



COMMENTARY

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Significant Role of Antioxidants in Eye Diseases

Elia Hine*

Department of Emergency Medicine, Adnan Menderes University, Aydin, Turkey

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Description

Oxidative stress can cause a number of pathophysiological modifications that are directly involved in the development of ophthalmic diseases, such as age-related cataracts, macular degeneration or diabetic retinopathy, which are considered responsible for most cases of vision loss. The human eye is constantly exposed to oxidative stress due to daily exposure to sunlight. Reactive oxygen species produced by environmental exposures and pathological conditions make the human eye particularly vulnerable to oxidative damage. The ocular surface, consisting of the tear film, cornea and aqueous humor, forms the first physical and biochemical barrier of the eye and plays a key role in fighting free radicals. These eye sections are enriched with certain antioxidants in the form of metabolic enzymes or small molecules. Such an antioxidant defense system in the ocular surface is important for maintaining redox homeostasis in the eye and protection against oxidative damage.

Among the various drugs used in ophthalmology, antioxidants are used for their ability to scavenge free radicals and prevent cell and tissue damage caused by oxidative stress. Antioxidants may particularly benefit from incorporation into nanosystems due to their poor pharmacokinetic properties and apparent propensity for rapid inactivation. Antioxidant defense systems in the ocular surface act to combat ROS and protect eye tissues from oxidative damage. Superoxide Dismutase (SODs), Catalase (CAT), Glutathione Peroxidase (GPXs), Glutathione Reductase (GR) and Aldehyde Dehydrogenase are enzymatic antioxidants.

Ultraviolet sunlight promotes oxidation. When you look at the midday sun, the UV rays can "oxidize" the retinal cells in the back of your eyes, causing a brief loss of central vision. Similarly, the destruction of retinal cells can occur slowly over many years as a result of exposure to low levels of sunlight and/or as a result of the gradual degradation of the antioxidant defense system. A decline in antioxidant levels in the eyes with age is thought to be a major factor in vision loss.

Food sources that contain antioxidants for vision

Amino Acids: Amino acids are the building blocks of protein, including proteins such as S-proteins and RGS proteins that researchers have identified as important for vision. Cysteine and taurine are two amino acids that are particularly important for vision.

Bioflavonoids: Bioflavonoids, a type of phytonutrient, are natural yellow, red, and blue pigments found in plants that protect the eyes from damage due to exposure to sunlight. They are powerful antioxidants that fight free radical damage and appear to promote blood circulation to and within the retina. They act in combination with vitamins to strengthen and maintain healthy vision.

Carotenoids: Carotenoids such as lutein, astaxanthin, and zeaxanthin are plant pigments that absorb blue light and exist naturally in plants through photosynthesis, including not only the plants we see every day, but also algae, some types of fungi, and some bacteria. They are valuable antioxidants and help protect the eyes from many eye diseases. Studies have shown that people who eat a lot of carotenoids are healthier and have less chronic disease overall. Interestingly, the oils in fruits and vegetables are important for the absorption of carotenoids.

Essential fatty acids: Essential fatty acids are the building blocks for fats in the body and are one of the sources of energy for the cell. Omega-3 and omega-6 fatty acids are needed by the body in appropriate proportions to maintain good vision and general health.

Vitamins: Vitamins play a well-known important role in the body and vision. They are important for many activities in the cells either in reactions with other components to generate the necessary nutrients, contributing to the energy product, or supporting antioxidant functions. Vitamins C and E act as antioxidants.

Other nutrients: There are other nutrients that support good vision that do not fall into the above categories. These include: alpha-lipoic acid and coenzyme Q10, which support cellular energy production, and garlic, which has been shown to have many positive benefits for good eye health.