



Role of Antioxidants and its Functions in Human Body

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Description

The human body has multiple mechanisms to counteract oxidative/nitrosative stress through the production of antioxidants. A shift in the balance between oxidants and antioxidants in favour of oxidants is referred to as “oxidative/nitrosative stress”. Paradoxically, there is a large body of research demonstrating the general effect of oxidative/nitrosative stress on signaling pathways, while less is known about the initial and direct regulation of signaling molecules by Reactive Oxygen Species (ROS)/Ribonucleic Acid (RNA). Despite the assumption that antioxidants must exert beneficial effects against oxidative/nitrosative stress, many large-scale randomized controlled trials have provided conflicting and disappointing results on chronic disease prevention. It is now widely accepted that there is no evidence to support the use of non-discriminatory antioxidant supplements to prevent disease.

Aerobic life is associated with the continuous production of free radicals, particularly Reactive Oxygen Species (ROS) or free radicals. This ROS is formed in the body. These ROS are the components normally made in the body in response to stress, but they damage healthy cells by attacking and damaging the cell membrane. Free radicals are formed through exposure to various factors such as smoking, chewing tobacco, excessive sun exposure, and prolonged exposure to heavy metals.

Antioxidant deficiencies can develop as a result of decreased antioxidant intake, synthesis of endogenous enzymes, or increased antioxidant utilization. Antioxidant supplementation has become an increasingly popular practice to help maintain optimal body function. However, antioxidants exhibit pro-oxidant activity depending on the specific conditions.

Several types of reactive species are generated in the body

as a result of metabolic reactions in the form of free radicals or non-radicals. These species can be derived from either oxygen or nitrogen and are called pro-oxidants. They attack macromolecules including protein, DNA and lipid etc. causing cell/tissue damage. To counteract their effects, the body is equipped with another category of compounds called antioxidants. These antioxidants are either endogenously produced or ingested from exogenous sources and include enzymes such as superoxide dismutase, catalase, glutathione peroxidase, and glutathione reductase, minerals such as Se, Mn, Cu, and Zn, and vitamins such as vitamins A, C, and E. Other compounds with antioxidant activity include glutathione, flavonoids, bilirubin and uric acid, etc. In a healthy body, pro-oxidants and antioxidants maintain a ratio, and a shift in that ratio towards pro-oxidants leads to oxidative stress. As a bonus, fruits, vegetables, and whole grains that are high in antioxidants are also typically high in fiber, low in saturated fat and cholesterol, and good sources of vitamins and minerals.

Oxidants and antioxidants may play a role in the late stages of cancer development. At this stage, antioxidant levels play a very crucial role in the prevention and progression of carcinogenesis. The human body has an inherent mechanism to protect against free radicals and other ROS called antioxidant stress. It is defined as a “persistent imbalance between antioxidants and pro-oxidants in favour of the latter, leading to irreversible cellular damage”.

Functions of antioxidants

- It reduces the free radicals.
- It stimulates the growth of normal cells.
- Protects cells from premature and abnormal aging.
- Helps fight age related molecular degeneration.
- It supports the body's immune system.