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Krill oil a potential ocular anti-inflammatory

Presenters at the Natural Products Expo discussed the future role of omega-3 fatty acids, antioxidants, lutein, zeaxanthin and astaxanthin in treating inflammation and AMD.

Barbara Anan Kogan, OD

WASHINGTON – Here at the Natural Products East Expo, 20,000 health food industry representatives, including researchers, nutritionists, retailers, laboratory manufacturers and complementary and alternative health care practitioners, gathered to focus on nutritional and lifestyle supplements for 2006.

Krill oil provides omega-3s, antioxidants

Patients with arcus and Hollenhorst plaque resulting from elevated cholesterol and those suffering from ocular allergies may benefit from omega-3 fatty acids and antioxidants. Expo lecturer Fontini (Tina) Sampalis, MD, PhD, recommended Neptune's Krill Oil (NKO, Neptune Technologies and Bioressources, Quebec). Dr. Sampalis, vice president of research and development and business development at Neptune, explained to *Primary Care Optometry News* that clinical studies in Antarctica involving the big-eyed, shrimp-like aquatic crustacean, krill, show that its oil may effectively treat these secondary ophthalmic complications.



Krill: The oil from this crustacean contains EPA and DHA omega-3 fatty acids and antioxidants, including the recently discovered red-orange colored astaxanthin.

Image: Twinlab

"The krill extract is frozen immediately to avoid decomposition at -30 degrees C and put into a cold vacuum," she said. "It yields 4% when scientists are ready to extract NKO, which has no bonds broken and, therefore, has enhanced bioavailability."

This oil contains EPA and DHA omega-3 fatty acids and antioxidants, including the recently discovered red-orange colored astaxanthin. Dr. Sampalis envisions an eye health study with astaxanthin, zeaxanthin and lutein. "When the beta-carotene astaxanthin is combined with omega-3 fatty acid and phospholipid, it has a much more potent effect and bioavailability because it can cross the blood-brain barrier," she said.

NKO also contains small amounts of choline from the vitamin B complex, A and E, which is important in dissolving cholesterol.

In 2003, some Montreal physicians assessed NKO's effects on hyperlipidemia. They found that 1.0 g to 1.5 g of NKO daily significantly reduced cholesterol by 13%, low-density lipids by 32% and triglycerides by 11%, while increasing the high-density lipids

by 13%. The 90-day double-masked trial involved 120 men and women between 25 and 75 years of age with mildly to severely high blood cholesterol levels (Bunea 2004).

After 90 more days, a maintenance dose of 500 mg of NKO twice daily lowered total cholesterol levels by 19% from baseline. After 180 days of krill oil intake, the LDL was reduced by 44% and triglycerides by 25%, while the HDL was increased 33% from baseline. Cholesterol is regulated through NKO's abundance of phospholipids, particularly astaxanthin.

A Canadian NKO clinical trial by Western Ontario and McMaster Universities found that chronic inflammation, especially with osteoarthritis, rheumatoid arthritis and elevated C-reactive protein levels, was reduced by 30.9% in patients taking NKO. Ninety men and women received 300-mg capsules daily for 30 days.

According to Dr. Sampalis, this dosage strongly inhibits inflammation within as little as 7 to 14 days of treatment. "This

same mechanism of action of the immune system's response to pollens and allergy triggers has been effective in reducing inflamed, itchy eyes, and the NKO reduces interleukin I by 50% in a bioassay," said Dr. Sampalis, who anticipates an ocular clinical study.

Supplements for AMD

Ophthalmologist Robert Abel Jr., MD, discussed a University of Utah study that evaluated carotenoids and age-related macular degeneration. Researchers used a noninvasive spectroscopy method to quantify the levels of lutein and zeaxanthin in the maculas of 63 AMD and 138 normal patients.

Initially, lutein and zeaxanthin levels were 32% lower in AMD vs. normal eyes. Those subjects who took at least 4 mg daily of lutein returned to normal lutein levels in the macula while reducing AMD pathogenesis risk development (Bernstein 2002).

In the Lutein Antioxidant Supplementation Trial, 90 AMD patients received 10 mg of lutein, 10 mg of lutein plus a multivitamin/mineral supplement or the placebo (Richer 2004). After 4-, 8- and 12-month vision testing, those in the lutein or combined lutein and multivitamin/mineral supplement groups improved in macular pigment density, glare recovery, Snellen visual acuity (by 5.4 letters in group 1 and 3.5 letters in group 2) and contrast sensitivity function. "There is six times as much lutein in the eye as beta carotene," Dr. Abel emphasized.

Dr. Abel also cited a poster from the Association for Research in Vision and Ophthalmology 2005 meeting on the influence of lutein and docosahexaenoic acid (DHA) supplementation on serum levels and macular pigment. He stated that macular pigment density increased after 4 months of studying 50 healthy 60- to 80-year-old women taking 12 mg of lutein, 800 mg of DHA daily or both supplements together in this multicenter study (Snodderly 2005).

"I prefer the microalgae-derived DHA, which should be refrigerated and taken with meals for better absorption," Dr. Abel stressed.

He added that the Age-Related Eye Disease Study will continue with lutein, which was not commercially available during the original study. "I suggest ODs read the June 10, 2004, NEI's National Advisory Eye Council presentation by Dr. Emily Chew detailing this new pilot study and its goal to determine whether xanthophyll/omega-3 fatty acid supplementation will delay the progression of AMD," he told *Primary Care Optometry News*. (See www.nei.nih.gov/about/naec/061004.asp.)

Beginning AREDS II

"We were curious about lutein, from its benefits in a lot of the literature, and have designed a precursor study to 'the big one' – referring to the original AREDS – AREDS II," Emily Y. Chew, MD, National Eye Institute deputy director of epidemiology and clinical research, told *Primary Care Optometry News*. The NEI recruiting began July 14, 2005. The study will begin this summer and will conclude by July 2007.

Referring to her 2004 National Advisory Eye Council presentation, Dr. Chew said, "Our goal in this phase 1 pilot study is to prepare for a large-scale phase 3 randomized clinical trial to investigate whether oral supplementation with macular xanthophylls (lutein and zeaxanthin) and omega-3 long-chain polyunsaturated fatty acids will decrease the progression of AMD with dosages of 10 mg of lutein, 2 mg of zeaxanthin and 1 g of omega-3. This will change the plasma levels of lutein and zeaxanthin and identify whether xanthophylls appear in the macular pigment density."

About 50 clinical centers will enroll 4,000 AREDS category 3 and 4 AMD patients into four arms. The goal will be to determine which oral supplement with the xanthophylls lutein and zeaxanthin, the omega-3 fatty acids DHA and eicosapentaenoic acid (EPA), or the combination of the two will reduce the incidence of vision loss associated with advanced AMD.

For more information:

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- Recommend to your patients "Taking a Closer Look at Age-Related Macular Degeneration," a consumer brochure written by Dr. Kogan and available from the Alliance for Aging Research at www.agingresearch.org/bookshelf_details.cfm?id=20.

Suggested reading:

- AREDS research group report no. 9. A randomized, placebo-controlled, clinical trial of high-dose supplementation with vitamins C and E and beta-carotene for age-related cataracts and vision loss. *Arch Ophthalmol*. 2001;119(10):1439-1452.
- Bernstein PS, Zhao DY, Wintch SW, et al. Resonance Raman measurement of macular carotenoids in normal subjects in age-related macular degeneration patients. *Ophthalmol*. 2002;109(1):1780-1787.
- Bunea R, El Farrah K, Deutsch L. Evaluation of the effects of Neptune Krill Oil on the clinical course of hyperlipidemia. *Altern Med Rev*. 2004;9(4):420-428.
- Richer S, Stile W, Statkote L, et al. Double-masked placebo-controlled, randomized trial of lutein and antioxidant supplementation in the intervention of atrophic age-related macular degeneration. *Optom*. 2004;75(4):216-239.
- Snodderly DM, Chung HC, Caldarella SM, et al. The influence of supplemental lutein and docosahexaenoic acid on their serum levels and on macular pigment. *Invest Ophthalmol Vis Sci*. 2005;46(3):1766.