Aging and Nutrition in Modern Eye Care

(A joint symposium with the Vision in Aging SIG and the Nutrition, Disease Prevention and Wellness SIG)

ABSTRACT

Nutrition in eye care has become an integral part of modern eye care practice. Eye care practitioners increasingly make nutrition supplement recommendations for their older patients. There are many considerations unique to older adults with general and ocular nutrition needs along with relevant clinical information beyond AREDS.

OBJECTIVES

1. To review key general nutrition concepts related to the needs of aging adults.
2. To understand age-related factors in making nutritional supplement recommendations for older adults.
3. To better appreciate how nutrition effects disease prevention and wellness in aging adults.
4. To better understand what the AREDS studies have taught us about ocular nutrition.
5. To learn about the role that macular pigments have in the vision function of older adults.

OUTLINE

I. Introductions and welcome: John Kaminski
II. General nutrition and the older adults. Stuart Richer, OD, PhD, FAAO. (Director, Ocular Prevention Medicine at James Lovell Federal Health Facility)
   a. Integrative Ocular Medicine
      i. Primary care optometry
      ii. Therapeutic eye care
      iii. Principles of “Integrative Medicine”
      iv. How does this fit with optometry?
   b. Demographic info and morbidity/ mortality statistics
      i. United States
         1. Other countries
         2. Long lived populations – 40 x more people reach age 100 than in the US
         3. Multiple deficits with aging
      ii. Males vs. Females
      iii. Ethnic Differences
   c. Are the nutritional needs of older adults unique?
      i. Changes in absorption, metabolism and clearance
         1. Achlorhydria
         2. Disrupted microbiome
         3. H Pylori, C Diificille
         4. Polypharmacy
5. Dehydration
6. US food supply issues – high calorie malnutrition
   ii. Exercise
   iii. Sleep quality
   iv. Stress
   v. SunLight
d. Common disease prevention and wellness needs related to nutrition.
   i. Heroic Medicine
   ii. Aging and Chronic Disease, Managing Chronic Degeneration – failure
      1. Expensive and doesn’t work against statistics (see above)
      2. Day to Day Medicine,
      3. Primary Care
      4. Problematic specialties
e. The role of oxidative stress, inflammation and immune dysregulation

III. Ocular nutrition and the older adult. Emily Chew, MD (Ophthalmologist and Deputy director for Division of Epidemiology and Clinical Applications, Deputy Clinical Director at the NEI).
   a. Epidemiologic studies of nutrition and ocular health suggesting the importance of lutein/zeaxanthin and omega-3 long-chain polyunsaturated fatty acids (LCPUFAs) will be discussed, including the following studies:
      i. The National Health And Nutrition and Examination (1988)
      ii. Population-based studies
      iii. Other longitudinal studies
      iv. Case-control studies
   b. Update on the Age-Related Eye Disease Study (AREDS) and AREDS2:
      i. The design and rationale for the AREDS of the clinical trial (1992-2001) and the epidemiologic study (2001-2005)
      ii. The results of the 2 X 2 factorial design of the randomized clinical trial of antioxidant vitamins C (500 mg), E (400 international units), beta-carotene (15 mg) and zinc (80 mg as zinc oxide) and copper (2 mg as cupric oxide)
      iii. The combination of antioxidant vitamins and minerals reduced the risk of progressing to late AMD by 25% in 5 years.
      iv. The results of the nested case-control study within AREDS demonstrated the importance of lutein/zeaxanthin and omega-3 long-chain polyunsaturated fatty acids (LCPUFAs) in the development of various stages of AMD
      v. The rationale and design of the AREDS2-the randomized trial that tested adding lutein (10 mg) and zeaxanthin (2 mg) and/or omega-3LCPUFAs to the original AREDS supplement
      vi. AREDS2 conducted secondary randomization to refine the AREDS supplement further by testing the elimination of beta-carotene and reducing the dose of zinc to 25 mg.
vii. The Results of AREDS2 showed that omega-3 LCPUFAs were neither beneficial nor harmful and lutein/zeaxanthin reduced the risk of progression to late AMD in those with the lowest dietary intake of lutein/zeaxanthin by 25%.

viii. Beta-carotene increased the risk of lung cancer by 2 fold and 90% of these were former smokers.

ix. There was not sufficient power in the study to conclude that high zinc and low zinc were similar in their effect but there were no differences in adverse effects between the two doses.

x. The AREDS2 supplement consisting of vitamins C (500 mg), E (400 IU), lutein (10 mg), zeaxanthin (2 mg) and zinc (80 mg), and copper (2 mg) is recommended to persons with intermediate AMD (bilateral large drusen) and late AMD.

c. Address nutritional recommendations for age-related macular degeneration (and Cataracts)
   i. The B vitamins were tested for their effects on cardiovascular disease and their secondary effects on AMD.
   ii. AREDS and AREDS2 were also tested for their effects on cataract and cataract surgery.

d. Discuss genetic testing in therapies for age-related macular degeneration.
   i. Genetic testing has been evaluated for the interaction or the influence of genetic variants on the response to therapies of AMD, including anti-vascular endothelial growth factor (VEGF) agents (Avastin, Lucentis, Eyelea) for the treatment of neovascular AMD and the AREDS supplements for intermediate AMD or late AMD in one eye.
   ii. Various genetic variants were found in numerous studies to have an interaction with the response to treatment with anti-VEGF therapies but none of these variants had been replicated in other studies.
   iii. Results from a study that suggested an interaction existed between CFH alleles and the response to treatment with zinc in the AREDS supplement. These study results could not be replicated. The American Academy of Ophthalmology recommends avoid genetic testing for AMD prior to treatment with AREDS supplements.

IV. Beyond the AREDS, macular pigment considerations for older adults—Billy Hammond PhD at University of Georgia.
   a. Effects of light screening by the macular pigments on glare, photostress recovery and chromatic contrast.
      i. Measuring glare, PS recovery and chromatic contrast using ecologically valid stimuli.
      ii. Visual effects of increasing macular pigment density through supplementation.
   b. Macular pigment effects on photo-oxidative stress.
      i. The blue-light hazard function.
ii. The effects of other light-absorbing intraocular filters (e.g., blue-filtering intraocular implants)
c. Macular pigment relations to visual-motor and temporal processing
   i. Measurement techniques for measuring dynamic aspects of visual function
   ii. Applications to sports performance
d. Macular pigment effects on the maturation of the visual system
   i. Major milestones in visual development
   ii. The macular carotenoids in breastmilk and infant formula (preliminary results)
e. Neuroimaging studies on the effects of lutein/zeaxanthin on brain function
   i. Effects of lutein/zeaxanthin supplementation on EEG and fMRI data
   ii. B. Effects of lutein/zeaxanthin supplementation on cognition