

# Reduced Glutathione (GSH) Content Assay Kit

**Note:** Take two or three different samples for prediction before test.

**Operation Equipment:** Spectrophotometer

**Catalog Number:** NA0781

**Size:** 50T/48S

## Components:

**Reagent I:** 50 mL×1. Store at 4°C.

**Reagent II:** 50 mL×1. Store at 4°C.

**Reagent III:** 15 mL×1. Store at 4°C, protect from light.

**Standard:** Powder 10 mg×1. Store at 4°C, protect from light.

## Product Description

Glutathione is a natural tripeptide composed of glutamic acid (Glu), cysteine (Cys) and glycine (Gly). It is a kind of compound containing sulfhydryl group (-SH), which widely exists in animal tissue, plant tissue, microorganism and yeast. Glutathione can react with 5,5'-dithiobis-(2-nitrobenzoic acid) (DTNB) to produce 2-nitro-5-mercaptobenzoic acid and glutathione disulfide (GSSG). 2-nitro-5-mercaptobenzoic acid is a yellow product with the maximum absorption at 412 nm.

## Technical Specifications

Minimum Detection Limit: 2.67 µg/mL

Linear Range: 3.125-250 µg/mL

## Reagents and Equipment Required but Not Provided

Analytical balance, mortar/homogenizer, low temperature centrifuge, water bath, adjustable pipette, spectrophotometer, 1 mL glass cuvette and distilled water.

## Procedure

### I. Sample preparation

#### 1. Tissue sample

Wash fresh tissues with PBS for twice, then add 0.1 g of sample into homogenizer (the homogenizer has been rinsed with Reagent I and placed on ice before use). Add 1 mL Reagent I (the proportion of tissue and Reagents can be kept constant), fully grinding on ice (using liquid nitrogen will have a better grinding effect). Centrifuge at 8000 ×g for 10 minutes at 4°C, take the supernatant and place it at 4°C for test. (If the test cannot be completed temporarily, the supernatant can be stored at -80°C for 10 days.)

#### 2. Blood sample

*Plasma:* Sample is centrifuged at 600 ×g for 10 minutes at 4°C. Absorbing the upper plasma into another tube with adding the same volume Reagent I. Centrifuge at 8000 ×g for 10 minutes at 4°C, take the supernatant and place it at 4°C for test. (If the test cannot be completed temporarily, the supernatant can be

stored at -80°C for 10 days.)

*Blood cell:* Sample is centrifuged at 600 ×g for 10 minutes at 4°C. Discarding the upper plasma, wash with three times volume of PBS for 3 times (re-suspend blood cell with PBS, centrifuge at 600 ×g for 10 minutes), add equal volume of Reagent I. After mixing, it is placed at 4°C for 10 minutes. Centrifuge at 8000 ×g for 10 minutes, take the supernatant and place it at 4°C for test. (If the test cannot be completed temporarily, the supernatant can be stored at -80°C for 10 days.)

### 3. Cell sample

Harvesting cell should not less than 10<sup>6</sup>, then wash it with PBS for twice (re-suspend cell with PBS, centrifuge at 600 ×g for 10 minutes), The volume of Reagent I added is three times the volume of cell precipitation to re-suspend the cells. Repeated freezing and thawing 2-3 times (It is suggested that frozen in liquid nitrogen, dissolved in 37°C water bath). Centrifuge at 8000 ×g for 10 minutes, take the supernatant and place it at 4°C for test. (If the test cannot be completed temporarily, the supernatant can be stored at -80°C for 10 days.)

## II. Procedure

1. Preheat spectrophotometer for 30 minutes, adjust the wavelength to 412 nm, set zero with distilled water.
2. Preheat Reagent II in 37°C (mammal cell) or 25°C (other species) water bath for 30 minutes.
3. Blank tube test: take 1 mL glass cuvette, add 100 μL of distilled water, 700 μL of Reagent II, 200 μL of Reagent III in turn, mix well, place for 2 minutes, and measure 412 nm absorbance  $A_B$ .
4. Making standard curve

Weigh 1 mg standard and dissolve it with 1 mL of distilled water to obtain the concentration of 1 mg/mL. Take the appropriate solution to prepare the standards with the concentration of 200 μg/mL, 100 μg/mL, 50 μg/mL, 25 μg/mL and 12.5 μg/mL (Dilute Reagent I ten times before diluting the standard solution).

Take a 1.5 mL EP tube and add 100 μL of standard, 700 μL of Reagent II and 200 μL of Reagent III in turn. After each tube is evenly mixed, it is allowed to stand for 2 minutes. Measure the absorbance at 412 nm, and absorbance minus  $A_B$  as abscissa. Make the standard curve according to the absorbance (x) and concentration (y, μg/mL).

5. Sample tube test: take 1 mL glass cuvette, add 100 μL of sample, 700 μL of Reagent II, 200 μL of Reagent III in turn, mix well, and then stand for 2 minutes to test the absorbance  $A_T$  at 412 nm,  $\Delta A = A_T - A_B$ .

## III. Calculations

According to the standard curve, take sample  $\Delta A$  into the formula(x), and calculate the sample concentration y (μg/mL).

- 1) Protein concentration

$$\text{GSH } (\mu\text{g/mg prot}) = y \times V_{RV} \div V_{RV} \div C_{pr} = y \div C_{pr}$$

- 2) Sample weight

$$\text{GSH } (\mu\text{g/g}) = y \times V_{RV} \div (V_{RV} \div V_{SV} \times W) = y \div W$$

### 3) Cell amount

$$\text{GSH } (\mu\text{g}/10^4\text{cell}) = y \times V_{RV} \div (V_{RV} \div V_{SV} \times N) = y \div N$$

### 4) Solution volume

$$\text{GSH } (\mu\text{g/mL}) = 2y$$

N: Cell amount,  $10^6$ ;

$V_{SV}$ : Total supernatant volume, 1 mL;

$V_{RV}$ : Supernatant volume added into the reaction system,  $100 \mu\text{L} = 0.1 \text{ mL}$ ;

W: Sample weight, g;

Cpr: Supernatant protein concentration, mg/mL;

2: The volume of plasma (blood cells) is diluted by one time.

### Note:

1. The sample needs to be homogenized completely. If the test cannot be completed temporarily, it can be stored at  $-80^\circ\text{C}$ .
2. Standard: Reduced glutathione is prepared when the solution will be used.
3. If the GSH content in the sample is uncertain, Dilute the sample for several gradients before test.
4. Because Reagent I contains protein precipitant, the supernatant cannot be used for protein concentration determination. If the protein content needs to be determined, take another tissue.

### Recent Product citations

[1] FangzhouChen, YingZhao, Huizhao Chen. MicroRNA-98 reduces amyloid  $\beta$ -protein production and improves oxidative stress and mitochondrial dysfunction through the Notch signaling pathway via HEY2 in Alzheimer's disease mice. *International Journal of Molecular Medicine*. October 2018;91-102.(IF2.784)

[2] Ming Song, FangfangChen, YihuiLi, et al. rimetazidine restores the positive adaptation to exercise training by mitigating statin-induced skeletal muscle injury. *Journal of Cachexia, Sarcopenia and Muscle*. November 2017;(IF10.754)

[3] Hua Li, LanyingWang, Yanping Luo. Composition Analysis by UPLC-PDA-ESI (-)-HRMS and Antioxidant Activity Using *Saccharomyces cerevisiae* Model of Herbal Teas and Green Teas from Hainan. *Molecules*. October 2018;(IF3.06)

[4] OuYang Q, Tao N, Zhang M. A damaged oxidative phosphorylation mechanism is involved in the antifungal activity of citral against *Penicillium digitatum*[J]. *Frontiers in microbiology*, 2018, 9: 239.

[5] Chen Z Y, Wang Y T, Pan X B, et al. Amelioration of cold-induced oxidative stress by exogenous 24-epibrassinolide treatment in grapevine seedlings: Toward regulating the ascorbate–glutathione cycle[J].

Scientia horticultrae, 2019, 244: 379-387.

[6] GongSun X, Zhao Y Q, Jiang B, et al. Inhibition of MUC1 - C regulates metabolism by AKT pathway in esophageal squamous cell carcinoma[J]. Journal of cellular physiology, 2019, 234(7): 12019-12028.

#### **Reference:**

[1] Alpert A J, Gilbert H F. Detection of oxidized and reduced glutathione with a recycling postcolumn reaction[J]. Analytical biochemistry, 1985, 144(2): 553-562.

[2] Owens C W I, Belcher R V. A colorimetric micro-method for the determination of glutathione[J]. Biochemical Journal, 1965, 94(3): 705.

#### **Related products:**

NA0780/ NA0539 Oxidized Glutathione (GSSG) Assay Kit

NA0779/ NA0538 Glutathione Peroxidase Assay Kit

NA0783/ NA0542 Oxidized Thioredoxin Reductase (TrxR) Assay Kit

NA0778/ NA0537 -glutamate-cysteine ligase (GCL) Assay Kit