

Macular Carotenoids: Effects in the Eye and Beyond

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Course Description: Learn about the importance of ocular nutrition through level 1 studies and how enriching macular pigment can improve visual performance including visual-motor skills, latent inhibition, and cognition. Also, how a fortified macular pigment can protect against oxidative stress, one of the leading causes of age-related macular degeneration.

Learning Objectives:

1. How everyone benefits from a diet rich in carotenoids, and which carotenoids are important for vision.
2. The importance of prevention and patient education as part of ocular and visual health.
3. How today's electronic use can cause cumulative oxidative damage and the effects on macular pigment
4. The correlation of MPOD as it related to neural function, cognitive performance and disease such as Alzheimer's disease

Course Outline:

Macular carotenoids

- i. Lutein, zeaxanthin, meso-zeaxanthin
- ii. Dietary sources
 - a. Leafy-green vegetables, other food sources
 - b. Supplementation
 - i. Efficiency of absorption?
- iii. Biochemistry of macular carotenoids
 - a. Antioxidant capacity
 - i. Xanthophyll carotenoid triplet excitation transfer
- iv. Location of deposition in the body
 - a. Macular concentration
 - b. Brain regions where macular carotenoids are deposited
 - i. Frontal, temporal, occipital lobes
 - ii. Hippocampus

Aspects of visual performance shown to benefit from macular carotenoids

- i. Visual performance in bright light (glare)
 - a. Visual discomfort

- b. Photostress recovery
 - c. Disability glare
- ii. Temporal vision
 - a. Critical flicker fusion
 - b. Coincidence anticipation
- iii. Contrast sensitivity
 - a. Lateral inhibition
- iv. Lutein, zeaxanthin, meso-zeaxanthin continuity

Broad implications to clinical practice

- i. Discuss macular pigment as a biomarker for other disease and cognitive performance
 - a. Dementia, Alzheimer's disease
 - b. Cognitive function
- ii. Discuss fact that we are living longer and nutrients in our diet are not sufficient to sustain graceful aging without some nutritional "help"
- iii. Discuss role as a primary health care provider and role in looking at the central nervous system every day. This puts the eye care provider in a unique role to detect disease long before a primary care physician may either see the patient or uncover disease symptoms.
 - a. Role of Optometry as a primary care provider
 - i. Prevention is key to successful patient management and reduced legal liability
- iv. Discuss the manifold benefits of macular carotenoids
 - a. Not only ocular health / performance, but also systemic and brain health
- v. Potential for macular densitometry in your practice
 - a. Implications of adding this technology into a practice on patient flow and staff resources
- vi. Review with patients benefits to vision today while protecting macular health later in life
- vii. When appropriate make definitive recommendation to supplement patients...do not give them the option!
 - a. This will significantly improve patient acceptance and compliance.
 - b. Be prescriptive. Prescribing macular supplements that can enhance visual performance and reduce oxidative stress over a lifetime can be considered important to your patients' overall eye health, no different than prescribing lenses or contact lenses to correct vision.
 - c. To be successful macular supplementation cannot be seen simply as another "vitamin"

- viii. Reinforce importance for vision and eye health throughout the lifespan, but also reinforce the positive impact changes in lifestyle choices will have on eye health and overall health.
- ix. You can play a meaningful role in reducing diabetes, cancer, hypertension, cholesterol levels, and more.
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 - a. Dementia, Alzheimer's disease
 - b. iii. Cognitive function
- xi. Discuss fact that we are living longer and nutrients in our diet are not sufficient to sustain graceful aging without some nutritional "help"
- xii. Discuss role as a primary health care provider and role in looking at the central nervous system every day. This puts the eye care provider in a unique role to detect disease long before a primary care physician may either see the patient or uncover disease symptoms.
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Plausible mechanisms for macular carotenoids to improve visual performance

- iii. Optical factors
 - 1. Absorption of short-wavelength light
- iv. Neural factors
 - 1. Neural "efficiency"
 - a. Enhanced gap junction communication
- v. Metabolic factors
 - 1. Enhance visual cycle
 - 2. Increase signal-to-noise ratio of neural circuitry serving center-surround receptive fields