

ANTIOXIDANTS IN DIETARY SUPPLEMENTS: EFFECTS ON OXIDATIVE STRESS AND AGING

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Abstract

This article examines the role of antioxidants in dietary supplements, their impact on oxidative stress and aging processes. The mechanisms of action of antioxidants, their biochemical properties and potential for use in maintaining health and prolonging life are discussed.

Keywords: Antioxidants, oxidative stress, aging, dietary supplements, free radicals, mitochondria, polyphenols, coenzyme Q10.

INTRODUCTION

Modern research in biochemistry and medicine confirms the importance of antioxidants in protecting the body from damage caused by oxidative stress. Oxidative stress is associated with aging processes and the development of many chronic diseases, including cardiovascular pathologies, neurodegenerative disorders and cancer. Dietary supplements with antioxidants offer the opportunity to maintain health and slow down age-related changes [1,2,3,4,5].

Objective of the Study

The objective of this work is to study the effect of antioxidants contained in dietary supplements on oxidative stress and aging processes, as well as their role in maintaining health.

Materials and Methods

The work analyzes modern scientific publications concerning the biochemical properties of antioxidants, their mechanisms of action and influence on aging processes. The data from clinical studies and laboratory experiments devoted to antioxidants in dietary supplements were used [6,7,8,9,10,11,12].

Results and Discussions

Oxidative stress: causes and consequences. Oxidative stress occurs when there is an imbalance between the formation of reactive oxygen species (ROS) and the body's ability to neutralize them using antioxidant systems. The main sources of ROS include:



- Metabolic processes in mitochondria
- Inflammatory reactions
- Exposure to UV radiation, pollutants and toxins
- Infections and chronic diseases

Excessive accumulation of ROS leads to damage to cellular structures, including lipids, proteins and DNA, which accelerates the aging process and contributes to the development of diseases.

The Role of Antioxidants in Dietary Supplements. Antioxidants are compounds that neutralize free radicals and reduce oxidative stress. They can be endogenous (synthesized by the body) and exogenous (obtained from food or supplements). The main antioxidants used in dietary supplements are:

1. Vitamin C (ascorbic acid) is a water-soluble antioxidant that protects cells from oxidative damage, strengthens the immune system and promotes collagen synthesis.
2. Vitamin E (tocopherols and tocotrienols) is a fat-soluble antioxidant that protects cell membranes from lipid peroxidation.
3. Coenzyme Q10 (ubiquinone) – participates in energy metabolism in mitochondria, supports the cardiovascular system and has a powerful antioxidant effect.
4. Glutathione is the main endogenous antioxidant that regulates detoxification processes in the body.
5. Flavonoids (quercetin, catechins, anthocyanins) – plant polyphenols with pronounced antioxidant and anti-inflammatory properties.
6. Resveratrol is a polyphenol found in red wine and grapes that slows down the aging process at the cellular level.

Conclusion:

Antioxidants play a key role in maintaining health and prolonging life by neutralizing free radicals and reducing oxidative stress, which is one of the main factors in aging and the development of chronic diseases. Antioxidant supplements such as vitamins C and E, coenzyme Q10, flavonoids, resveratrol and glutathione have a beneficial effect on the body, protecting cellular structures, supporting mitochondrial function and promoting normalization of metabolic processes.

Research shows that including antioxidants in your diet can improve cardiovascular health, reduce the risk of neurodegenerative diseases, slow down age-related changes in the skin, and strengthen the immune system. However, it is important to consider that the effectiveness of antioxidants depends on their form, dosage, and interaction with other nutritional components. Excessive consumption of some antioxidants can have the opposite effect, leading to cellular imbalance and even increasing oxidative stress.

Thus, to achieve the optimal effect, it is necessary to take a rational approach to the use of antioxidant dietary supplements, combining them with a balanced diet, physical activity and a healthy lifestyle. A personalized approach to the selection of antioxidants taking into account the individual needs of the body and health status is the most effective strategy for slowing down the aging process and preventing various diseases.



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