



Antioxidant Metabolites: Classification and Foods to Boost Metabolism

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Description

Antioxidant networks in the body are complex and consist of several components. These can be endogenous factors such as glutathione, thiols, heme proteins, coenzyme Q, bilirubin, and urate. It can also be endogenous enzymes such as GSH reductase, GSH transferase, GSH peroxidases, superoxide dismutase and catalase.

Dietary factors

Some nutritional and dietary factors also function as antioxidant metabolites or parts of antioxidant metabolic pathways. These include ascorbic acid or vitamin C, tocopherol or vitamin E, beta-carotenes and retinoids, selenium, methionine, etc.

Classification of antioxidant metabolites

Antioxidant metabolites are further classified as water soluble (hydrophilic) or lipid soluble (hydrophobic). Water-soluble antioxidants react with oxidants in the cell cytosol and blood plasma. On the other hand, fat-soluble antioxidants protect cell membranes from lipid peroxidation. The actions of each of these metabolites are interdependent because the metabolic pathways are complex. Selenium and zinc are commonly referred to as antioxidant nutrients. They do not have antioxidant properties by themselves, but are necessary for the activity of some antioxidant enzymes.

Vitamin C or Ascorbic acid: It is a monosaccharide antioxidant found in both animals and plants. It is one of the essential nutrients for such living organisms as humans. It must be obtained from the human diet and is a vitamin. Most other animals are able to produce this compound in their bodies and do not require it in their diet. The vitamin is maintained in a reduced form by

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reaction with glutathione in the cell. It can be catalyzed by protein disulphide isomerase and glutaredoxins. Because it exists as a reducing agent, it can neutralize reactive oxygen species such as hydrogen peroxide. Ascorbic acid is also a substrate for the antioxidant enzyme ascorbate peroxidase. This is important to prevent oxidative stress, especially in plants.

Vitamin E or tocopherols: Vitamin E includes about eight related tocopherols and tocotrienols. These are fat-soluble vitamins with antioxidant properties. Of these, alpha-tocopherol is the most studied component, as it has the highest bioavailability. The body absorbs this vitamin together with fats. The α -tocopherol form is claimed to be the most important fat-soluble antioxidant. This vitamin protects membranes from oxidation by reacting with lipid radicals formed in the chain reaction of lipid peroxidation. The reaction removes intermediate free radicals and prevents the propagation reaction. Once complete, oxidized α -tocopheroxyl radicals can be recycled back to the active reduced form by reduction with other antioxidants such as ascorbate, retinol, or ubiquinol. This α -tocopherol protects Glutathione Peroxidase 4 (GPX4) deficient cells from cell death.

Glutathione: It is an endogenous antioxidant factor. Glutathione contains cysteine and is a peptide found in most forms of aerobic life. It is not required in food and is instead synthesized in cells from its constituent amino acids. Glutathione contains a thiol group in its cysteine moiety, which is a reducing agent and can be reversibly oxidized and reduced. In cells, glutathione is maintained in a reduced form by the enzyme glutathione reductase. This reduced glutathione reduces other metabolites and enzyme systems such as ascorbate in the glutathione-ascorbate cycle, glutathione peroxidases, and glu-

taredoxins.

Foods to boost metabolism

Protein-rich foods: Foods rich in protein, such as meat, fish, eggs, dairy products, legumes, nuts and seeds, can help raise your metabolism for several hours. This is because your body needs more energy to digest them. This is known as the Thermic Effect of Food (TEF).

Mineral-rich foods: The minerals iron and selenium play different but equally important roles in keeping your body functioning properly. However, they have one thing in common. Both of them are necessary for the normal functioning of the thyroid gland, which regulates

metabolism. Research shows that a diet too low in iron or selenium can reduce your thyroid's ability to produce enough hormones, which can slow your metabolism.

Ginger: Ginger and related spices are believed to have particularly beneficial metabolism-boosting properties. For example, research shows that dissolving 2 grams of ginger powder in hot water and drinking it with a meal can help you burn up to 43 more calories than drinking hot water alone. This hot ginger drink can also reduce hunger and increase satiety. Grains of paradise, another spice in the ginger family, can have similar effects.