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Commentary

ROLE OF ANTIOXIDANTS, FREE-RADICALS ON HUMAN HEALTH

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INTRODUCTION

The topic of free radical chemistry has received a great deal of attention in recent years. Our bodies produce free radicals, reactive oxygen species, and reactive nitrogen species as a result of diverse endogenous systems, physiochemical circumstances, and pathological states. For appropriate physiological function, there must be a balance between free radicals and antioxidants. When the body's ability to regulate free radicals is overwhelmed, the result is oxidative stress. As a result, free radicals damage lipids, proteins, and DNA, resulting in a variety of human disorders. As a result, using an external source of antioxidants can help you cope with oxidative stress. The recent advances in biology's understanding of free radicals and reactive oxygen species (ROS) are resulting in a medical revolution that promises a new era of health and illness control. It's strange that oxygen, which is necessary for life, may be harmful to the human body in certain instances. The majority of oxygen's potentially detrimental effects are caused by the production and activity of a group of chemical molecules known as reactive oxygen species (ROS), which have a proclivity for donating oxygen to other substances. In recent explanations of disease mechanisms, the phrases "free radicals" and "antioxidants" have become interchangeable.

Any molecular entity capable of independent existence that has an unpaired electron in an atomic orbital is referred to as a free radical. The existence of an unpaired electron causes most radicals to have certain features in common. Many radicals are highly reactive and unstable. They act as oxidants or reductants depending on whether they donate or absorb an electron from other molecules. Hydroxyl radical, superoxide anion radical, hydrogen peroxide, oxygen singlet, hypochlorite, nitric oxide radical, and peroxynitrite radical are the most important oxygen-containing free radicals in many disease conditions. These are extremely reactive species capable of disrupting biologically important components such as DNA, proteins, carbohydrates, and lipids in the nucleus and cell membranes. When the essential balance between free radical formation and antioxidant defences is unfavourable, the word is used to describe the condition of oxidative damage that results. Oxidative stress is linked to damage to a wide range of molecular species, including lipids, proteins, and nucleic acids, as a result of an imbalance between free radical production and antioxidant defences. Trauma, illness, heat injury, hypertoxia, toxins, and excessive exercise can all cause short-term oxidative stress in tissues. Increased radical generating enzymes (e.g., xanthine oxidase, lipogenase, cyclooxygenase), phagocyte activation, release of free iron, copper ions, or a disruption of the electron transport chains of oxidative phosphorylation all result in excess ROS in these wounded tissues.

Antioxidants can reduce oxidative stress-induced carcinogenesis by scavenging reactive oxygen species (ROS) and/or decreasing cell growth due to protein phosphorylation. Because oxidative products can cause genetic harm, B-antioxidant carotene's action may protect against cancer. As a result, B-photoprotective carotene's qualities may protect against UV light-induced carcinogenesis. B-carotene immunoenhancement may help to protect against cancer. B-carotene may also have an anticarcinogenic impact via changing the effects of carcinogens on liver metabolism. Vitamin C may aid in the prevention of cancer. An antioxidant is a molecule that is stable enough to give an electron to a rogue free radical, neutralising it and limiting the free radical's ability to cause damage. Because of their ability to scavenge free radicals, these antioxidants can postpone or prevent cellular damage. These low-molecular-weight antioxidants can safely interact with free radicals and stop the chain reaction from causing harm to critical components. Some antioxidants, such as glutathione, ubiquinol, and uric acid, are created by the body's natural metabolism. Dietary sources of lighter antioxidants can also be identified. Although the body has multiple enzyme systems that scavenge free radicals, vitamin E (-tocopherol), vitamin C (ascorbic acid), and B-carotene are the most important micronutrient (vitamin) antioxidants.

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CONFLICT OF INTEREST

The author declares that there are no conflicts of interest.