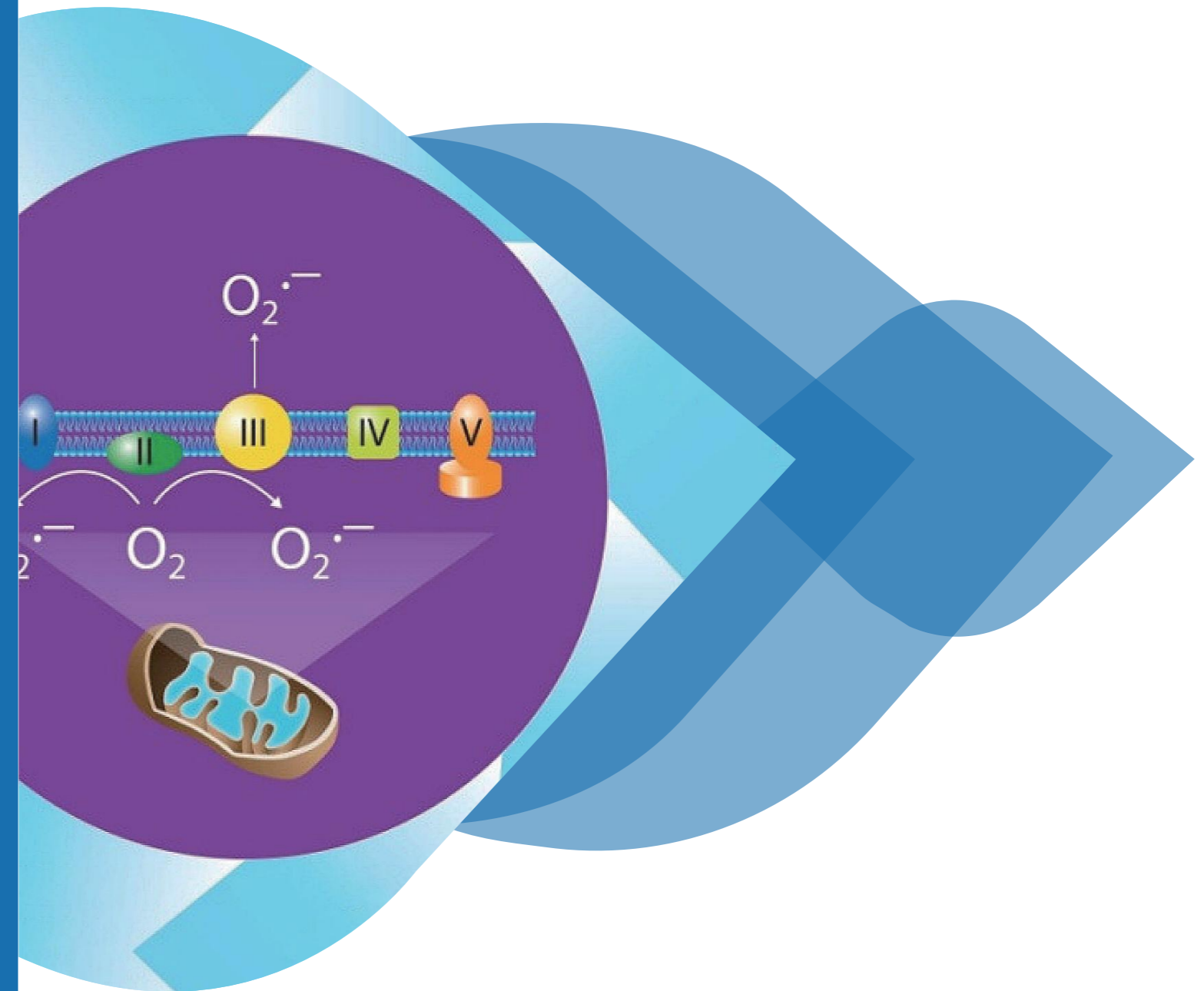


Metabolism Assay Kits

Oxidative Stress

Elabscience®



CATALYTIC

CATALOG

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METABOLISM ASSAY KITS

Elabscience specializes in immunodiagnostic biotechnology that enhances the research efforts of the life science community through our leading research products that have been validated, both internally (QC) and externally (within noteworthy peer-reviewed journals). Our products have obtained ISO9001 and CE certifications, garnering widespread recognition within the global market, spanning 100 nations and 5 continents.

Elabscience have developed a series of Metabolism Assay Kits to meet the requirements of researchers, yielding efficient detection of biochemical indicators. Through years of R&D development, the scientific team has developed Metabolism Assay Kits that are easy to use, highly sensitive, and have efficacious performance.

PRODUCT FEATURES

Applicable to the Following Research Fields:

Covers oxidative stress, ferroptosis, cuproptosis, mitochondria function, amino acids and proteins, glycolysis and lipid metabolism, liver and renal function, TCA cycle, plant physiology series, metabolic diseases -10 research areas.

Applicable Sample Types:

Serum, plasma, cultured cells, tissues, not limited to specific species.

Stability:

12-month shelf-life.

Technical Support:

Provides guidance and/or answers questions pertaining to use of kits within your research area.

External Validation:

Citations and publications within renown international journals: *Nature, Cell & Advanced Materials*.

OXIDATIVE STRESS

OXIDATIVE STRESS INTRODUCTION

Oxidative stress refers to the process of oxidative damage caused by the imbalance of the generation and clearance of oxygen free radicals in body or cells.

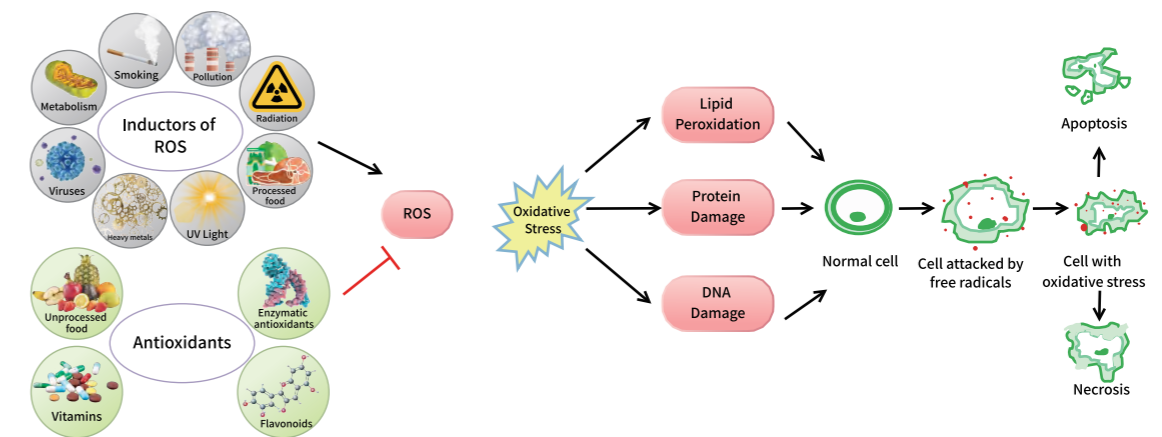


Figure 1. The occurrence and function of oxidative stress

Oxidative stress promotes the occurrence and development of multiple diseases, such as cancer, cardiovascular disease and diabetes. Oxidative stress is widely studied in medical and disease mechanism research.

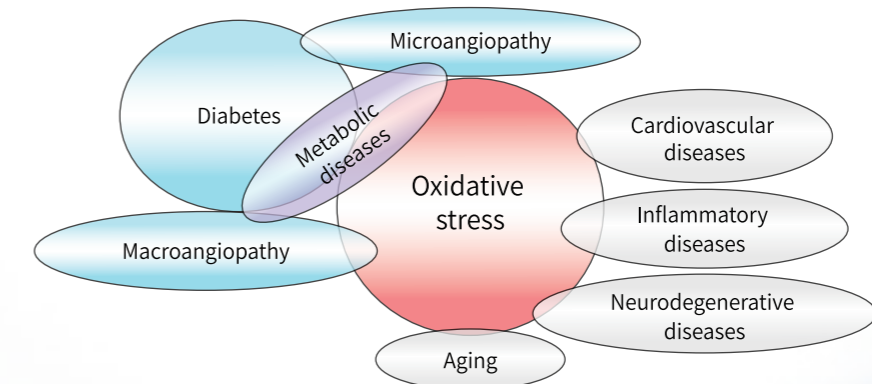


Figure 2. Oxidative stress and disease

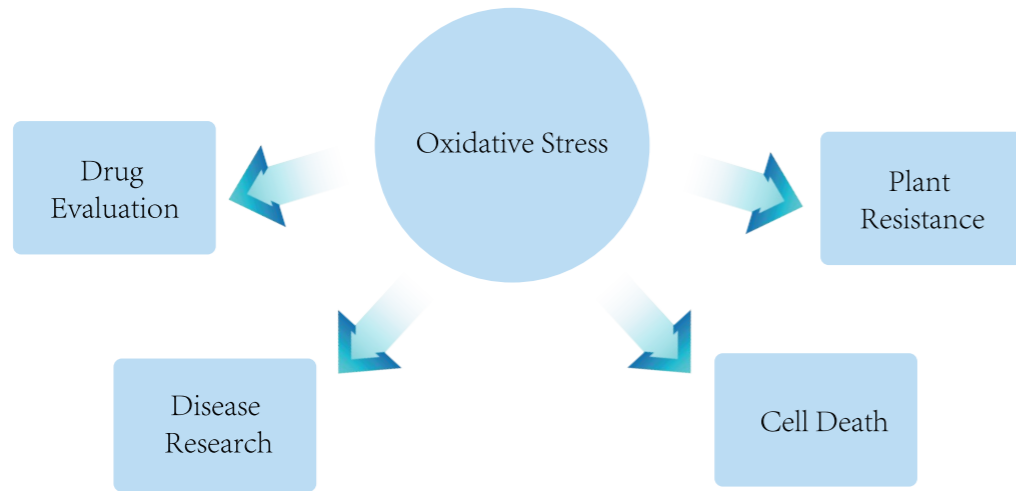


Figure 3. Oxidative stress assay applications

OXIDATIVE STRESS ASSAY

When cells are subjected to oxidative stress, their oxidative capacity is enhanced while their antioxidant capacity is weakened. Oxidative stress can be evaluated by measuring the changes in the content of oxidants, oxidation products and antioxidant substances directly or indirectly. Elabscience has developed a variety of kits to accurately determine oxidative stress related metabolites such as reactive oxygen species, catalase and lipid peroxides.

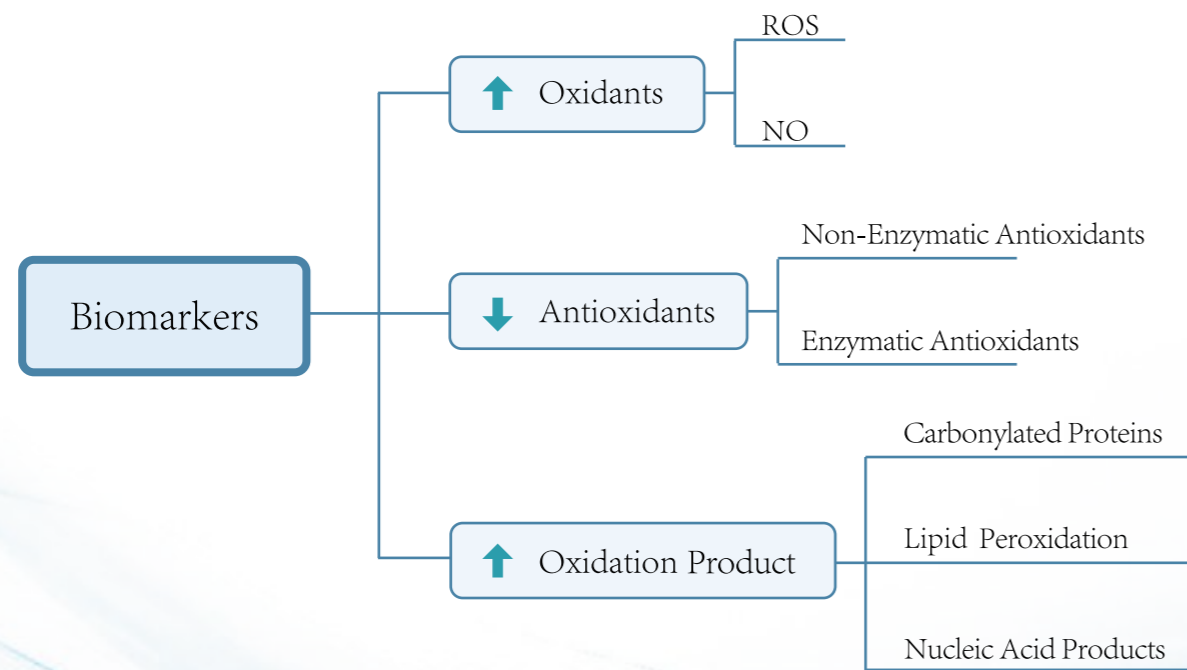


Figure 4. Characteristics and markers of oxidative stress

REACTIVE OXYGEN SPECIES

Reactive Oxygen Species (ROS) are active chemicals produced in the process of metabolism, including oxygen free radicals and hydrogen peroxide. Either a lack or an excessive quantity of ROS can lead to various disease states including autoimmune disorders and cardiovascular disorders, respectively. Excess ROS is the main factor leading to oxidative stress, which can be measured by ROS-related substrates.

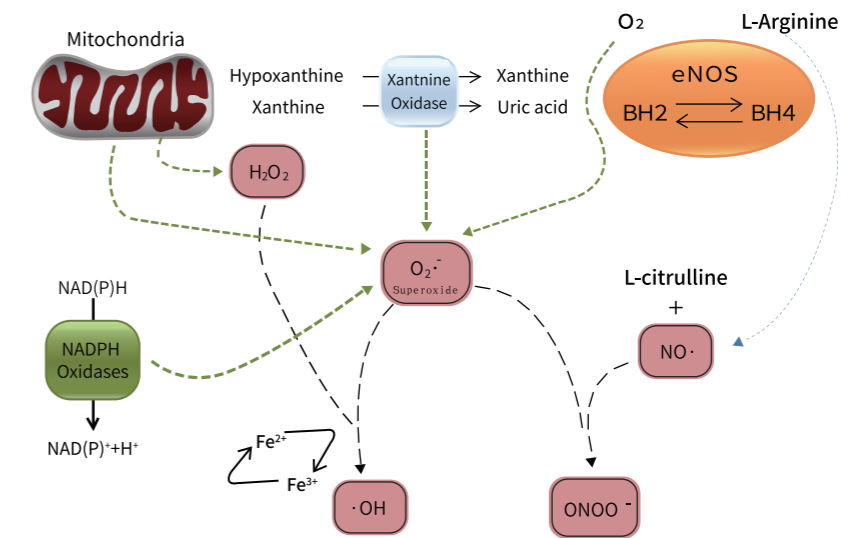


Figure 5. ROS generation process

ROS Related Kits

Target	Product Name	Cat. No.
H ₂ O ₂	Hydrogen Peroxide (H ₂ O ₂) Fluorometric Assay Kit	E-BC-F001
	Hydrogen Peroxide (H ₂ O ₂) Colorimetric Assay Kit	E-BC-K102-M
	Hydrogen Peroxide (H ₂ O ₂)Colorimetric Assay Kit	E-BC-K102-S
NO	Nitric Oxide (NO) Colorimetric Assay Kit	E-BC-K035-M
	Nitric Oxide (NO) Colorimetric Assay Kit (Nitrate Reductase Method)	E-BC-K135-M
NOX	NADH Oxidase (NOX) Activity Assay Kit	E-BC-K806-M
O ₂ ^{•-}	Inhibition And Production Of Superoxide Anionic Colorimetric Assay Kit	E-BC-K001-M
•OH	Hydroxyl Free Radical Scavenging Capacity Assay Kit	E-BC-K527-M
ROS	Reactive Oxygen Species (ROS) Fluorometric Assay Kit (Green)	E-BC-K138-F
	Reactive Oxygen Species (ROS) Fluorometric Assay Kit (Red)	E-BC-F005
TOS	Total Oxidant Status (TOS) Colorimetric Assay Kit	E-BC-K802-M
XOD	Xanthine Oxidase (XOD) Activity Fluorometric Assay Kit	E-BC-F019
	Xanthine Oxidase (XOD) Activity Assay Kit	E-BC-K805-M

Products Presentation

• Total Oxidant Status (TOS) Colorimetric Assay Kit (E-BC-K802-M)

Product Features

① Smaller sample volume needed: only 20 µL (vs 45 µL)

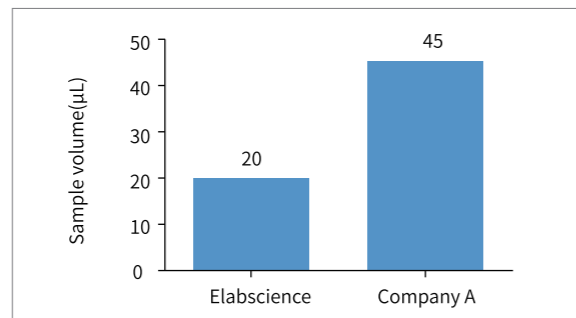


Figure 6. Sample volume comparison of Elabsience and company A

② Shorter reaction time: 5 min (vs 15 min)

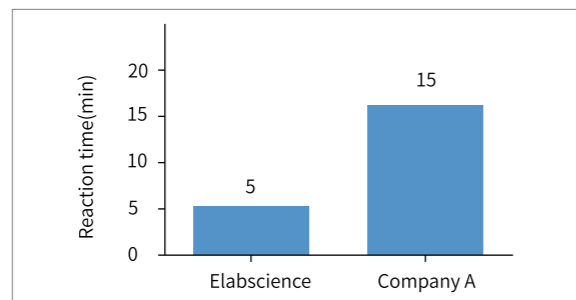


Figure 7. Reaction time comparison of Elabsience and company A

③ Utility: Longevity studies

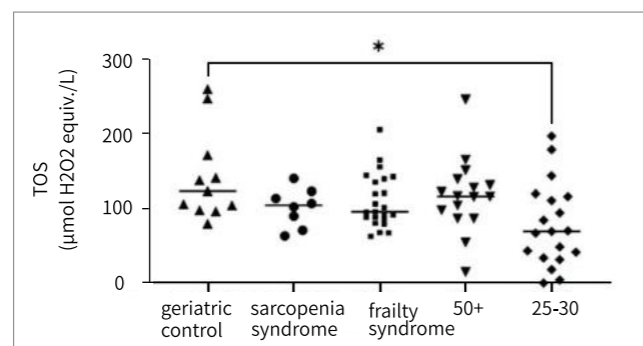


Figure 8. The comparison of total oxidant status between five study groups

Result: TOS values are significantly higher in geriatric control, compared with healthy control patients aged 25-30 years old.

*Kmiotek T, Filipowicz G, Bogucka D, et al. Aging and the impact of global DNA methylation, telomere shortening, and total oxidative status on sarcopenia and frailty syndrome [J]. *Immunity & Ageing*, 2023, 20(1): 61. IF:7.9

ANTIOXIDANT CAPACITY

There are several antioxidant mechanisms that maintain the balance of ROS in organisms in vivo. Enzymatic and non-enzymatic antioxidants are important for ROS clearance. The status of oxidative stress can be assessed by measuring both enzymatic antioxidants such as superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase, and non-enzymatic antioxidants such as glutathione, Vitamin C and Vitamin E.

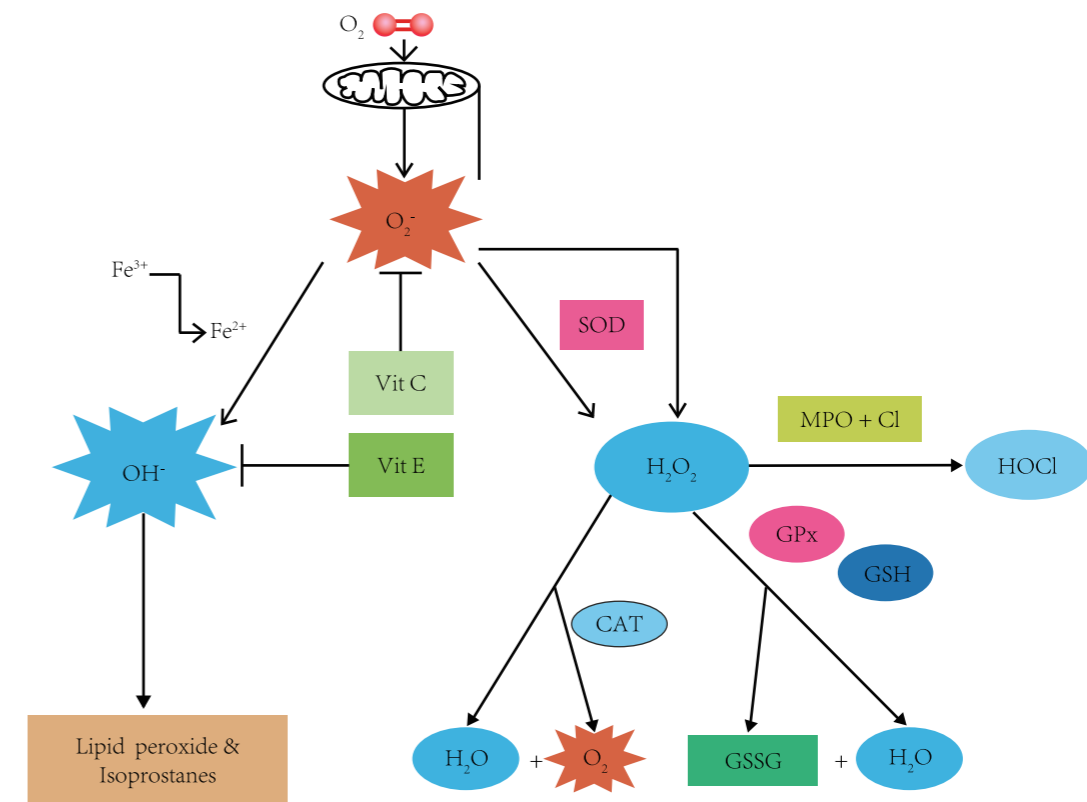


Figure 9. The removal of the ROS

Antioxidant Capacity Kits

Target	Product Name	Cat. No.
APX	Ascorbate Peroxidase (APX) Activity Assay Kit	E-BC-K353-S
CAT	Catalase (CAT) Activity Fluorometric Assay Kit	E-BC-F006
	Catalase (CAT) Activity Assay Kit	E-BC-K031-M

Antioxidant Capacity Kits

Target	Product Name	Cat. No.
CuZn/Mn-SOD	CuZn/Mn Superoxide Dismutase Activity Assay Kit	E-BC-K022-M
DPPH	DPPH Free Radical Scavenging Capacity Colorimetric Assay Kit	E-BC-K807-M
Flavonoids	Plant Flavonoids Colorimetric Assay Kit	E-BC-K284-M
	Plant Flavonoids Colorimetric Assay Kit	E-BC-K284-S
GPX4	Glutathione Peroxidase 4 (GPX4) Activity Assay Kit	E-BC-K883-4
GR	Glutathione Reductase (GR) Activity Assay Kit	E-BC-K099-S
GSH	Reduced Glutathione (GSH) Colorimetric Assay Kit	E-BC-K030-M
GSH-Px	Glutathione Peroxidase (GSH-Px) Activity Assay Kit	E-BC-K096-M
	Cell Glutathione Peroxidase (GPX) Activity Assay Kit	E-BC-K809-M
GST	Glutathione-S-Transferase (GST) Activity Assay Kit(DTNB method)	E-BC-K800-M
MPO	Myeloperoxidase (MPO) Peroxidation Activity Fluorometric Assay Kit	E-BC-F013
	Myeloperoxidase (MPO) Activity Assay Kit	E-BC-K074-M
	Myeloperoxidase (MPO) Activity Assay Kit	E-BC-K074-S
POD	Peroxidase (POD) Activity Assay Kit (Plant Samples)	E-BC-K227-M
T-AOC	Total Antioxidant Capacity (T-AOC) Colorimetric Assay Kit	E-BC-K136-M
	Total Antioxidant Capacity (T-AOC) Colorimetric Assay Kit (ABTS)	E-BC-K219-M
	Total Antioxidant Capacity (T-AOC) Colorimetric Assay Kit	E-BC-K225-M
	Total Antioxidant Capacity (T-AOC) Colorimetric Assay Kit (ABTS)	E-BC-K271-M
TAS	Total Antioxidant Status (TAS) Colorimetric Assay Kit	E-BC-K801-M
T-GSH	Total Glutathione (T-GSH) Colorimetric Assay Kit	E-BC-K097-M
Total Phenols	Total Phenols Colorimetric Assay Kit (Plant samples)	E-BC-K354-M
	Total Phenols Colorimetric Assay Kit (Plant samples)	E-BC-K354-S
Total Thiol	Total Sulfhydryl Group/Total Thiol (-SH) Colorimetric Assay Kit	E-BC-K265-M
TrxR	Thioredoxin Reductase (TrxR) Activity Assay Kit	E-BC-K548-M
T-SOD	Total Superoxide Dismutase (T-SOD) Activity Assay Kit (Hydroxylamine Method)	E-BC-K019-M
	Total Superoxide Dismutase Activity Assay Kit (WST-1 Method)	E-BC-K020-M
VC	Vitamin C (VC) Colorimetric Assay Kit	E-BC-K034-M
	Vitamin C (VC) Colorimetric Assay Kit	E-BC-K034-M
VE	Vitamin E (VE) Colorimetric Assay Kit	E-BC-K033-M

Product Presentation

• Glutathione Peroxidase 4 (GPX4) Activity Assay Kit (E-BC-K883-M)

As a member of glutathione peroxidase family, GPX4 protects cells from oxidative damage by reducing hydrogen peroxide, organic hydroperoxides, and lipid peroxides. GPX4 acts as a master regulator in the ferroptosis process.

◆ Product Features ◆

① High performance assay: both highly specific and highly recoverable

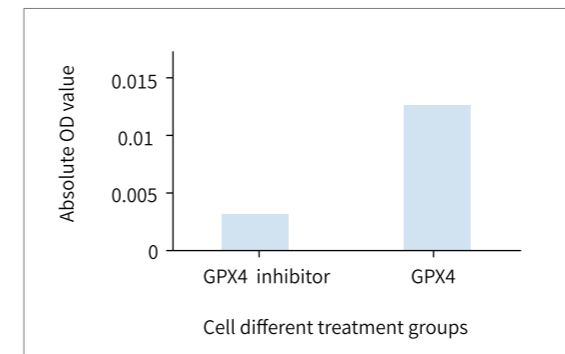


Figure 10. Sample dilution recovery: 95%-100%

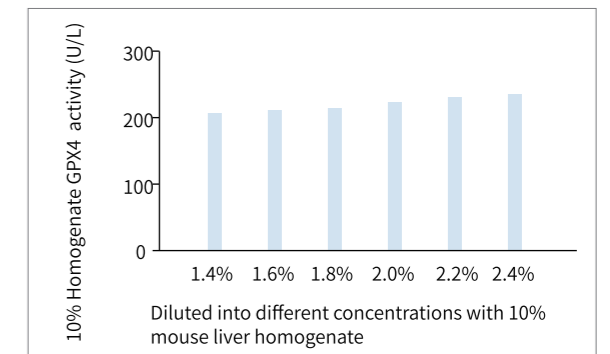


Figure 11. Sample dilution recovery

② Sample type options: serum, cells and tissues

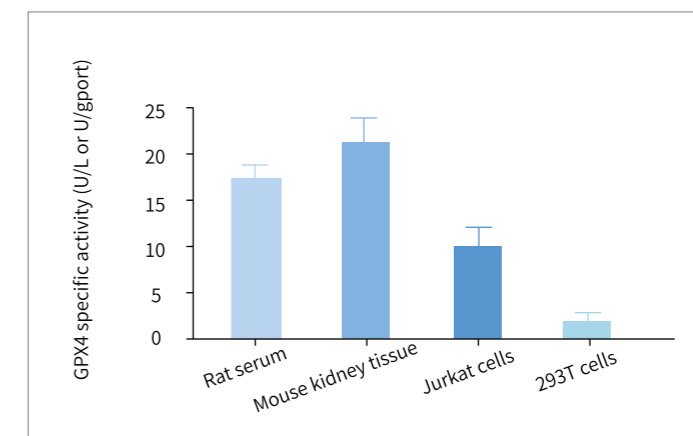


Figure 12. Sample validation

Detect rat serum (dilute for 2 times), 10% mouse kidney tissue homogenate (the concentration of protein is 5.492 gprot/L), 2.7×10^6 Jurkat cells homogenate (the concentration of protein is 0.639 gprot/L), 2.03×10^6 293T cells homogenate (the concentration of protein is 1.635 gprot/L).

OXIDATION PRODUCTS

Lipid Peroxidation

Lipid peroxidation is the oxidation of carbon-carbon double bonds in lipids by reactive oxygen species to form unsaturated lipids. The products of lipid peroxidation are Malondialdehyde (MDA) and 4-hydroxynon-enal (HNE). Lipid peroxidation is the core reaction of ferroptosis. Due to the production of lipid peroxy radicals, hydroperoxides, and various oxidation products, uncontrolled lipid peroxidation leads to membrane rupture and cell death.

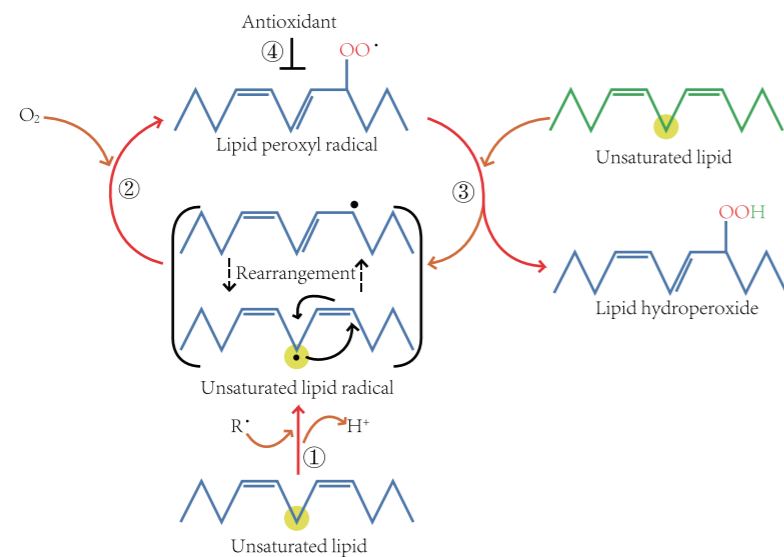


Figure 13. Lipid peroxidation process

Lipid Peroxidation Kits

Target	Product Name	Cat. No.
LPO	Lipid Peroxide (LPO) Colorimetric Assay Kit	E-BC-K176-M
	Lipid Peroxide (LPO) Fluorometric Assay Kit	E-BC-F003
MDA	Malondialdehyde (MDA) Colorimetric Assay Kit (TBA Method)	E-BC-K025-M
	Malondialdehyde (MDA) Colorimetric Assay Kit (TBA Method)	E-BC-K025-S
	Malondialdehyde (MDA) Colorimetric Assay Kit (Plant Samples)	E-BC-K027-M
	Malondialdehyde (MDA) Fluorometric Assay Kit	E-BC-F007
	Malondialdehyde (MDA) Colorimetric Assay Kit (Cell Samples)	E-BC-K028-M
TBARS	Thiobarbituric Acid Reactants (TBARS) Colorimetric Assay Kit	E-BC-K298-M
	Thiobarbituric Acid Reactants (TBARS) Colorimetric Assay Kit	E-BC-K298-F

Product Presentation

Lipid Peroxide (LPO) Fluorometric Assay Kit (E-BC-F003)

LPO are substances produced by the action of ROS on unsaturated fatty acids. C11-BODIPY 581/591 (C11) is widely used in the LPO detection. C11 fluoresces red under normal conditions, but changes to green with the process of LPO.

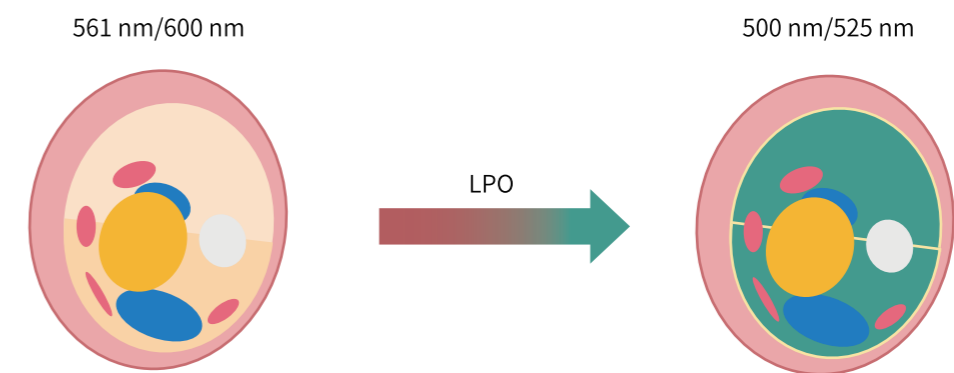


Figure 14. C11-BODIPY 581/591 method

Product Features

- ① High sensitivity: suitable for cell sample
- ② Applicable instrument diversification: Fluorescence microplate reader, Fluorescence microscope, Flow cytometry.

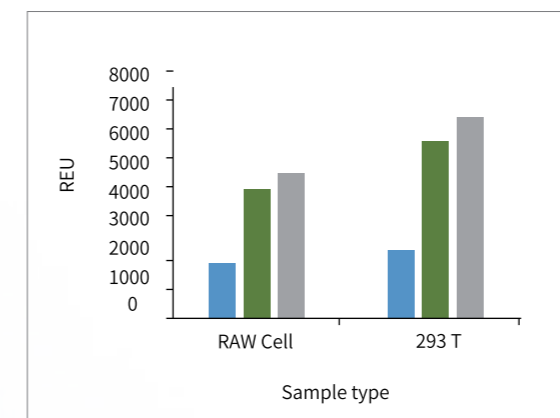


Figure 15. Fluorescence microplate

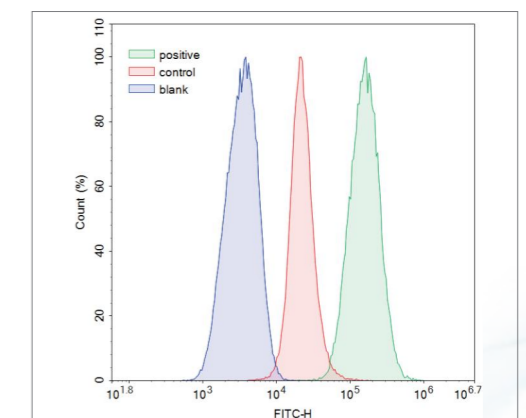


Figure 16. Flow cytometry assay

Protein Oxidation

Protein oxidation is the oxidation of amino acid side chains by H₂O₂ or O₂⁻ free radical to produce proteins containing carbonyl groups. Protein carbonyl is a biological indicator of oxidative stress, and the degree of protein oxidation can be estimated indirectly by measuring the content of protein carbonyl.

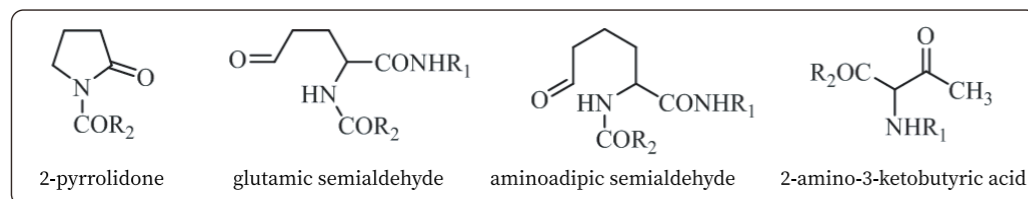


Figure 17. Carbonyl derivative structures produced by direct oxidation of amino acid side chains

Protein Oxidation Kits

Target	Product Name	Cat. No.
Protein Carbonyl	Protein Carbonyl Colorimetric Assay Kit	E-BC-K117-M
	Protein Carbonyl Colorimetric Assay Kit	E-BC-K117-S

Product Presentation

• Protein Carbonyl Colorimetric Assay Kit (E-BC-K117-M)

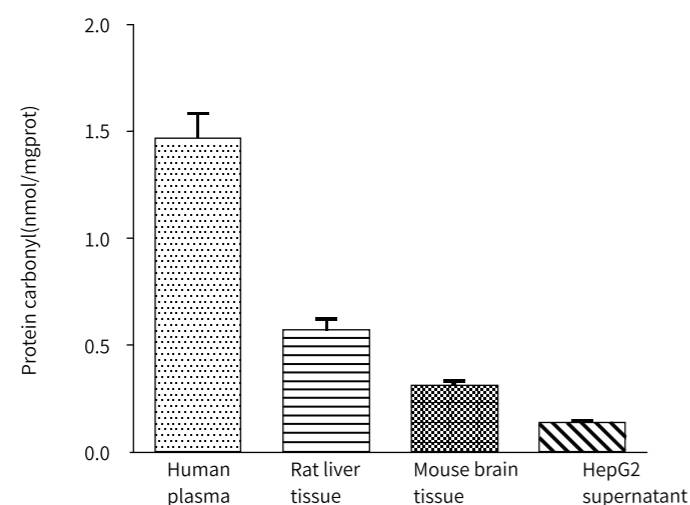


Figure 18. Sample validation

Detect human plasma (dilute for 10 times, the concentration of protein in sample is 0.43 mgprot/mL), 10% rat liver tissue homogenate (dilute for 2 times, the concentration of protein in sample is 0.29 mgprot/mL), 10% mouse brain tissue homogenate (the concentration of protein in sample is 0.23 mgprot/mL) and HepG2 supernatant (the concentration of protein in sample is 0.35 mgprot/mL) according to the protocol.

OXIDATIVE STRESS PUBLICATIONS

Target	Cat. No.	Publication Information
ATPase ATP	E-BC-K831-M E-BC-K157-M	Ouyang B, Zhong Q, Ouyang P, et al. Graphene quantum dots enhance the biological nitrogen fixation by up-regulation of cellular metabolism and electron transport[J]. <i>Chemical Engineering Journal</i> , 2024, 487: 150694.
GPX GSH/GSSG MDA SOD	E-BC-K096-M E-BC-K097-M E-BC-K025-M E-BC-K019-M	Liu Y, Wang L, Liu Z, et al. Durable immunomodulatory nanofiber niche for the functional remodeling of cardiovascular tissue[J]. <i>ACS nano</i> , 2023.
GSH	E-BC-K030-M	Liu J, Chang Y, Zhou W, et al. An esterase-activatable nanoprodug mitigates severe spinal cord injury via alleviating ferroptosis and reprogramming inflammatory microenvironment[J]. <i>Nano Today</i> , 2024, 56: 102229.
GSH/GSSG	E-BC-K097-M	Li X, Wu T, Zhang Z, et al. Tumor microenvironment activated nanoreactors for chemiluminescence imaging-guided simultaneous elimination of breast tumors and tumor-resident intracellular pathogens[J]. <i>Chemical Engineering Journal</i> , 2023
H ₂ O ₂	E-BC-K102-M	Du S, Zhou N, Xie G, et al. Surface-engineered triboelectric nanogenerator patches with drug loading and electrical stimulation capabilities: Toward promoting infected wounds healing[J]. <i>Nano Energy</i> , 2021, 85: 106004.
H ₂ O ₂	E-BC-F001	Sun R, Zhang J, Chen X, et al. An adaptive drug-releasing contact lens for personalized treatment of ocular infections and injuries[J]. <i>Journal of Controlled Release</i> , 2024,
MDA SOD	E-BC-K028-M E-BC-K020-M	Wang X, Wang J, Liu S, et al. Sterilization mechanism and nanotoxicity of visible light-driven defective carbon nitride and UV-excited TiO ₂ [J]. <i>Journal of Hazardous Materials</i> , 2024
MPO	E-BC-F013	Song X, Huang Q, Yang Y, et al. Efficient therapy of inflammatory bowel disease (IBD) with highly specific and durable targeted Ta ₂ C modified with chondroitin sulfate (TACS)[J]. <i>Advanced Materials</i> , 2023, 35(36): 2301585.
O ₂ ⁻ ·OH	E-BC-K001-M E-BC-K527-M	Zhang W, Lu H, Zhang W, et al. Inflammatory Microenvironment - Responsive Hydrogels Enclosed with Quorum Sensing Inhibitor for Treating Post - Traumatic Osteomyelitis[J]. <i>Advanced Science</i> , 2024
ROS	E-BC-K138-F	Bi Y Y, Chen Q, Yang M Y, et al. Nanoparticles targeting mutant p53 overcome chemoresistance and tumor recurrence in non-small cell lung cancer[J]. <i>Nature Communications</i> , 2024,
SOD	E-BC-K020-M	Li M, Liu J, Shi L, et al. Gold nanoparticles-embedded ceria with enhanced antioxidant activities for treating inflammatory bowel disease[J]. <i>Bioactive Materials</i> , 2023, 25: 95-106.

DETAILED KIT EXPLANATION




Product Items

E-BC-K000-S, in which the letter "S" is the initial letter of the Spectrophotometer, on behalf of the applicable instrument is UV-visible Spectrophotometer.

E-BC-K000-M, in which the letter "M" is the initial letter of the Microplate, on behalf of the applicable instrument is Microplate reader.

E-BC-F000, in which the letter "F" is the initial letter of the Fluorescence, on behalf of the applicable instrument is Fluorescence microplate reader.

Instrument Characteristics

Instrument	Characteristics
 <p>Spectrophotometer</p>	<ul style="list-style-type: none"> • Large sample volume • High sensitivity • Low operating cost • Wide wavelength range • Time-consuming detection
 <p>Microplate reader</p>	<ul style="list-style-type: none"> • Small sample volume • Low sensitivity • Simple to operate • Rapid detection
 <p>Fluorescence microplate reader</p>	<ul style="list-style-type: none"> • Small sample volume • High specificity and sensitivity • Higher operating cost

Sample Preparation

- 【1】Samples should have no hemolysis, lipemia phenomenon.
- 【2】Samples should be clarified. [If it is not clarified, supernatant should be taken for testing after centrifugation (except for special indexes)].
- 【3】Samples should be tested as soon as possible after processing, and stored in the ice box (2-8 °C) while testing.
- 【4】Please avoid thawing and freezing samples repeatedly.

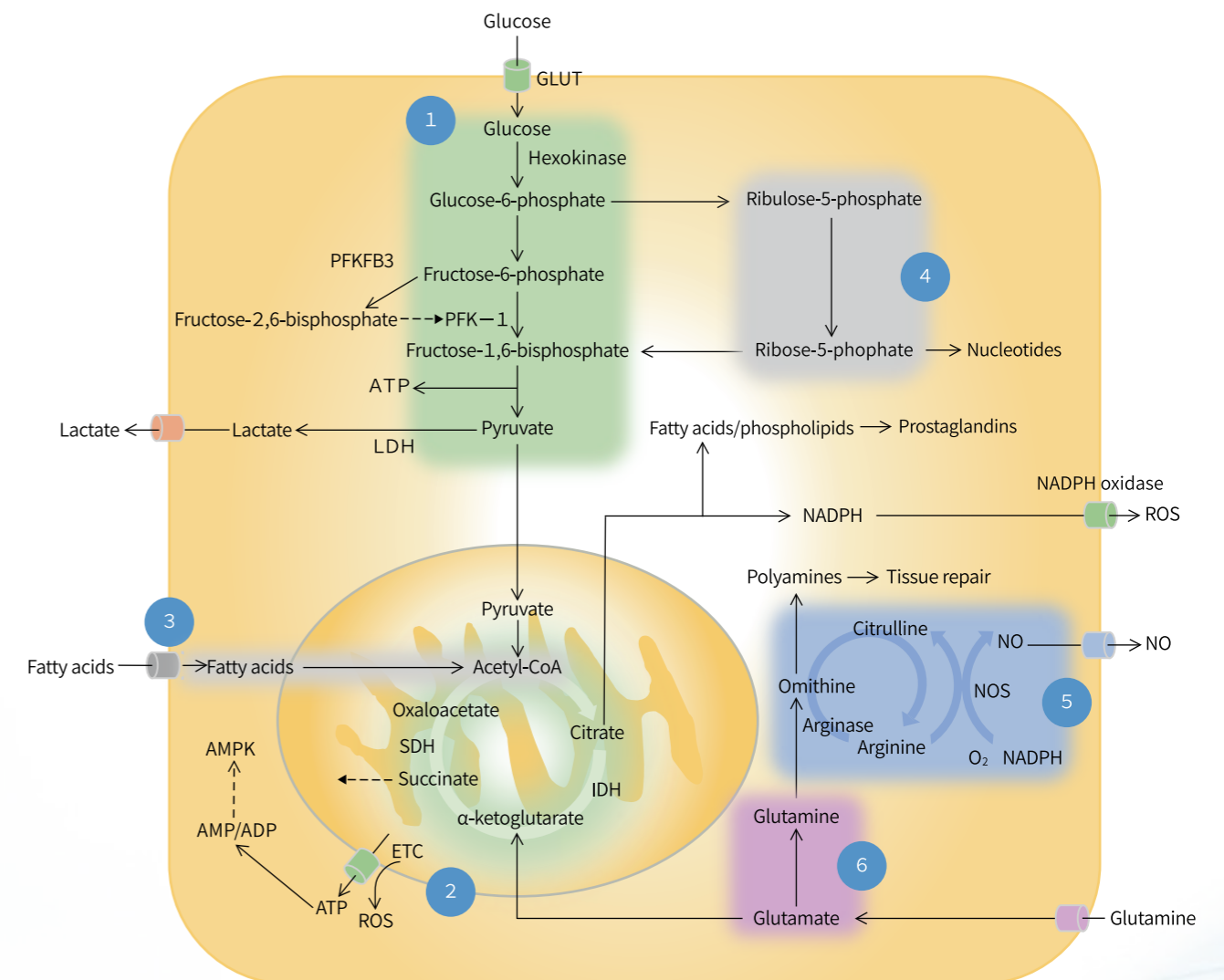


Figure 19. The interrelationship of carbohydrate, lipid, protein and nucleic acid metabolism