Eye lens in aging and diabetes: effect of quercetin.

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Abstract

Old age is accompanied by a number of pathological eye conditions. Cataract is the most common age-related eye complication. Because the lens becomes naturally more opaque over time, aging is the most important risk factor for developing cataract, which is a major cause of blindness in the world. Cataractogenesis is also one of the earliest secondary complications of diabetes mellitus. The lens is a closed system with limited capability to repair or regenerate itself. Current evidence supports the view that cataractogenesis is a multifactorial process. Oxidative stress and its sequelae are clearly involved in the etiology of senile cataract, whereas mechanisms related to glucose toxicity, namely oxidative stress, processes of nonenzymatic glycation, and enhanced polyol pathway contribute significantly to the development of the eye complications under conditions of diabetes. There is an urgent need for inexpensive, nonsurgical approaches to the treatment of cataract. Recently, considerable attention has been devoted to the search for phytochemical therapeutics. Several pharmacological actions of natural flavonoids may operate in preventing cataract because flavonoids are capable of affecting multiple mechanisms or etiological factors responsible for the development of sight-threatening ocular diseases. The flavonol quercetin is the most widely consumed flavonoid in the human diet. In this article, quercetin is reviewed as an agent that could reduce the risk of cataract formation via affecting multiple pathways pertinent to eye lens opacification, including oxidative stress, nonenzymatic glycation, the polyol pathway, lens calpain proteases, and epithelial cell signaling. In addition, the bioavailability of quercetin to the lens is considered.

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