

An Overview of Antioxidants

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Abstract

Antioxidants-The name itself suggests that these are the substances that inhibit the oxidation of other molecules. Oxidation is a chemical reaction that leads to the production of free radicals which may lead to chain reaction due to which the cells get damaged. In order to prevent the cells from getting damaged, these Antioxidants which inhibit the oxidation reaction, are taken into the body. Antioxidants are available in both natural as well as in synthetic forms. Antioxidants are found in many foods, which includes fruits and vegetables and sometimes these are taken as dietary supplements. Some of the antioxidants are Beta carotene, Lutein, Vitamin A, Vitamin C, Vitamin E, Lycopene, etc. Antioxidants play a major role in the prevention of some cancers, Alzheimer's disease, arthritis and other related conditions.

Keywords: Antioxidants; Cancer; Damaged cells; Foods; Diet

Introduction

Antioxidants are the substances that prevent the oxidation of other substances. These are found in many foods and other dietary supplements. Intake of high dose of antioxidants may cause some health risks. For example, intake of high doses of Beta Carotene may increase the risk of lung cancer in smokers. Intake of high doses of Vitamin E increases the risk of prostate cancer and stroke. The benefits of Antioxidants are very important to maintain good health, because if the free radicals released in the body are left without unchanged, these radicals may lead to wide range of chronic diseases and illness [1-9]. Antioxidants also help to slow down the process of aging, which can have immense effect on the skin. Antioxidants may be of lipid soluble or water soluble. Lipid soluble antioxidants protect the cell membrane from lipid peroxidation and are mostly located in the cell membrane whereas water soluble antioxidants are present in aqueous fluids like blood and cytosol. Some of the lipid soluble antioxidants include Vitamin A, E, Carotenoids, Lipoic acid. Water soluble antioxidants include Vitamin C, Polyphenols and Glutathione [10-15].

There exists a need to be educated and to obtain knowledge on the dietary supplements that are to be taken in order to prevent the onset of various diseases. People can gain awareness through literature, internet sources, nutritionists and dieticians. Open access journals provide more visibility and accessibility to the readers in gaining the required information. The ongoing

researches all over the world, which are being exhibited through open access journals, serve as the main source of information in various fields [16-22].

Major Non Profit Organizations

In order to create awareness among the people, group of physicians and consultants unite to form a society or an organization. The main aim of these societies is to counsel and create awareness among the masses in the prevention of diseases. Major societies like Institute of Food Science & Technology of London was established with the aim of providing genuine information to the scientific community. It provides various innovative food processing technologies as well as the latest emerging trends in food science. All the scientific bodies of this association serve for the promotion of maternal and child health [23-29]. The Association of Food Technology is another non-profit organization of Turkey, formed for the development and expansion of recent trends in food technologies and also plays a major role in determining food safety. The main aim of all these societies is to promote better health of women and child during and after pregnancy. These associations enable in understanding the disorders during pregnancy by creating awareness among the women around the globe [30-36]. Mongolian Association of Nutrition and Food Service Management is another major association set up with the aim to promote and facilitate the health status of the people by exploring nutritional knowledge by dietitians, nutritionists and other professionals in the related field.

Visibility of Open Access Journals

Open Access literature plays a key role in providing the information and current researches across the globe. Journal of Food Processing & Technology is one of the open access journal that provides latest developments and techniques in the field of Food Technology. Through its publications, it disseminates the nutritional knowledge to the readers without any restrictions and subscriptions. Journal of Nutrition & Food Sciences is another open access journal that provides information across various themes pertaining to Food Science, Health Nutrition, Nutrition Economics, Sonic Nutrition, etc [37-41].

Journal of Nutritional Disorders & Therapy studies improve the knowledge and provide cutting-edge research strategies for the development of new therapeutics and technologies. Journal of Food and Nutritional Disorders is a leading provider of information in the field of Food science and Nutrition [42-49]. The above mentioned Open access journals on Food science are the peer-reviewed journals that maintain the quality and standard of the journal content, reviewer's agreement and respective editor's acceptance in order to publish an article. These journals ensure the barrier-free distribution of its content through online open access and thus help in improving the citations for authors and attaining good journal impact factors.

Future Perspectives in the field of Food sciences

Apart from the articles, presentation at conferences, symposiums, workshops also yield a better exposure to health information and advanced technologies that are being invented in the present generation. At 2nd International Conference on Food Chemistry & Nutrition which is going to be held at Canada, during July 2017, the recent advances in food research and business are to be discussed. The attendees will gain knowledge in the field of Food Science. Novel technologies and advancements in the current era are also going to be discussed at the conference. Steven Pao from United States is one of the professionals in Food Science and Nutrition graduated from Ohio State University. 7th European Food Safety & Standards Conference is going to be held at Greece, during November 2017. The main theme of this conference is to address the current issues and foster the advances in Food Safety [50-56].

Mechanism of Action

The mechanism of action of the Antioxidants can be well explained from the molecular level. Matter in the universe is composed of atoms. Atoms comprises of neutrons, protons at the core and electrons revolving around the core. The protons carry positive charge and the electrons possess negative charge. The combination of two or more atoms is known as a molecule. Human body is made up of substances like proteins, fats and DNA which comprises of molecules made up of thousands of atoms that are combined together [57-63]. Human beings and other organisms maintain their structure and functions by Chemical reactions. During these chemical reactions, the larger molecules are broken down into smaller molecules and smaller molecules combine to form a larger molecule. For a molecule to be stable, it must contain right number of electrons. When a molecule loses electron, the paired electron becomes lonely and this unpaired electron may become a free radical. The free radicals thus formed are electrically charged and unstable in nature. Thus they react with other molecules like DNA and damage them. Sometimes these free radicals can even form chain reactions and in turn form free radicals which cause damage to the cells. At this situation, the antioxidants donate one electron to the free radical thereby neutralizing it preventing from the damage [64-69] (FIG. 3).

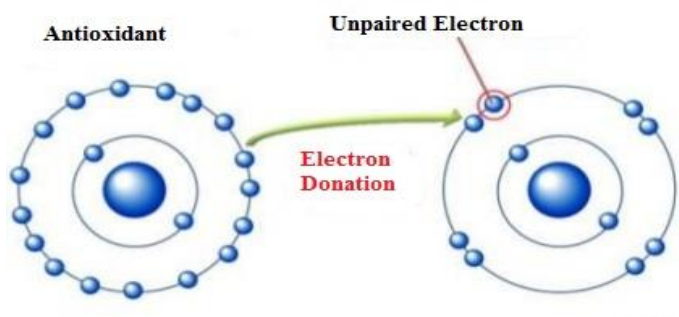


FIG. 3. Mechanism of Action of Antioxidant

Types of Antioxidants

Antioxidants are classified based on their solubility, enzymatic activity and molecular size. Firstly, based on the solubility, antioxidants are classified into Lipid soluble and Water soluble antioxidants. Lipid soluble antioxidants are located in the cell membrane and protect it from lipid peroxidation. Water soluble antioxidants are present in the blood and cytosol [70-76]. Secondly, based on the enzymatic activity, antioxidants are categorized into enzymatic and non-enzymatic antioxidants. Enzymatic antioxidants act by breaking or removing the free radicals from the body. Some of these include Superoxide dismutase, Catalase, Glutathione peroxidase and Glutathione reductase. Enzymatic antioxidants are not found in the foods or diet that we take instead they are found inside the body. Non-enzymatic antioxidants act by interrupting the chain reactions resulted by the free radicals in the body. These antioxidants are found in many foods that we take. Some of these antioxidants include Vitamin C, Vitamin E, Plant polyphenols, etc. Thirdly, antioxidants are divided into Small-molecule antioxidants and Large-protein antioxidants based on the molecular size. Small-molecule antioxidants work by scavenging the free radicals [77-82]. These include Vitamin C, E, Lipoic acid, etc. Large-protein antioxidants also known as

sacrificial proteins absorb the reactive oxygen species preventing them from attacking the proteins. Albumin is one of the Large-protein antioxidant [83-91].

Benefits of Antioxidants

Antioxidants have a wide range of health benefits. Antioxidants are useful in removing free radicals from the blood stream. They also help in reducing the signs of aging by inhibiting the wrinkle formation and preserving the skin texture. These antioxidants also protect your skin from sun damage [92-96]. Though there is no significant report that antioxidants are used to treat any medical condition but these are used in the prevention of Cancer, Cardiovascular disease, Cognitive impairment, Immune dysfunction, Cataracts, Macular degeneration, Alzheimer's disease. Antioxidants boost the functions of the brain and consumption of Vitamin C and E reduces the risk of dementia. Some of the antioxidants stimulate the body's genes and increase the natural defenses [97-100].

Conclusion

In spite of the fact that the term “antioxidant” plainly infers the function of a molecule, but the antioxidant activity is not confined to molecular function in the body. Current researches recommend that antioxidants actively participate in the prevention of various medical conditions and disease onset. These are also used as food additives and preservatives for preventing the food from getting spoiled. Intake of antioxidants helps to protect the body from Heart problems, Eye problems, Memory problems, Mood disorders, Immune system problems, etc. Antioxidants are also used in industrial products. They used as stabilizers in fuels and lubricants to prevent oxidation. With the recent advances and researches on Antioxidants, various health benefits and other innovative technologies have been developed.

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