



# **Glutaminase Microplate Assay Kit**

## **User Manual**

**Catalog # FTA0064**

(Version 1.3D)

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 + H<sub>2</sub>O → Glutamate + NH<sub>3</sub>. 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.

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 µmol/ml)	1 ml x 1	4 °C
Technical Manual	1 Manual	

### Note:

**Substrate:** add 20 ml distilled water to dissolve before use, 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  $5 \times 10^6$  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
Sample	20 $\mu$ l	--	--	--
Distilled water	--	20 $\mu$ l	--	--
Substrate	200 $\mu$ l	200 $\mu$ l	--	--
Mix, put it in the oven, 37 °C for 1 hour.				
Stop Solution	300 $\mu$ l	300 $\mu$ l	--	--
Mix, centrifuged at 8,000g for 5 minutes, add the supernatant into the microplate.				
Supernatant	130 $\mu$ l	130 $\mu$ l	--	--
Standard	--	--	130 $\mu$ l	--
Distilled water	--	--	--	130 $\mu$ l
Reaction Buffer	50 $\mu$ l	50 $\mu$ l	50 $\mu$ l	50 $\mu$ l
Dye Reagent	20 $\mu$ l	20 $\mu$ l	20 $\mu$ l	20 $\mu$ 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; if the enzyme activity is higher, please dilute the sample, or decrease the reaction time.

## VI. CALCULATION

**Unit Definition:** one unit is defined as the enzyme that generates 1  $\mu\text{mol}$  of ammonia per hour.

### 1. According to the protein concentration of sample

$$\begin{aligned}\text{GLS (U/mg)} &= C_{\text{Standard}} \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / V_{\text{Sample}} / C_{\text{Protein}} / T \\ &\quad \times 4 \\ &= 200 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / C_{\text{Protein}}\end{aligned}$$

### 2. According to the weight of sample

$$\begin{aligned}\text{GLS (U/g)} &= C_{\text{Standard}} \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / (V_{\text{Sample}} \times W / V_{\text{Assay}}) / \\ &\quad T \times 4 \\ &= 200 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / W\end{aligned}$$

### 3. According to the quantity of cells or bacteria

$$\begin{aligned}\text{GLS (U/10}^4\text{)} &= C_{\text{Standard}} \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / (V_{\text{Sample}} \times N / V_{\text{Assay}}) \\ &\quad / T \times 4 \\ &= 200 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / N\end{aligned}$$

### 4. According to the volume of sample

$$\begin{aligned}\text{GLS (U/ml)} &= C_{\text{Standard}} \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / V_{\text{Sample}} / T \times 4 \\ &= 200 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}})\end{aligned}$$

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

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

W: the weight of sample, g;

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

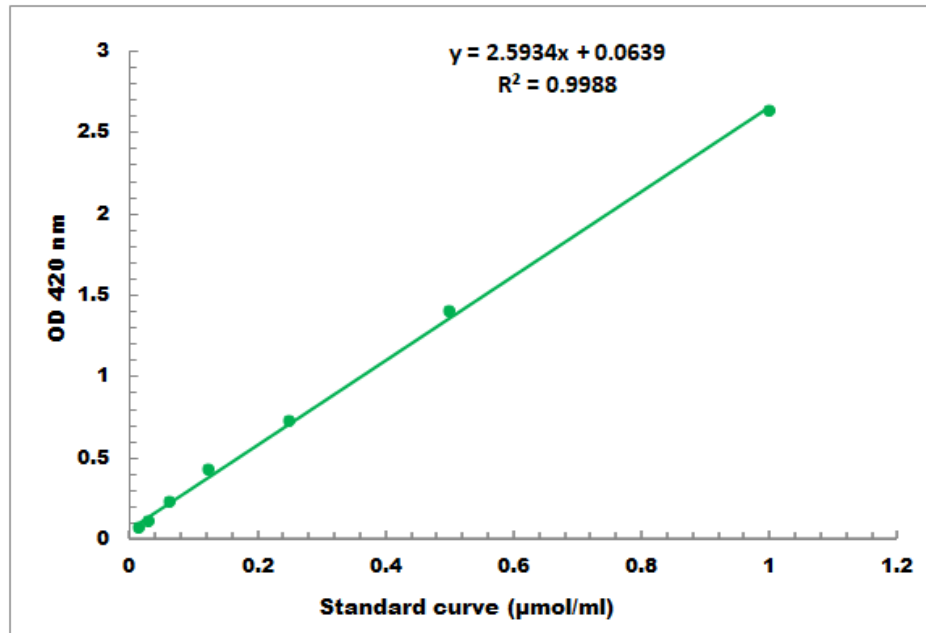
$V_{\text{Sample}}$ : the volume of sample, 0.02 ml;

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

T: the reaction time, 1 hour.

## VII. TYPICAL DATA

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



Detection Range: 10 μmol/L - 1 μmol/ml

## VIII. TECHNICAL SUPPORT

For troubleshooting, information or assistance, please go online to [www.cohesionbio.com](http://www.cohesionbio.com) or contact us at [techsupport@cohesionbio.com](mailto:techsupport@cohesionbio.com)

## IX. NOTES