OCULAR NUTRITION SOCIETY

Focusing On Nutrition Education

Nutrition for Cataracts: An Executive Summary

Cataracts have plagued mankind throughout history, and with the prolonged lifespan of Americans, age-related cataracts will affect nearly all long-lived Americans. The eye is a vulnerable organ, exposed to heat and solar radiation. Maintenance of the visual system must be sustained up to 8 to 10 decades of life now that a significant portion of the population is living longer. About 85% of octogenarians exhibit some degree of cataract formation in their eyes. If the onset of cataracts could be delayed by 10 years, researchers estimate that half of the surgical procedures to remove cloudy cataracts could be averted.

Vitamin C is a primary antidote against cataracts, but the public fails to recognize its importance and physicians have been misled over the potential effectiveness of supplemental vitamin C in preventing cataracts.

It has been well established, for decades, that blood plasma levels of vitamin C correlate with levels in the aqueous fluid of the eye. The aqueous fluid, secreted by the ciliary gland, delivers nutrients to the lens of the eye which is a bloodless crystalline transparent structure. The aqueous fluid bathes the lens with antioxidants, in particular vitamin C. It is generally believed a shortage of vitamin C delivered to the lens may, over a period of many years, result in a cloudy cataract that can impair vision.

It has been shown that vitamin C concentrations decrease in human lenses during cataract progression. Smoking, diabetes, steroids, all deplete the body and lens of Vitamin C and all are risk factors for cataracts. It should be recognized that in dynamic conditions encountered in daily life, such as greater oxidative stress produced by unfiltered sunlight, infection, inflammation, diabetes, the demand for vitamin C increases and would raise the saturation point. For each 1 milligram increase in serum vitamin C there is an associated 26 percent reduction in self-reported cataracts.

For example, glucose (sugar) inhibits a form of vitamin C from entering cells, thus diabetes increases the need for vitamin C in the eye. Exposure to solar ultraviolet radiation is another factor that increases the demand for vitamin C in the eyes. Vitamin C is reported to serve as an antioxidant and ultraviolet radiation filter in the human eye, and greater concentrations of vitamin C via oral consumption could help the human eye to withstand detrimental environmental factors such as unfiltered solar radiation.

The problem with so-called observational or population (epidemiological) studies is that they are disregarded by eye researchers because they often obtain only one blood sample for vitamin C at the beginning and end of the test period and rely upon the recall of study participants regarding their antioxidant food intake. Sometimes participants with diabetes or smokers aren't excluded from the study, factors which may skew results.

However, the very fact that blood sugar levels rise and fall in adulthood, exposure to solar ultraviolet radiation varies depending upon geographical location and time of year, and that dietary consumption of vitamin C varies, speaks for the validity of population studies in that they encounter the public in the variances of their daily life. The problem for researchers is in proving whether a factor like vitamin C actually prevents or is just associated with cataract prevention, which is why controlled studies are preferred.

One of the problems with recommendations to supplement with vitamin C to prevent cataracts is that the public is more likely to begin use of supplements after an eye doctor diagnoses cataracts. Cataracts cannot be self-detected. By then, usually in the 6th or 7th decade of life, the hardening, discoloration and opacification of the lens may be irreversible.

There is the misconception that cataracts are a plague of old age. In fact, the crystalline lens slowly loses transparency early in life, at the rate of 1% per year of life. By age 60 the crystalline lens only transmits about 35% of visible light to the retina. It increasingly becomes more difficult to see in dim light with advancing age. This is consistent with the fact that the human body no longer synthesizes vitamin C and there is progressive loss of lens transparency throughout life.

The predominant question is not that vitamin C prevents cataracts, but whether supplements are needed or is a plant-food diet sufficient? Five servings of fruits and vegetables are commonly recommended and many vitamin C researchers suggest foods over supplements. Five servings of selected fruits and vegetables may provide 200 milligrams of vitamin C, the so-called saturation point for humans, but the five most common plant foods consumed by Americans, iceberg lettuce, tomatoes, French fries, orange juice and onions, do not aggregately provide sufficient amounts of vitamin C. Dietary consumption of vitamin C in the population at large is about 110 milligrams per day, with 18% of the population consuming less than 30 milligrams of vitamin C per day.

Antioxidants are food substances that slow or prevent oxidative damage. When our cells use oxygen, they produce by-products called free radicals, which cause cellular damage. Antioxidants neutralize free radicals, reducing this damage.

The relationship between oxidation and antioxidants in the body is complex and little understood. But oxidative damage has been linked to the development of cataracts, as well as heart disease, cancer, diabetes, macular degeneration, and even the signs of aging itself.

Eating a variety of different foods, especially those with the brightest colors, is one way to get many diverse antioxidants. But research has shown that five antioxidants – just five out of thousands – stand out as superior to the others.

In fact, these *network* antioxidants, as they are known, work best as a team. Each of them mops up even more oxidative free radicals when they are in the body at the same time as other members of the network. Each serves a different function and enhances the activity of the others. Most antioxidants become useless after they have neutralized a free radical, but the network antioxidants rescue and revive each other in an ongoing recycling process.

The five network antioxidants are glutathione, alpha lipoic acid, coenzyme Q10 (CoQ10), vitamin C, and vitamin E. After it has quenched a free radical, vitamin E becomes a weak free radical itself. However, either vitamin C or CoQ10 can recycle this spent free radical vitamin E back into its antioxidant form, ready to neutralize more free radicals.

Glutathione and vitamin C also become weak free radicals after disarming free radicals. But alpha lipoic acid (ALA) can recycle them back into their active antioxidant form. In fact, vitamin C can also clean and recycle both spent glutathione and spent vitamin C. This rescue-and-revive cycle prolongs the lifespan of these antioxidants and makes them – together – a virtual powerhouse. Each has a job to do.

The mission of the Ocular Nutrition Society is to promote excellence in the care of patients through nutritional support for eye diseases and disorders through professional education and scientific investigation. Go to: www.ocularnutritionsociety.org for more information.