Supplementary materials for

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Data S1 Methods for biochemical parameter detection

A. The detection of glutathione peroxidase (GSH-Px)

GSH-Px catalyzes the reaction between H_2O_2 and GSH to produce GSSG and H_2O. The activity of GSH-Px can be calculated by the reduction of GSH. Color of 5-thio-dinitrobenzoic acid anion produced by the reaction between GSH and 5,5'-dithio-bis-(2-nitrobenzoic acid) is yellow and the absorbance is measured at 412 nm via spectrophotometry.

Glutathione peroxidase (GSH-Px) assay kit (Colorimetric method), A005, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

B. The detection of blood urea nitrogen (BUN)

Urea can be hydrolyzed by urease to produce NH_4^+ and CO_2. In alkaline medium, NH_4^+ produces blue substance with phenolic chromogenic agent. The production of blue material is proportional to the urea content. The blue substance is measured at 640 nm via spectrophotometry.

Urea assay kit, C013-1, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

C. The detection of total anti-oxidant capacity (T-AOC)

The antioxidant substances in organisms can reduce the Fe^{3+} to Fe^{2+} and Fe^{2+} can produce stable complex with phenanthroline. Via spectrophotometry, the T-AOC can be measured.

Total anti-oxidant capacity assay kit, A015, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

D. The detection of glucose

Glucose in samples can produce gluconic acid and peroxide by glucose oxidase. Then, with the catalytical reaction of peroxidase, the peroxide can coupling 4-aminoantipyrine and phenol to produce quinines and detected via spectrophotometry.

Glucose assay kit, 09000238813, Rongsheng Bio-pharmaceutical Co., Ltd., Shanghai, China.

E. The detection of total cholesterol (TC)

Under the catalysis of cholesterol esterase, cholesterol ester produces cholesterol and fatty acids. Then Δ^4-cholestenone and H_2O_2 are produced by the reaction between cholesterol and O_2 under the catalysis of cholesterol oxidase. At last, H_2O_2, 4-aminoantipyrine and 3,5-dichloro-2-hydroxybenzenesulfonic acid sodium salt can produce red quinone compound

under peroxidase catalysis. The production is proportional to the cholesterol content. Via spectrophotometry, levels of TC are measured.

Total cholesterol assay kit, 100608, Saike Bio-technology Co., Ltd., Ningbo, China.

F. The detection of triglyceride (TG)

We use GPO-PAP enzyme method to detect levels of TG. First, triglyceride decomposes glycerol and fatty acids with lipoprotein lipase catalysis. Second, the reaction between glycerol and ATP produces glycerophosphoric acid and ADP via glycerol kinase catalysis. After that, glycerophosphoric acid decomposes phosphodihydroxyacetone and H_2O_2 by glycerol phosphate oxidase. Last, H_2O_2 can react with 4-aminoantipyrine to produce red quinone compound through peroxidase. The production is proportional to the cholesterol content. Via spectrophotometry, levels of TG are measured.

Triglyceride assay kit, 110104, Saike Bio-technology Co., Ltd., Ningbo, China.

G. The detection of low-density lipoprotein cholesterol (LDL-C)

Selective precipitation is used for LDL-C detection. PVS is used to precipitate the LDL-C. Via spectrophotometry, LDL-C concentrations are detected and calculated.

Low-density lipoprotein cholesterol assay kit, 6328, Beihuakangtai Clinical Reagent Co., Beijing, China.

H. The detection of high-density lipoprotein cholesterol (HDL-C)

Selective precipitation is used for HDL-C detection. Phosphotungstic acid is used as the precipitant. Via spectrophotometry, HDL-C concentrations are detected and calculated.

High-density lipoprotein cholesterol assay kit, 6340, Beihuakangtai Clinical Reagent Co., Beijing, China.

I. The detection of glutathione (GSH)

Yellow complex can be produced during the reaction between 5,5'-dithio-bis-(2-nitrobenzoic acid) and sulfhydryl compound. Through spectrophotometry, levels of GSH are detected.

Reduced glutathione (GSH) assay kit (Spectrophotometric method), A006-1, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

J. The detection of glutamic oxaloacetic transaminase (GOT)

GOT promotes amino and keto transformation of α-ketoglutaric acid and aspartic acid, producing glutamic acid and oxaloacetic acid. Oxaloacetic acid can form pyruvic acid via decarboxylation. Then pyruvic acid reacts with 2,4-dinitrophenylhydrazine to produce dinitrophenylhydrazone, which presents red brown color in alkaline solution. Through spectrophotometry, the activity of GOT can be calculated.

Aspartate aminotransferase assay kit (AST/GOT), C010-1, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

K. The detection of glutamic pyruvic transaminase (GPT)

GPT catalyzes amino and keto transformation of α-ketoglutaric acid and aspartic acid, producing glutamic acid and pyruvic acid. Then pyruvic acid reacts with 2,4-dinitrophenylhydrazine to produce dinitrophenylhydrazone, which presents red brown color in alkaline solution. Through spectrophotometry, the activity of GOT can be calculated.

Alanine aminotransferase assay kit (ALT/GPT), C009-1, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

L. The detection of superoxide dismutase (SOD)

Reaction of xanthine and xanthine oxidase produces superoxide anion, which oxidizes hydroxylamine to form nitrite. With the chromogenic agent, nitrite presents purple. When SOD presents, contents of superoxide anion are reduced, thus nitrite productions are decreased.

Superoxide dismutase (SOD) typed assay kit (Hydroxylamine method), A001-2, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

M. The detection of catalase (CAT)

The decomposition reaction between CAT and H_2O_2 can be terminated after adding ammonium molybdate. The remained ammonium molybdate can form pale yellow complex. Absorbance is measured at 405 nm.

Catalase (CAT) assay kit (visible light), A007-1, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

N. The detection of xanthine oxidase (XO)

XO catalyzes hypoxanthine to produce xanthine as well as superoxide anion. In the presence of electron acceptor and chromogenic agent, the reaction can produce purple complex. According the absorbance, the activity of XO can be calculated.

Xanthine oxidase (XO) assay kit (Colorimetric method), A002, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.

O. The detection of anti-superoxide anion activity (ASOA)

The reaction of XO and xanthine can produce superoxide anion. Adding electron transport material and chromogenic agent, the system produces purple complex. According the absorbance, the inhibition of superoxide anion can be calculated.

Anti-superoxide anion activity assay kit, A052, Nanjing Jiancheng Bioengineering Institute, Nanjing, China.