTION**

Glutaminase (glutamine aminohydrolase or GLS) catalyzes the following reaction:

Glutamine + H₂O → Glutamate + NH₃. The enzyme has tissue-specific roles in multiple organs. Two different mammalian phosphate-activated GLS isoforms are known: GLS1 (kidney-type) and GLS2 (liver-type; a target of the tumor suppressor protein p53). The hydrolytic activity of glutaminase generates ammonia for urea synthesis in the liver similar to that mediated by glutamate dehydrogenase. During renal acidosis, glutaminase is induced in the kidney, leading to increased excretion of ammonia, which plays an important role in maintaining acid-base homeostasis. Glutaminase regulates the levels of the neurotransmitter glutamate in the brain. The rate of glutaminolysis is known to increase in tumors and may be a hot spot for regulation of cancer cell metabolism. Inhibitors of GLS may therefore be candidate drugs for cancer therapy.

Glutaminase Microplate Assay Kit is a sensitive assay for determining glutaminase activity in various samples. The assay is initiated with the enzymatic hydrolysis of glutamine by GLS. The enzyme catalysed reaction products can be measured at a colorimetric readout at 420 nm.

**II. KIT COMPONENTS**

Component	Volume	Storage
96-Well Microplate	1 plate	
Assay Buffer	30 ml x 4	4 °C
Substrate	Powder x 1	4 °C
Stop Solution	30 ml x 1	RT
Reaction Buffer	5 ml x 1	RT
Dye Reagent	2 ml x 1	RT
Standard (1 mmol/L)	1 ml x 1	4 °C
Positive Control	1 µl x 1	4 °C
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Note:

Substrate: add 20 ml distilled water to dissolve before use, store at 4 °C.

Positive Control: add 100 µl distilled water before use, mix, store at 4 °C.

III. MATERIALS REQUIRED BUT NOT PROVIDED

1. Microplate reader to read absorbance at 420 nm
2. Distilled water
3. 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%, sonication 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**

Add following reagents in the microcentrifuge tubes:

Reagent	Sample	Control	Standard	Blank	Positive Control
Sample	20 μ l	--	--	--	--
Distilled water	--	20 μ l	--	--	--
Positive Control	--	--	--	--	20 μ l
Substrate	200 μ l	200 μ l	--	--	200 μ l
Mix, put it in the oven, 37 °C for 10 mins.					
Stop Solution	300 μ l	300 μ l	--	--	300 μ l
Mix, centrifuged at 10,000g for 5 minutes, add the supernatant into the microplate.					
Supernatant	130 μ l	130 μ l	--	--	130 μ l
Standard	--	--	130 μ l	--	--
Distilled water	--	--	--	130 μ l	--
Reaction Buffer	50 μ l	50 μ l	50 μ l	50 μ l	50 μ l
Dye Reagent	20 μ l	20 μ l	20 μ l	20 μ l	20 μ l
Mix, record absorbance measured at 420 nm immediately.					

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 sample into the reaction system; or increase the reaction time in first step; if the enzyme activity is higher, please dilute the sample, or decrease the reaction time in first step.

**VI. CALCULATION**

Unit Definition: one unit is defined as the enzyme that generates 1 μmol of ammonia per minute.

1. According to the protein concentration of sample

$$\begin{aligned}\text{GLS (U/mg)} &= (C_{\text{Standard}} \times V_{\text{Standard}}) \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / V_{\text{Sample}} / \\ &\quad C_{\text{Protein}} / T \times 4 \\ &= 2.6 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / C_{\text{Protein}}\end{aligned}$$

2. According to the weight of sample

$$\begin{aligned}\text{GLS (U/g)} &= (C_{\text{Standard}} \times V_{\text{Standard}}) \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / (V_{\text{Sample}} \times \\ &\quad W / V_{\text{Assay}}) / T \times 4 \\ &= 2.6 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / W\end{aligned}$$

3. According to the quantity of cells or bacteria

$$\begin{aligned}\text{GLS (U/10}^4\text{)} &= (C_{\text{Standard}} \times V_{\text{Standard}}) \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / (V_{\text{Sample}} \\ &\quad \times N / V_{\text{Assay}}) / T \times 4 \\ &= 2.6 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / N\end{aligned}$$

4. According to the volume of sample

$$\begin{aligned}\text{GLS (U/ml)} &= (C_{\text{Standard}} \times V_{\text{Standard}}) \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / V_{\text{Sample}} / \\ &\quad T \times 4 \\ &= 2.6 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}})\end{aligned}$$

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

C_{Standard} : the concentration of standard, 1 mmol/L = 1 $\mu\text{mol/ml}$;

W: the weight of sample, g;

N: the quantity of cell or bacteria, $N \times 10^4$;

V_{Sample} : the volume of sample, 0.02 ml;

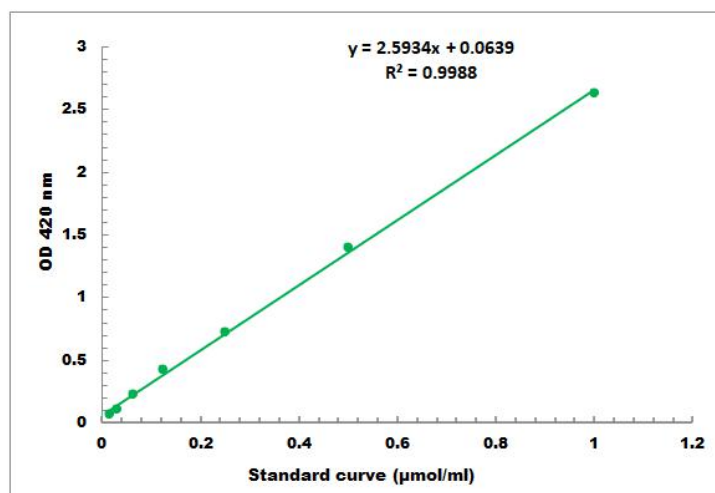
V_{Standard} : the volume of sample, 0.13 ml;

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

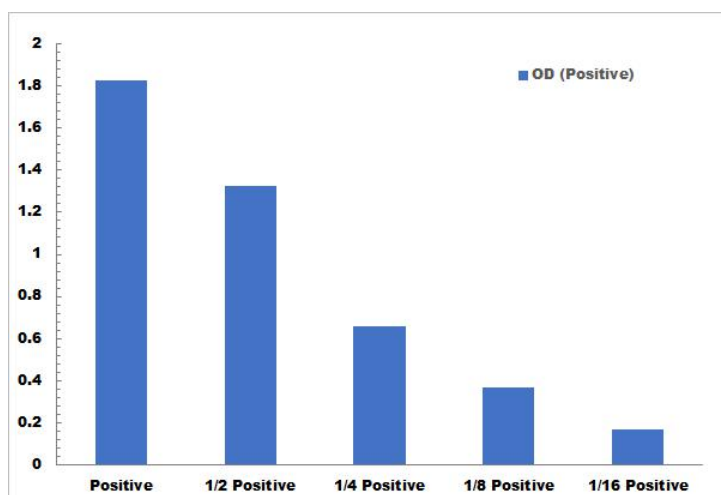
T: the reaction time, 10 mins.

VII. TYPICAL DATA

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



Detection Range: 0.01 mmol/L - 1 mmol/L



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