



Ophthalmology Update

Richmond Eye Associates, P.C.

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In the Next Issue of

Ophthalmology Update:

- Update on Laser Vision Correction – What it Can and Cannot Do.
- How to Respond to Patient's Questions about Laser Vision Correction.
- Future Developments

Ophthalmic Topics of Interest to the Medical Physician

Nutritional Supplements for Eye Health and Disease

The use of nutritional supplements such as vitamins and alternative herbal products is increasing as they are marketed heavily to consumers. Often these are used without the knowledge or advice of a physician. This issue explores the role that these products may have in ophthalmic disorders such as age-related macular degeneration and cataract.

Lutein and Age-related Macular Degeneration (AMD)

Lutein is a dietary carotenoid found primarily in leafy green vegetables such as spinach. It has received considerable media attention recently, with well known brands of vitamins adding lutein into their products. The significance of lutein is that it, along with the related carotenoid zeaxanthin, are dominant pigments found in the macula. Other carotenoids such as beta carotene and lycopene (found in tomatoes) are virtually absent in the macula. It is felt that these yellow pigments (lutein) may serve to filter blue light from reaching the retina, which has been established as a major cause of photic damage to the retina. Furthermore, carotenoids are well known to have anti-oxidant properties. The outer retina's photoreceptor layer, with its high proportion of polyunsaturated fatty acids, is subjected to constant pho-

tochemical insults leading to oxidation and free radical formation. Carotenoids may play a role in preserving normal retinal and vascular function.

A study published in 1994 as part of the Eye Disease Case-Control Study¹ looked at relationships between dietary intake of carotenoids, and vitamins A, C, and E and the risk of neovascular (wet) age-related macular degeneration in Caucasians. (Age-related macular degeneration is the leading cause of irreversible blindness in those over 65). 356 patients with AMD and 520 matched control subjects were divided into groups based on their intake of different nutrients from foods. Those in the highest quintile of carotenoid intake (from foods) had a 43% lower risk of developing AMD than

Continued on page 4 . . .

Supplemental Bilberry, Ginkgo biloba, and St. John's Wort

1. Study Finds Bilberry Supplementation Ineffective.

Bilberry is often used by individuals who feel that it improves night vision. Bilberry extract contains anthocyanosides which are hypothesized to support blood vessel elasticity and permeability, and to prevent leakage of ves-

sels. An April 2000 study¹ looked at contrast sensitivity and night vision in a double-blind, crossover, controlled study where subjects took either placebo or bilberry extract (160mg tid) for 3 weeks. After a washout period, the medication was reversed. Contrast sensitivity and night vision measurements were taken

Continued on page 3 . . .

Vitamin Supplementation and Cataract, Macular Degeneration Risk

Several studies have looked at associations between vitamin intake (as food, with or without supplements) and the presence or development of cataract or age-related macular degeneration. These studies tend to be population based studies, where a given eye disease is correlated with a dietary history questionnaire. While studies such as these are important, they do not establish a definite cause and effect relationship. One ongoing, randomized study evaluating the relationship of cataract and age-related macular degeneration with actual vitamin supplementation is the National Eye Institute's Age-Related Eye Disease Study. The results of this study should yield more definitive answers as to the benefits of vitamin supplementation on eye disease prevention.

Nevertheless, a number of well designed and significant studies have correlated dietary vitamin consumption as well as supplementation mainly with cataract prevention. The Longitudinal Study of Cataract¹, published in 1998, found a significant reduction in nuclear cataract development over a 4.5 year follow-up period with regular users of multivitamins (31% reduced risk), and regular user of vitamin E (57% reduced risk). The actual visual significance of the cataract was not measured (surgery or vision).

A prospective study looking at cataract progressing to extraction in nurses (also discussed on page 4) found a significant reduction in cataract risk associated with dietary total vitamin A (including carotenoids, but excluding supple-

ments), and with a long term history of vitamin C supplementation (10 years).

A March 2000 population-based cross-sectional study in Australia² found that higher intakes of protein, vitamin A (including carotenoids), niacin, thiamin, and riboflavin were associated with a reduced prevalence of nuclear cataract (again, through masked grading of photographs of the lens, not through visual significance). No evaluation of vitamin E, or of supplementation as a separate variable was made. Spinach (high in lutein) was especially found to be associated with a reduced cataract risk.

Studies evaluating age-related macular degeneration have mainly pointed to dietary habits, rather than vitamin supplementation, as being preventative. A 1994 report from the Baltimore Longitudinal Study of Aging³ found that vitamin supplementation was generally not beneficial. Plasma levels of vitamin E, C, and beta carotene were moderately inversely related with non-severe (dry) macular degeneration. Other cross-sectional studies have shown that low intake of foods rich in vitamin A to be a risk factor for macular degeneration. Consumption of foods rich in the carotenoids lutein and zeaxanthin was found to be highly protective of macular degeneration, as discussed on page 1.

¹Ophthalmology 1998;105:831-836 MC Leske, MD et al.

²Ophthalmology 2000;107:450-456 RG Cumming PhD et al.

³Arch Ophthalmol. 1994;112:222-227 S West PhD et al.

Clinical Pearl: Vitamins and the Eye? What to say when patients ask.

There are modifiable risk factors for both cataract and age-related macular degeneration. These include both nutritional factors as well as lifestyle changes. Below is a summary of important, evidence-based, modifiable risk factors for cataract and age-related macular degeneration. Glaucoma is known to have specific risk factors, such as family history, but few, if any, modifiable risk factors. Diabetic retinopathy is similar, with the major modifiable risk factor being tight glycemic and hypertensive control. No alternative herbal preparations have been found to be protective of any eye disorder through reputable clinical trials.

Cataract

- Avoid tobacco use.
- Avoid sun exposure, and wear ultraviolet protecting sunglasses or a wide brimmed hat outside.
- Maintain ideal body weight – a high BMI is associated with cataract development.
- Avoid nasal, oral, or eyedrop steroids if possible.
- Evidence points to a probable protective effect of con-

suming foods high in carotenoids such as lutein (spinach, collard greens, kale).

- Evidence points to a protective effect from supplemental multivitamin usage, and especially vitamins C and E.

Age-Related Macular Degeneration

- Avoid tobacco use.
- Avoid sun exposure, and wear ultraviolet protecting sunglasses or a wide brimmed hat outside.
- Evidence points to a protective effect of dietary consumption of foods high in carotenoids such as lutein (see page 3).
- There is no conclusive evidence that vitamin supplementation or any kind, or of lutein supplementation in combination with vitamins, is protective.
- Keep regularly scheduled appointments with an ophthalmologist, and report any distortion, blind spots, or change in vision immediately.
- Control hypertension, if present.

... if it doesn't hurt, and it might help, why not use it?

The above caption is the philosophy of many eye care providers and physicians when discussing vitamin use and alternative herbal preparations. While there are some well known syndromes of mega-dosage vitamin toxicity, and a few interactions of herbal preparations with other medications, these OTC, non-regulated products are largely without side effects: Except for cost. This has become a multi-billion dollar industry in the United States. Below is a sample of a daily regimen of herbs and vitamins recommended by a well-meaning ophthalmologist, printed in an ophthalmology trade journal. Prices are from a local drugstore:

Multivitamin with lutein – 1 bid (#130 \$9.00) \$50/yr
Ginkgo biloba extract – 2 bid (#50 \$6.50) \$324/yr
Bilberry – 4 bid (#50 9.00) \$525/yr
Pycnogenol (pine bark) - 2 bid (#50 \$6.50) \$190/yr
\$1089/yr

In contrast, 1 week supply of fresh kale, collard greens, or spinach (1/2 cup/day) from a local grocery store (1 pound, uncooked) is **\$2.88 per week, or \$150 per year**. This dietary regimen may offer the most significant protective effect for cataract and macular degeneration yet described.

Lutein – Zeaxanthin Content of Vegetables (mcg/100g)

Kale -----	21,900
Collard Greens -----	16,300
Spinach (cooked) -----	12,600
Spinach (raw) -----	10,200
Mustard Greens -----	9,900
Dill (not dried) -----	6,700
Celery -----	3,600
Scallions (raw) -----	2,100
Broccoli (cooked) -----	1,800
Lettuce -----	1,800
Green Peas -----	1,700
Pumpkin -----	1,500
Corn -----	790
Green Beans -----	740
Green Pepper -----	700
Pickle -----	510

Bilberry, Ginkgo biloba, and St. John's Wort (from page 1)

throughout the 3 month study. There was found to be no difference in night vision or contrast sensitivity between the treatment groups and control groups during any part of the experiment. Thus, the use of bilberry was felt to be ineffective for improvement of these vision parameters. The weaknesses of the study include the small group size (15), and the short duration of the study.

Others have postulated that bilberry may be effective at preventing capillary leakage in conditions such as diabetic macular edema, but no controlled studies nor case reports have demonstrated this.

2. Ginkgo biloba May Have Use in Certain Optic Neuropathies.

Increasing evidence is pointing to glaucoma being more than simply an intraocular pressure dependent atrophy of the optic nerve. A recent study showed that even after maximal ocular pressure lowering by surgery, 10% of patients continued to lose peripheral vision over a 10 year period. The existence of "normal tension glaucoma", where damage occurs with no history of elevated eye pressure, also indicates other mechanisms of damage. Possible vascular risk factors may include systemic hypotension (especially nocturnal hypotension), cardiovascular disease, vasospasm, elevated endothelin levels, autoimmune disease, hematological abnormalities, and cerebral microvascular ischemia. A role for excita-

tory neurotransmitters and free radicals may also be present in cellular death in glaucoma.

Ginkgo biloba extract has numerous properties which may be beneficial in treating non-pressure related mechanisms of damage in glaucoma?. These include increased ocular blood flow, antioxidant activity, platelet activating factor and nitric oxide inhibition, and neuroprotective activity. Some researchers are beginning trials where *ginkgo biloba* extract is used in selected glaucoma patients, especially in those with "normal tension glaucoma" or those with progressing glaucomatous damage in spite of adequate ocular pressure control.

3. St. John's Wort May be Phototoxic to Lens and Retina

The active ingredient in St. John's Wort (hypericin) has demonstrated potential for phototoxicity due to its absorption spectrum of light in both the ultraviolet and visible light ranges. This can lead to toxic retinal and lens effects, especially with outdoor sunlight exposure. Patients using St. John's Wort should avoid sun exposure (not just UV exposure) for at least 2 days after taking the medication. Cataract and retinal damage may take 1 to 5 years to develop after exposure.

¹Altern Med Rev 2000;5(2):164-173 ER Muth et al.

²Ophthalmology Times 2000;Apr. 15:14-15 R Ritch MD

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- Extensive patient information, including discussion of over 80 eye conditions and a section discussing risks and benefits of laser vision correction.
- Physician section with topics of interest, including a diabetes section.
- Office locations and information.

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 897-1510

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 236-9900

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Ophthalmology Update

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Beneficial Effects of Dietary Lutein and Zeaxanthin (page 1)

those in the lowest quintile. Foods especially rich in lutein and zeaxanthin had the strongest associated protective effect, with the highest quintile of consumption giving a 57% lower risk of advanced AMD than the lowest quintile. When specific foods were evaluated for a beneficial effect, spinach and collard greens consumption were associated with an astounding 86% reduction in risk. Spinach and collard greens are known to be especially high in lutein and zeaxanthin. In the study, those consuming 1/2 cup of spinach or collard greens 5-6 times per week had the 86% reduction in AMD risk, while those consuming the vegetables once per week had only a 39% reduction in risk.

In this same study, the intake of supplemental vitamin A, E, and C were not shown to offer a statistically significant reduction in risk for AMD. Total vitamin A (foods and supplements) was associated with a reduced risk, but the use of supplements did not improve the risk reduction over food alone. Vitamin C intake from food, excluding supplements, had a weak protective effect against AMD.

Lutein Protective Against Cataract Also

A prospective study² looking at the association between dietary intake of carotenoids, vitamins A, C and E, and riboflavin with cataract extraction in women included 50,800

nurses aged 45 and older, over an 8 year follow-up period. 493 cataracts were extracted over the course of the study. Total vitamin A intake (including carotenoids but excluding supplements) was associated with a significant 39% reduction in risk of cataract extraction comparing the highest to the lowest quintiles of consumption. Spinach consumption (lutein and zeaxanthin), rather than carrots (beta carotene), was associated with the risk reduction. Dietary consumption of riboflavin, and vitamins E and C were not associated with cataract extraction. Long term vitamin C supplementation (10 years or more) was associated with a 45% lower risk of cataract extraction. However, multivitamin use was not associated with a reduced risk (multivitamins contain 60-90 mg of vitamin C, while vitamin C supplements contain 250-500 mg).

Overall, these and other studies apparently point to increased dietary consumption of foods high in lutein and zeaxanthin as being protective of age-related macular degeneration and cataract. In general, additional vitamin supplementation in these studies did not improve the reduction in risk. Thus, it is not known whether or not lutein supplementation will improve risk. Future prospective studies will attempt to answer this question. See page 3 for a breakdown of foods rich in lutein and zeaxanthin.

¹JAMA 1994;272:1413-1420 JM Seddon, MD et al.

²BMJ 1992;305:335-339 SE Hankinson et al.