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REPORT

Nutritional Strategies for Preventing Age-Related Vision Loss

By Edward Rosick, DO, MPH, MS

By the age of 65, a shocking 30% of Americans suffer from drastic vision problems that are not correctable with glasses or contact lenses. The two most common causes of vision loss in older adults are cataracts and age-related macular degeneration.

While millions of doctors and their patients view these insidious conditions as inevitable consequences of the aging process, Life Extension has long maintained that potent antioxidants can play a critical role in supporting healthy ocular function with aging.

Mainstream medicine is finally recognizing the critical link between eye health and nutrition. Recent articles in prestigious scientific publications such as the Journal of the American Medical Association and Ophthalmology verify the importance of antioxidant nutrients in preserving vision. Moreover, emerging studies indicate that suppressing levels of potentially dangerous C-reactive protein and homocysteine is likewise essential to maintaining eye health with aging.

Health-conscious adults can thus preserve their vision by using targeted nutritional remedies and managing the risk factors that directly threaten eye health. This well-rounded, preventive approach can help ensure healthy vision over the course of a lifetime.

The sense of sight is a wondrous gift of nature that begins at the moment of birth and ideally lasts a lifetime. As we age, however, both the lens and retina of the eye may suffer deterioration that can lead to near or even total blindness. Such problems affect nearly one third of elderly adults. Two of the most common eye diseases afflicting the elderly are cataracts and age-related macular degeneration.

CATARACTS ARE NOT INEVITABLE

Most people in their sixties or seventies know someone who has had cataract surgery. Because cataracts are so common, many people assume that they are another inevitable consequence of aging. However, with a few essential precautions and the judicious use of targeted nutritional supplements, this does not have to be the case at all.

Cataracts are a clouding of the eye lens, which is mostly made up of protein and water. Although cataracts can begin to form before the age of 40, it is not until much later that they begin to adversely affect millions of older adults. As we grow older, new cells replace most of the cells in our bodies. However, the eye lens experiences no such cell turnover—thus the lens you are born with is the lens that will be with you the rest of your life.

Normally, light passes through the eye lens without distortion, as though the lens were made of perfectly clear glass. Over five or six decades, your eye lens can be damaged by ultraviolet (UV) radiation from sunlight, as well as by oxidative stress generated by free radicals. If this damage is significant enough, cataracts (which are actually “clumps” of protein in the lens) eventually form.

In their early stages, cataracts may not be much of a problem. Over years and decades, however, cataracts may grow larger, making it more difficult, or even impossible, to see clearly. According to people with cataracts, the visual sensation is like trying to look through a dirty, cloudy window.

While most cataracts are related to aging, other circumstances give rise to other types of cataracts. These include: congenital cataracts, which can affect infants and young children; secondary cataracts, which develop as a result of certain illnesses, such as diabetes, or in conjunction with the use of certain medications, such as long-term use of corticosteroids; and traumatic cataracts, which can form in the eyes following a traumatic injury or other event.

A century ago, having cataracts meant having to wear thick, unsightly glasses and using magnifying glasses to read even the largest print. Today, thanks to modern surgical techniques, removing cataracts and implanting an artificial lens is an almost routine surgical procedure. Yet for all of its positive aspects, cataract surgery comes with a price. The total cost of cataract surgeries performed in the US is estimated to be $3.5 billion a year.

Cataract surgery also entails additional health-related costs. Surgical complications are rare, but certainly not unheard of. Some 20-30% of those who undergo cataract surgery develop a subsequent clouding of the lens capsule, the part of the lens that is often left in the eye to hold the new synthetic lens in place. If the capsule becomes cloudy (this is known as an after-cataract), the patient will require additional surgery to restore clear vision. Moreover, in rare cases, cataract surgery can lead to more serious complications, such as swelling of the eye, infections, and even blindness.

WARNING: STATINS MAY CAUSE CATARACTS

Millions of Americans are taking so-called “statin” medications to combat high cholesterol, yet few are aware that these drugs may pose a serious threat to their eye health.

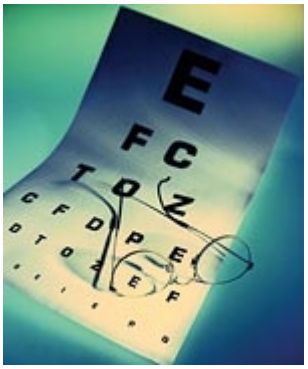
In early research, statin medications led to cataract formation in animals.[27] While human studies have failed to identify a causal link between statin drugs and cataracts,[28] some of the most widely used statins—including Zocor® and Mevacor® – carry warnings that they may contribute to the progression of cataracts.[28,29]

A recent study from Japan reveals a possible link between cholesterol and cataracts. The researchers found that rats that are genetically susceptible to developing cataracts demonstrate defects in two genes involved in cholesterol synthesis. Cholesterol is required for proper development of the epithelial cells of the eye lens, helping to maintain its transparency. The decreased availability of cholesterol in these animals may thus contribute to the eye lens becoming opaque.[30]

These findings further corroborate Life Extension's longstanding position that ideal cholesterol levels should range from 160 to 200 mg/dL. While excess cholesterol is known to contribute to arterial disease, cholesterol levels that are too low (below 160 mg/dL) may cause other health problems.

VITAMINS THAT HELP PREVENT CATARACTS

Scientists believe that the formation of cataracts is in part due to oxidative damage. Thus, it makes sense that well-known antioxidants such as lutein and vitamins A, C, and E could help retard the formation of these vision robbers. Indeed, numerous studies show that antioxidant vitamins can help counter the destructive effects of cataracts.



In the well-known Beaver Dam Eye Study, scientists examined the relationship between dietary intake of antioxidant nutrients and the incidence of cataract formation in a cohort of 1,354 adults, aged 43-84, over seven years.[1] Those who consumed foods that are high in anti-oxidant vitamins had a diminished risk of developing cataracts. According to the researchers, the data from this prospective study “are consistent with a possible protective influence of lutein and vitamins E and C on the development of . . . cataracts.”

Other, larger-scale studies suggest that vitamin A may help protect against cataracts. For example, in the Nurse’s Health Study, researchers followed 50,828 women, aged 45-67, for eight years. Women who consumed the most vitamin A had a 39% lower risk of developing cataracts than women who consumed the least vitamin A.[2]

BLINDNESS AND OTHER PERILS OF ARMD

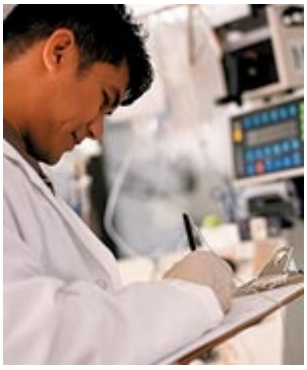
Age-related macular degeneration (ARMD), a debilitating eye condition that affects at least 10 million men and women in the US, is the leading cause of legal blindness in people 55 and older. Unlike cataracts, ARMD does not adversely affect the eye lens; instead, it causes a devastating deterioration of the macula, the specialized area of the eye’s retina that helps maintain the sharp, detailed vision required for tasks such as reading and driving. When the macula deteriorates due to ARMD, affected individuals experience a world of fuzzy, indistinct shapes and washed-out colors.

The two forms of ARMD are dry, or atrophic, and wet, or exudative. Dry ARMD is by far the most common, occurring in about 90% of those suffering from the disease. The wet form is seen in the remaining 10%. In the dry form, yellow deposits called drusen accumulate underneath the retina over a period of years, which causes the macula to thin and lose function. By contrast, wet ARMD can occur very rapidly over two or three years, and accounts for most of the major vision loss attributed to macular degeneration. This devastating condition is caused by abnormal blood vessels that grow across and under the macula and lead to scar tissue formation, which eventually damages and destroys the macula. While treatments can slow the abnormal blood

vessel growth that accompanies wet ARMD, there is no cure for either wet or dry macular degeneration.

INFLAMMATION, C-REACTIVE PROTEIN, AND ARMD

While scientists are still investigating why ARMD affects some aging adults but not others, new research points to inflammation's role in this devastating disease. As Life Extension readers are aware, multiple lines of research have demonstrated that chronic inflammation may contribute to various age-related diseases such as cancer, Alzheimer's, and heart disease. In fact, biological markers of inflammation, such as C-reactive protein (CRP), may be a harbinger of ARMD as well as a warning sign for heart disease risk.



C-reactive protein is produced and released by the liver in response to an acute inflammatory stimulus. Multiple studies have shown that CRP levels are elevated in multiple inflammatory, infectious, and neoplastic diseases, ranging from rheumatoid arthritis and tuberculosis to cancer and heart disease. Data gleaned from newly published studies suggest that ARMD may be yet another inflammatory disease that afflicts middle-aged and elderly adults.

Two recent papers examined whether elevated C-reactive protein levels correlate with the risk of developing ARMD. In one article, published in the prestigious journal Ophthalmology, researchers recruited 79 elderly men and women with ARMD, along with 77 unaffected control subjects.[3] Individuals suffering from ARMD exhibited higher CRP levels than did unaffected individuals, and this difference was statistically significant.

A case-control study of 930 patients also examined the relationship between C-reactive protein and ARMD risk. Published in 2004 in the Journal of the American Medical Association (JAMA), this investigation found that CRP levels were significantly higher among subjects with intermediate or advanced ARMD. According to the study authors, "elevated CRP level is an independent risk factor for [ARMD] and may implicate the role of inflammation in the pathogenesis of [ARMD]."[4]

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ANTIOXIDANT SUPPLEMENTS FOR EYE HEALTH

Because high C-reactive protein levels appear to be associated with risk for ARMD and numerous other age-related diseases, health-conscious adults are advised to implement strategies to lower CRP. One way to do this is through beneficial antioxidants. Multiple published studies demonstrate the efficacy of various antioxidant supplements in reducing CRP values.

One recent study examined the effect of alpha tocopherol (vitamin E) on C-reactive protein levels in 25 healthy volunteers and 47 people with type II diabetes. In this five-month study, the use of vitamin E supplements markedly decreased CRP levels in both healthy volunteers and those with diabetes.[5]

Another study examined the relationship between C-reactive protein levels and concentrations of various vitamins and minerals among 14,519 men and women. Higher CRP levels were significantly related to diminished concentrations of antioxidants, including vitamin C, beta-carotene, lutein, zeaxanthin, and selenium. According to the study authors, “these results suggest that the inflammatory process [reflected by high CRP levels], through the production of reactive oxygen species, may deplete stores of antioxidants.”[6]

With the knowledge that ARMD is at least partly connected to an inflammatory cascade reflected in high CRP levels, and that antioxidants effectively counter high CRP levels, it makes sense to investigate whether antioxidants help protect against ARMD. A study recently published in JAMA examined this very possibility.

In their report entitled “Dietary Intake of Antioxidants and the Risk of Age-Related Macular Degeneration,” researchers in the Netherlands conducted a population-based cohort study of 4,170 men and women, with an average age of 68. The scientists determined the subjects’ average antioxidant intake and incidence of ARMD using dietary questionnaires and detailed eye exams. Over a mean follow-up period of eight years, 560 participants developed macular degeneration. However, those with a high intake of foods rich in beta-carotene, vitamins C and E, and zinc had a 35% lower risk of developing ARMD.

The study authors noted, “recent data suggest that oxidative protein modifications may play a crucial role in the formation of drusen. This implies that antioxidants may have their strongest effect at the initiation of the disease.” They believe that antioxidants like vitamins A, C, and E may work synergistically in warding off ARMD. According to the research team, “We therefore conclude that dietary antioxidants may delay the development of early [ARMD], and possibly, of [ARMD] in general.”[7]

PROTECTIVE EFFECTS OF LUTEIN AND ZEAXANTHIN

Emerging research confirms that lutein and zeaxanthin can help protect vision by guarding against both cataracts and ARMD. These safe, beneficial compounds are chemically classified as carotenoids, the naturally occurring pigments found in many colorful fruits and vegetables.

Interestingly enough, lutein and zeaxanthin are the only carotenoids generally found in the eye. While high levels of other carotenoids are found in the blood and plasma—beta-carotene and lycopene are two examples—hardly any zeaxanthin is found in plasma. In the eye, lutein and zeaxanthin are found in both the lens and macula. The two help give the macula its striking, deep yellow hue. While researchers continue to study the precise roles played by lutein and zeaxanthin in the eyes, there is general agreement that both carotenoids protect the eye in two important ways.

First, lutein and zeaxanthin absorb near-to-UV blue light, which has the highest energy and is therefore the wavelength most potentially damaging to the retina and macula. Second, lutein and zeaxanthin are potent antioxidants that quash the formation of free radicals.8 By generating damage in both the lens and macula, free radicals may contribute to both cataracts and ARMD.

A solid body of scientific evidence points to the great potential of lutein and zeaxanthin in combating cataracts and ARMD. In three studies conducted in the late 1990s, men and women with a high intake of lutein and zeaxanthin had significantly lower

risks of developing cataracts compared to those with a low intake of these carotenoids.[1,9,10]

A more recent randomized, double-blind, placebo-controlled study showed that lutein supplements can help improve vision in people with existing cataracts.[11] Seventeen men and women with cataracts, aged 55-73, were given lutein (15 mg), vitamin E in the form of alpha tocopherol (100 mg), or placebo three times a week for up to two years. Subjects who took the alpha tocopherol supplements experienced a stabilization of their vision, while those taking placebo saw a decline in vision. Subjects who took lutein showed a significant increase in their visual acuity and glare sensitivity. According to the study authors, “a higher intake of lutein, through lutein-rich fruit and vegetables or supplements, may have beneficial effects on the visual performance of people with age-related cataracts.”

Another study published in JAMA evaluated the relationship between carotenoids—including lutein, zeaxanthin, and other antioxidants—and the risk of developing ARMD.[12] In this case-control study, 356 ARMD patients, aged 55-80, were compared to 520 control subjects. The results unequivocally demonstrated that a higher dietary intake of carotenoids is associated with a significantly lower risk of developing ARMD. Specifically, those who had the highest intake of carotenoids had a 43% reduction in ARMD risk. Not surprisingly, the study authors stated that “among the specific carotenoids, lutein and zeaxanthin . . . were the most strongly associated with a reduced risk for [ARMD].”

GINKGO BILOBA MAY IMPROVE VISION

Ancient Chinese medical manu-scripts indicate that for at least 5,000 years, the leaves of the ginkgo tree have been used for various health conditions, including supporting circulation, cognition, and respiratory function. Numerous studies indicate that ginkgo biloba may help fight dementia and Alzheimer’s disease.[13-16]

Exciting new findings suggest that ginkgo may also hold promise in countering ARMD. German researchers recently conducted a controlled, double-blind study of human subjects suffering from the dry form of ARMD. The subjects were given 60 or 240 mg/day of ginkgo over a six-month period. At the study’s end, the subjects who used either dose of ginkgo showed marked improvement in their vision. However, those taking the higher dose saw the most improvement. The study authors concluded that “the results demonstrate the therapeutic efficacy of [ginkgo extract] in patients with senile, dry macular degeneration, with obvious benefits in everyday life.”[17]

CARNOSINE COUNTERS OXIDATION AND GLYCATION

Advanced glycation end products, or AGEs, are molecules that may be just as important as free radicals in many of the pathological processes associated with aging, including the development of cataracts. AGEs adversely affect the physical and biochemical properties of proteins and the tissues in which they are present, such as the eye lens. Fortunately, carnosine not only protects against the ravages of oxidative damage, but also inhibits the formation of advanced glycation end products.

Carnosine is a natural, safe compound comprising the amino acids beta-alanine and L-histidine. Numerous studies have shown that carnosine inhibits lipid peroxidation and free radical-induced cellular damage.[18-21] In addition, carnosine has demonstrated anti-aging effects in laboratory animals.20 Carnosine may elicit these effects due to its ability to inhibit AGE formation and protein cross-linking.[18-21]

Multiple studies suggest that eye drops containing carnosine may help in the prevention and management of cataracts. In one 24-month, placebo-controlled study, an acetylated type of carnosine—N-acetylcarnosine—was used in eye-drop form in 49 patients with cataracts.[22] Cataract patients who received carnosine eye drops twice daily demonstrated significantly im-proved vision compared to those receiving placebo eye drops. In addition, topographical studies of the patients’ eyes revealed that people using the carnosine eye drops had fewer areas of lens clouding from cataract formation. The eye drops were well tolerated, and there were no reports of adverse ocular or systemic side effects. The researchers concluded, “topical [carnosine] shows potential for the treatment and prevention of cataracts.”

HIGH HOMOCYSTEINE TIED TO ARMD RISK

While some mainstream medical doctors may be surprised to learn that there is a link between free radicals, elevated C-reactive protein levels, and ARMD, they may be even more surprised to know that new studies link high homocysteine levels to macular degeneration.

Homocysteine is an amino acid produced in the body through the breakdown of methionine, an amino acid that occurs in many foods, including meats, fish, and eggs. Studies have associated high levels of homocysteine with elevated risk for a number of diseases, including atherosclerosis and stroke. A new study published in the American Journal of Ophthalmology has shown that high homocysteine levels may increase risk for ARMD.

In this case-controlled, cross-sectional study, researchers examined fasting plasma homocysteine levels in 934 men and women, 547 of whom had intermediate or advanced ARMD and 347 of whom served as healthy control subjects.[23] Median plasma levels of homocysteine were significantly higher in subjects who had advanced ARMD; high homocysteine was also significantly associated with a higher risk of developing ARMD. Regarding a possible mechanism by which homocysteine might contribute to the development of ARMD, the authors stated that "high homocysteine levels may cause oxidative injury to endothelial cells, enhance peroxidation of low-density lipoprotein, and alter blood-clotting mechanisms . . . because homocysteine levels can be modified by dietary means or nutritional supplements, additional studies to clarify the role of homocysteine in the development or progression of [ARMD] are warranted."

FOLIC ACID, B12 HELP LOWER HOMOCYSTEINE

Additional studies are needed to more precisely ascertain homocysteine's role in ARMD. In the meantime, however, it would be wise to take steps to reduce high homocysteine levels and thus possibly avoid the consequences of ARMD. In numerous studies, two safe and inexpensive nutrients—folic acid and vitamin B12—have been highly effective in lowering potentially lethal homocysteine levels.

In a study conducted in 2004, researchers examined the effects of a daily dose of 5000 mcg of folic acid and 250 mcg of vitamin B12 on the homocysteine levels of patients with significant coronary artery disease, defined as having at least 70% blockage of a major coronary artery.[24] After only 12 weeks, patients taking folic acid and vitamin B12 supplements reduced their homocysteine levels by 32%.

In a similar study conducted in China the same year, 152 patients with high homocysteine levels were given 5 mg of folic acid daily over an eight-week period.[25] As in the earlier studies, homocysteine levels dropped markedly, in this case by 34%.

Studies that are even more recent confirm the homocysteine-lowering effects of folic acid and vitamin B12. In a meta-analysis published in the American Journal of Clinical Nutrition, researchers analyzed 25 randomized, controlled trials examining the effects of folic acid and B12 supplements on homocysteine levels in a total of 2,596 patients.26 The results showed that at dosages of 200 mcg, 400 mcg, 800 mcg, 2000 mcg, and 5000 mcg/day, folic acid decreased homocysteine levels by 13%, 20%, 23%, 23%, and 25%, respectively. Vitamin B12 supplements at a dose of 400 mcg/day produced an additional 7% reduction in homocysteine.

BEGIN PROTECTING YOUR VISION NOW

The wonderful gift of sight is something most of us take for granted until it is somehow altered or diminished. By eating a diet abundant in fruits and vegetables, avoiding smoking, wearing ultraviolet radiation-blocking sunglasses when outdoors, maintaining healthy C-reactive protein and homocysteine levels, and using nutritional supplements with proven benefits for eye health—including antioxidants such as vitamins A, C, and E, carotenoids like lutein and zeaxanthin, and ginkgo biloba, carnosine, folic acid, and vitamin B12—you can help ensure healthy vision that lasts a lifetime.

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