



**PRODUCT INFORMATION &  
MANUAL**

**Free Cholesterol Assay Kit  
(Colorimetric)  
*NBP3-25803***

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

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Novus kits are guaranteed for 6 months from date of receipt

## Free Cholesterol Assay Kit (Colorimetric)

Catalog No: NBP3-25803

Method: Colorimetric method

Specification: 96T (Can detect 92 samples without duplication)

Measuring instrument: Microplate reader

Sensitivity: 0.07 mmol/L

Detection range: 0.07-24 mmol/L

Average intra-assay CV (%): 1.9

Average inter-assay CV (%): 5.2

Average recovery rate (%): 97

- ▲ This kit is for research use only.
- ▲ Instructions should be followed strictly, changes of operation may result in unreliable results.
- ▲ Please kindly provide us the lot number (on the outside of the box) of the kit for more efficient service.

## General information

### ▲ Intended use

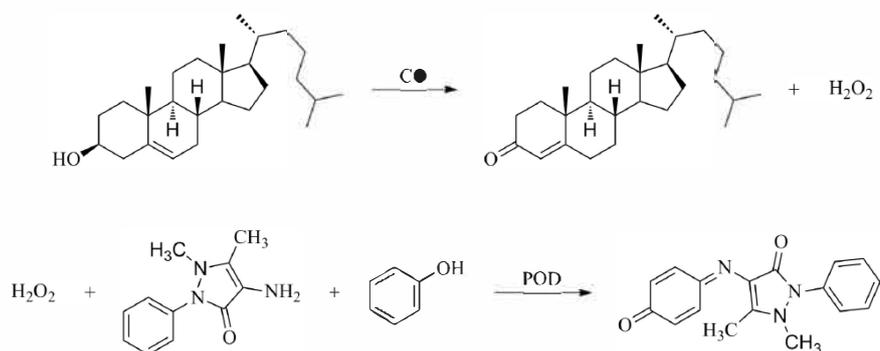
This kit applies the COD-PAP method and it can be used for in vitro determination of free cholesterol content in serum, plasma, tissue samples.

### ▲ Background

Cholesterol is a kind of sterol and lipid in cell membrane. Most of cholesterol in blood exists in the form of cholesterol ester. Lecithin-cholesterol acyltransferase in human plasma is an enzyme that catalyzes the formation of cholesterol ester. Cholesterol synthesized or deposited in peripheral cells returns to the liver through the reverse cholesterol transport system for reusing or regaining bile acids.

### ▲ Detection principle

Free cholesterol produces 4-cholestenone and hydrogen peroxide under the oxidation of cholesterol oxidase. In the presence of 4-aminoamylpyridine and phenol, peroxidase catalyze hydrogen peroxide to form red quinone compounds of benzoquinone imine phenizone. The color depth of the generated quinones is directly proportional to the cholesterol content.



## ▲ Kit components & storage

Item	Component	Specification	Storage
Reagent 1	Enzyme Working Solution	30 mL × 1 vial	2-8°C , 12 months, shading light
Reagent 2	5.17 mM Cholesterol Standard	0.2 mL × 1 vial	2-8°C , 12 months
	Microplate	96 wells	No requirement
	Plate Sealer	2 pieces	

Note: The reagents must be stored strictly according to the preservation conditions in the above table. The reagents in different kits cannot be mixed with each other.

## ▲ Materials prepared by users

### Instruments

Microplate reader(500-520 nm), Micropipettor, Vortex mixer, Incubator, Centrifuge

### Reagents

Double distilled water, Normal saline (0.85% NaCl), PBS (0.01 M, pH 7.4), Isopropanol(AR)

### ▲ Safety data

Some of the reagents in the kit contain dangerous substances. It should be avoided to touch the skin and clothing. Wash immediately with plenty of water if touching it carelessly. All the samples and waste material should be treated according to the relevant rules of laboratory's biosafety.

### ▲ Precautions

Before the experiment, please read the instructions carefully, and wear gloves and work clothes.

### ▲ The key points of the assay

1. Prevent the formulation of bubbles when the reagents is added into the microplate.
2. Bring all reagents to the room temperature before use.

## Pre-assay preparation

### ▲ Sample preparation

The samples should be prepared as conventional methods. Also please refer to appendix II.

#### Sample requirements

Reducing substances such as ascorbic acid and glutathione should not be added to the sample.

### ▲ Dilution of sample

It is recommended to take 2~3 samples with expected large difference to do pre-experiment before formal experiment and dilute the sample according to the result of the pre-experiment and the detection range (0.07-24 mmol/L).

The recommended dilution factor for different samples is as follows (for reference only):

Sample type	Dilution factor
Human plasma	1
Human serum	1
Rat serum	1
Mouse serum	1
Rabbit serum	1
10% Rat kidney tissue homogenate	1

**Note:** The diluent is normal saline (0.85% NaCl) or PBS (0.01 M, pH 7.4).

# Assay protocol

## ▲ Plate set up

	1	2	3	4	5	6	7	8	9	10	11	12
A	A	A	S13	S21	S29	S37	S45	S53	S61	S69	S77	S85
B	B	B	S14	S22	S30	S38	S46	S54	S62	S70	S78	S86
C	S1	S7	S15	S23	S31	S39	S47	S55	S63	S71	S79	S87
D	S2	S8	S16	S24	S32	S40	S48	S56	S64	S72	S80	S88
E	S3	S9	S17	S25	S33	S41	S49	S57	S65	S73	S81	S89
F	S4	S10	S18	S26	S34	S42	S50	S58	S66	S74	S82	S90
G	S5	S11	S19	S27	S35	S43	S51	S59	S67	S75	S83	S91
H	S6	S12	S20	S28	S36	S44	S52	S60	S68	S76	S84	S92

Note: A, blank wells; B, standard wells; S1-S92, sample wells.

## ▲ Detailed operation steps

1. **Blank well:** add 5  $\mu\text{L}$  of double distilled water into the well.  
**Standard well:** add 5  $\mu\text{L}$  of standard solution into the well.  
**Sample well:** add 5  $\mu\text{L}$  of sample into the well.
2. Add 250  $\mu\text{L}$  of reagent 1 to each well.
3. Mix thoroughly, incubate at 37°C for 10 min, measure absorbance value A at 510 nm with microplate reader.

## ▲ Summary operation table

	Blank well	Standard well	Sample well
Double distilled water ( $\mu\text{L}$ )	5		
Reagent 2 ( $\mu\text{L}$ )		5	
Sample ( $\mu\text{L}$ )			5
Reagent 1 ( $\mu\text{L}$ )	250	250	250
Mix thoroughly, incubate at 37°C for 10 min, measure the OD value.			

## ▲ Calculation

1. Serum (plasma) and other liquid sample:

$$\text{Free cholesterol content (mmol/L)} = \frac{\Delta A_1}{\Delta A_2} \times c \times f$$

2. Tissue sample:

$$\text{Free cholesterol content (mmol/kg wet weight)} = \frac{\Delta A_1}{\Delta A_2} \times c \times f \div \frac{m}{V}$$

### Note:

$$\Delta A_1: OD_{\text{sample}} - OD_{\text{blank}}$$

$$\Delta A_2: OD_{\text{standard}} - OD_{\text{blank}}$$

c: the concentration of standard, 5.17 mmol/L.

f: dilution factor of sample before tested.

m: the weight of tissue sample, g.

V: the volume of isopropanol, mL.

## Appendix I Data

### ▲ Example analysis

For mouse brain tissue, take 5  $\mu\text{L}$  of 10% mouse brain tissue homogenate and carry the assay according to the operation table. The results are as follows:

the average OD value of the sample is 0.318, the average OD value of the blank is 0.089, the average OD value of the standard is 0.519, and the calculation result is:

$$\begin{aligned} \text{Free cholesterol content} &= \frac{0.318-0.089}{0.519-0.089} \times 5.17 \times 0.9 \div 0.1 \\ \text{(mmol/kg wet weight)} &= 24.78 \text{ mmol/kg wet weight} \end{aligned}$$

## Appendix II Sample preparation

The following sample pretreatment methods are for reference only.

### Sample requirements

Reducing substances such as ascorbic acid and glutathione should not be added to the sample.

### ▲ Serum

Collect fresh blood and stand at 25°C for 30 min to clot the blood. Then centrifuge at 2000 g for 15 min at 4°C . Take the serum (which is the upper light yellow clarified liquid layer) to preserve it on ice for detection.

### ▲ Plasma

Take fresh blood into the tube which has anticoagulant, centrifuge at 700-1000 g for 10 min at 4°C . Take the plasma (which is the upper light yellow clarified liquid layer, don't take white blood cells and platelets in the middle layer) to preserve it on ice for detection.

### ▲ Tissue

Take 0.02-1g fresh tissue to wash with PBS (0.01 M, pH 7.4) at 2-8°C . Absorb the water with filter paper and weigh. Homogenize at the ratio of the volume of homogenized medium (2-8°C ) (mL): the weight of the tissue (g) =9:1, then centrifuge the tissue homogenate for 10 min at 10000 g at 4°C . Take the supernatant to preserve it on ice for detection.

**Note:**

1. Homogenized medium: Isopropanol.

2. Homogenized method:

(1) Hand-operated: Weigh the tissue and mince to small pieces ( $1\text{ mm}^3$ ), then put the tissues pieces to glass homogenized tube. Add homogenized medium into homogenized tube, place the tube into the ice bath with left hand, and insert the glass tamping rod vertically into the homogenized tube with the right hand to grind up and down for 6-8 min.

Or put the tissue into the mortar, and add liquid nitrogen to grind fully. Then add the homogenized medium to homogenize.

(2) Mechanical homogenate: Weigh the tissue to EP tube, add the homogenized medium to homogenize the tissue with homogenizer instrument (60 Hz, 90s) in the ice bath. (For samples of skin, muscle and plant tissue, the time of homogenization can be properly prolonged.)

## Appendix III References

1. Jauhiainen M, Dolphin P J. Human plasma lecithin-cholesterol acyltransferase. An elucidation of the catalytic mechanism[J]. Journal of Biological Chemistry, 1986, 261(15): 7032-7043.
2. Hill S A, Mcqueen M J. Reverse cholesterol transport--a review of the process and its clinical implications[J]. Clinical Biochemistry, 1997, 30(7): 517-525.