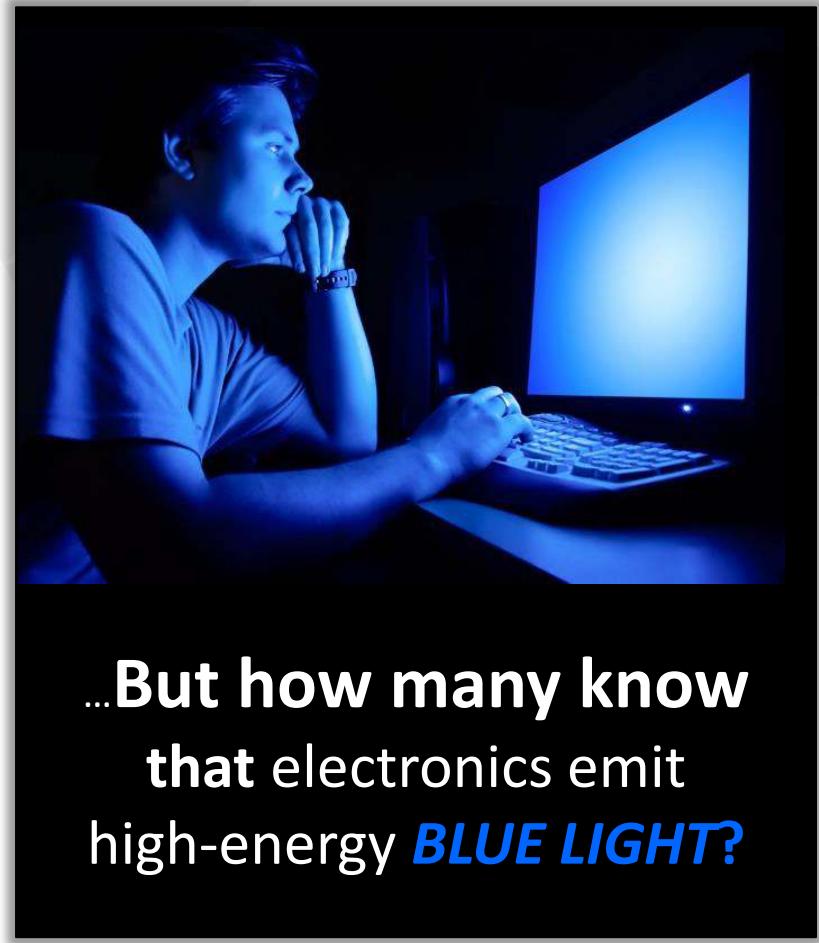




The Critical Role of Macular Carotenoids in the Age of Increasing High-Energy **Blue Light** Exposure

Vijay Rane, OmniActive Health Technologies
August 2016

Consumers are aware of the damaging effects of sunlight and protect themselves...



...But how many know
that electronics emit
high-energy **BLUE LIGHT?**

The Vision Council reports on digital eye strain, 2012.
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By 2020

90%

of indoor lighting expected to be
LED/CFL—sources of high-energy
BLUE LIGHT

The Lowdown on Blue Light: Good vs. Bad, and Its Connection to AMD. Rev of Opt. 2014;
http://www.reviewofoptometry.com/continuing_education/tabcviewtest/lessonid/109744/

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TV and/or videos

- 29% of infants 1 ½ hours¹
- 64% of babies 2 hours¹

TV screen media daily

- 7 hours daily consumption 8-18 years old²

Computers

- 91% of children use one³

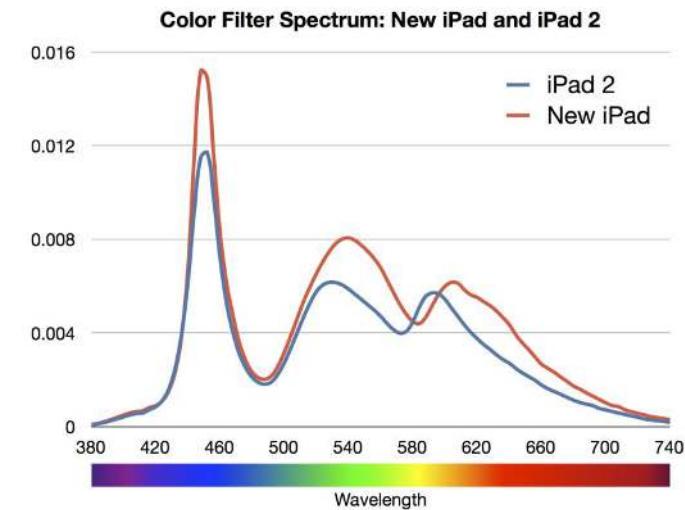
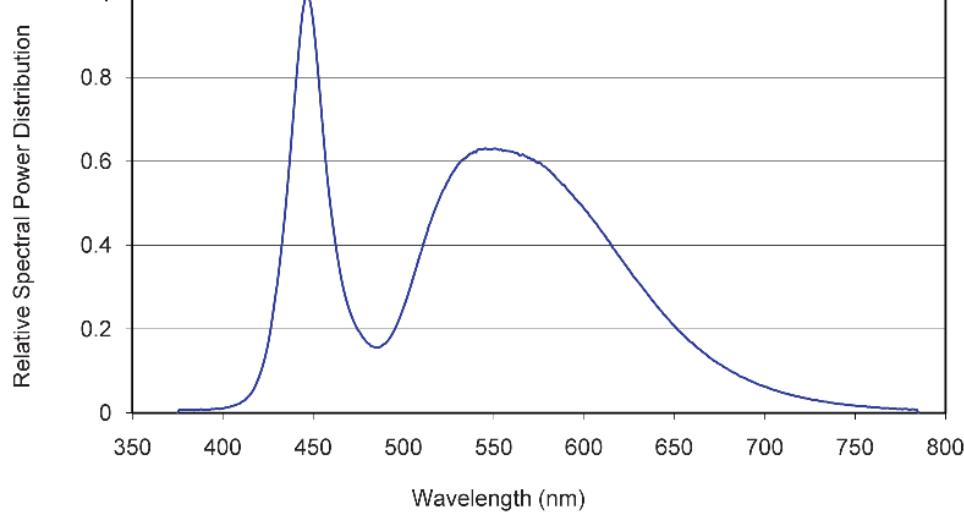
Adults spend on average 9.5 hours in front of a screen

1. Rideout, V. (2011). Zero to eight: Children's Media Use. Available at: <http://www.nielsen.com/us/en/insights/reports/487/zero-to-eight-childrens-media-use.html>

2. Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). Generation M2: Media in the Lives of 8- to 18-Year-Olds. Menlo Park, CA: Kaiser Family Foundation.

3. National Center for Education Statistics 2006.

“Blue spikes” are common from electronic devices and LED lighting

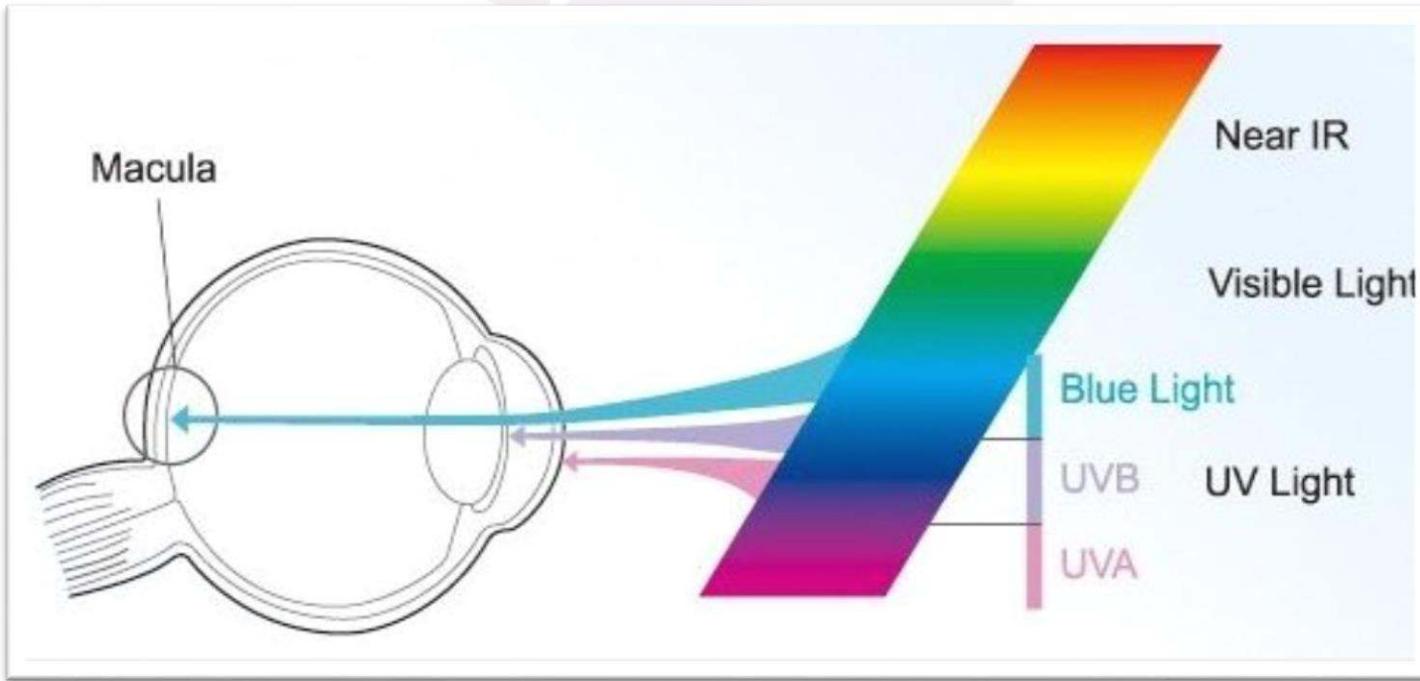


Even though it appears white (or “warm white” as in the case of LED lighting), electronic devices are characterized by an intense high-energy **BLUE LIGHT** component

Jaadane I, Boulenguez P, Chahory S, Carré S, Savoldelli M, Jonet L, Behar-Cohen F, Martinsons C, Torriglia A. Free Radic Biol Med. 2015; 84: 373-84.

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High-energy **BLUE LIGHT** penetrates deeper into eye



Most damaging wavelengths of blue light can be as low as 415 nm to as high as 500 nm^{1,2}

1. Smick K et al. Blue light hazard: New knowledge, new approaches to maintaining ocular health. Report of a roundtable sponsored by Essilor of America. March 16, 2013, NYC, NY.

2. Environmental Health Perspectives. 2014; 122(3), A81.

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High-energy **BLUE LIGHT** exposure: An emerging risk factor for visual health and eye fatigue

Short-term Exposure	Long-term Exposure
Eye strain, visual fatigue, headaches	Progressive loss of visual function



Photo-cellular changes occur in as little as 3 hours¹

Damage to the photoreceptor layer in as little as 18 hours²

Retinal damage and apoptosis (cell death) in as little as 9 days³

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1. Yoshiki K., et al. Damage of photoreceptor-derived cells in culture induced by light emitting diode-derived blue light. *Sci Rep.* 2014; 4: 5223. Published online 2014 Jun 9.

2. Environmental Health Perspectives. 2014; 122(3), A81.

3. Jaadane I, et.al. Free Radic Biol Med. 2015; 84: 373-84.

Our eyes are bombarded with high-energy **BLUE LIGHT** daily...

...but lutein and zeaxanthin isomers support our eyes by:

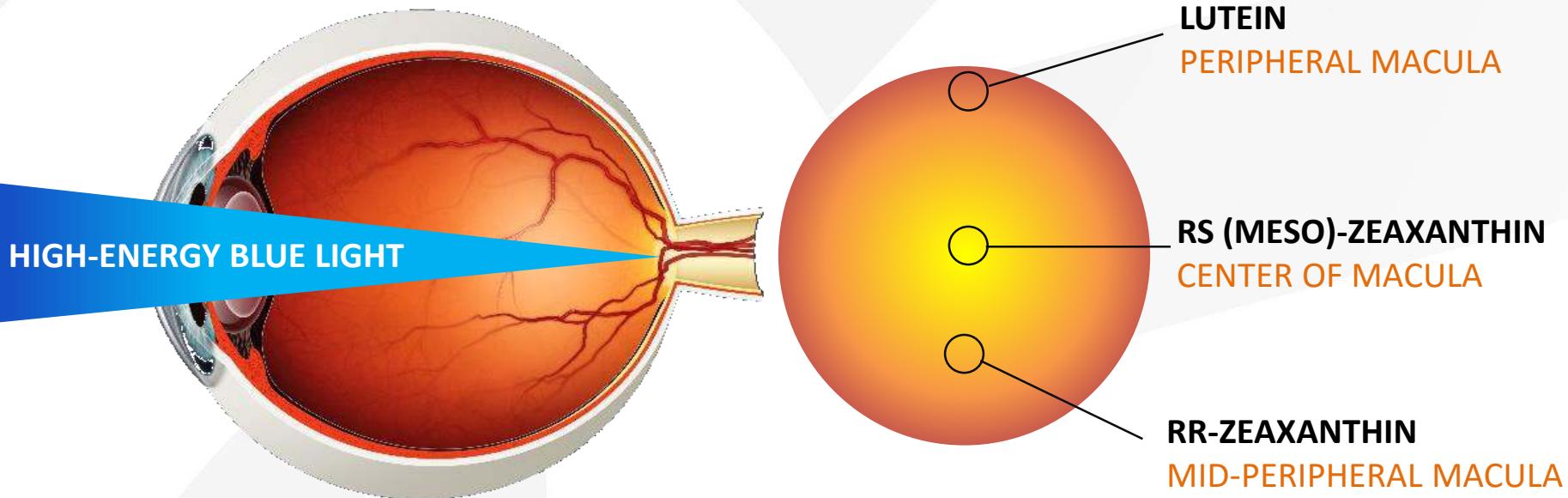
- Filtering high-energy **BLUE LIGHT**
- Protect against oxidative stress



D Max Snodderly. Am J Clin Nutr. 1995; 62 (suppl): 1448S-61S; Bone RA, et al. Exp Eye Res. 1997; 64: 211-218; Beatty S et al. Br J Ophthalmol. 1999; 83: 867-77; Olmedilla et al., 2003; Stringham et al., 2008; Renzi et al.

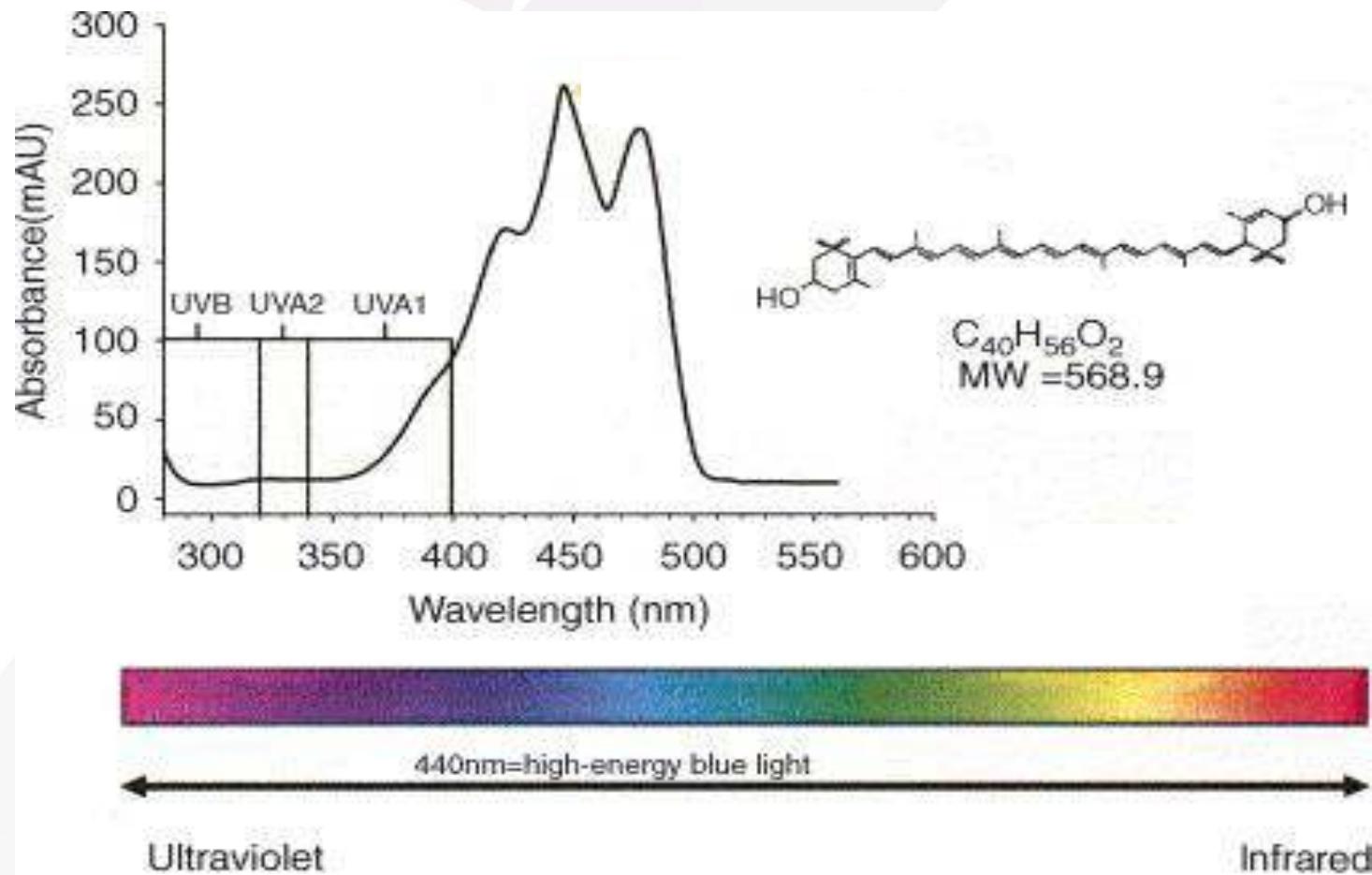
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Lutein, RR-zeaxanthin and RS-zeaxanthin—key macular carotenoids



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Lutein and Zeaxanthin broaden wavelength absorbency of high energy blue light



D Max Snodderly. Am J Clin Nutr. 1995; 62 (suppl): 1448S-61S; Bone RA, et al. Exp Eye Res. 1997; 64: 211-218; Beatty S et al. Br J Ophthalmol. 1999; 83: 867-77
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LAMA I

Lutemax 2020 and MPOD: Advanced support for healthy eyes

LAMA I: Lutein, Vision and Mental Acuity I

- **Characterize response dynamics in blood and retina of macular carotenoids versus placebo**
- **Supplementation effects**
 - Psychological stress and overall health status
 - Oxidative stress
 - Inflammation
- **RDBPC 12 week intervention trial (N=28)**
 - Placebo (n = 5)
 - L 6 mg, Zi 1.2 mg (n = 7)
 - L 10 mg, Zi 2 mg (n = 8)
 - L 20 mg, Zi 4 mg (n = 8)

LAMA I study summary - rapid retinal response at all doses with Lutemax 2020

- Significant dose-dependent serum response
- Readily bioavailable, robust retinal response
- Significant ↑ MPOD
 - after 8 wks: 10- and 20-mg vs placebo
 - after 12 wks: 6mg vs placebo (faster than 10mg in other studies)
- Smooths out central dip (↑ central macular pigment)

X

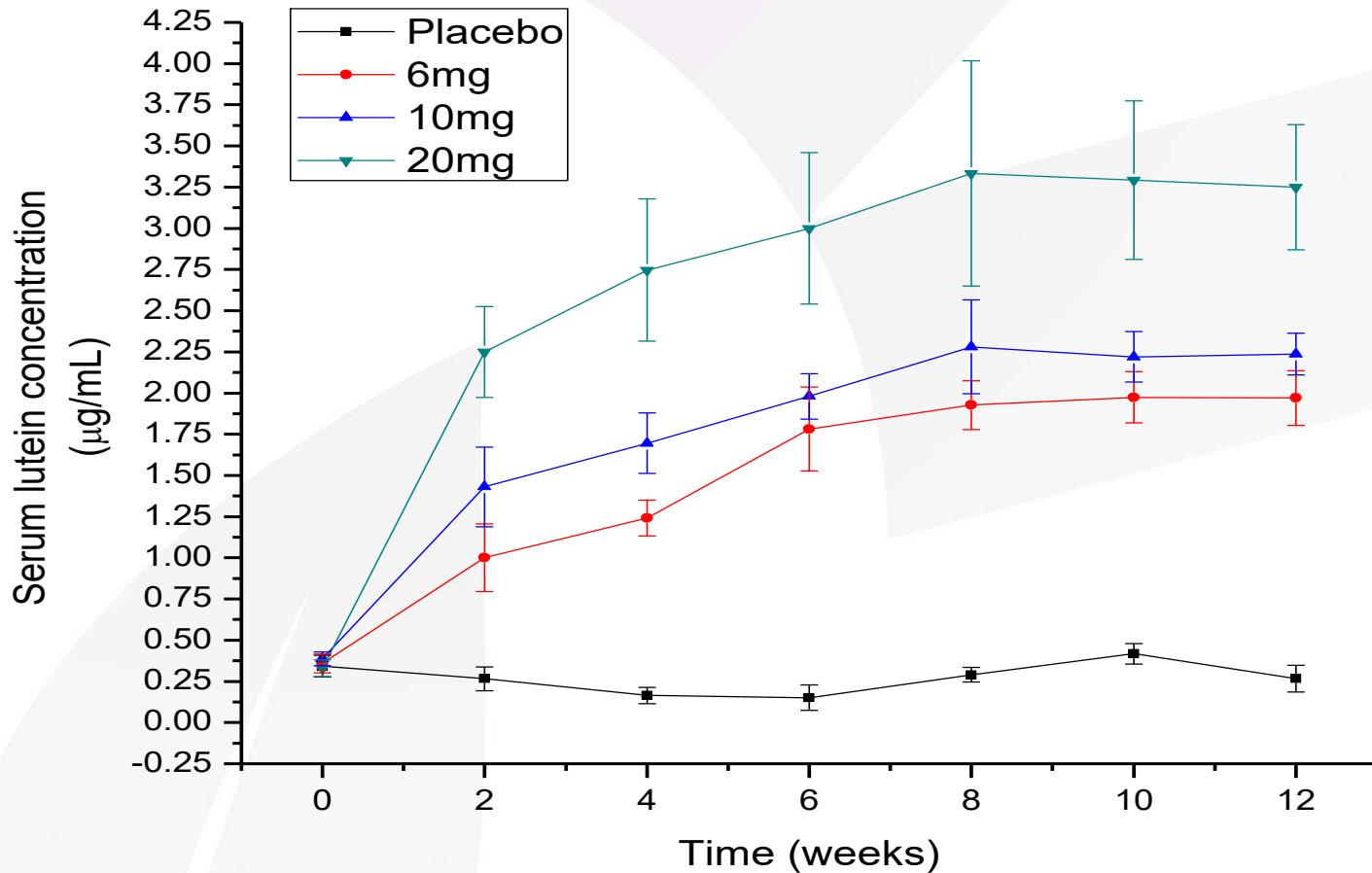
MCC 2015

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Significant dose-dependent serum response for Lutein

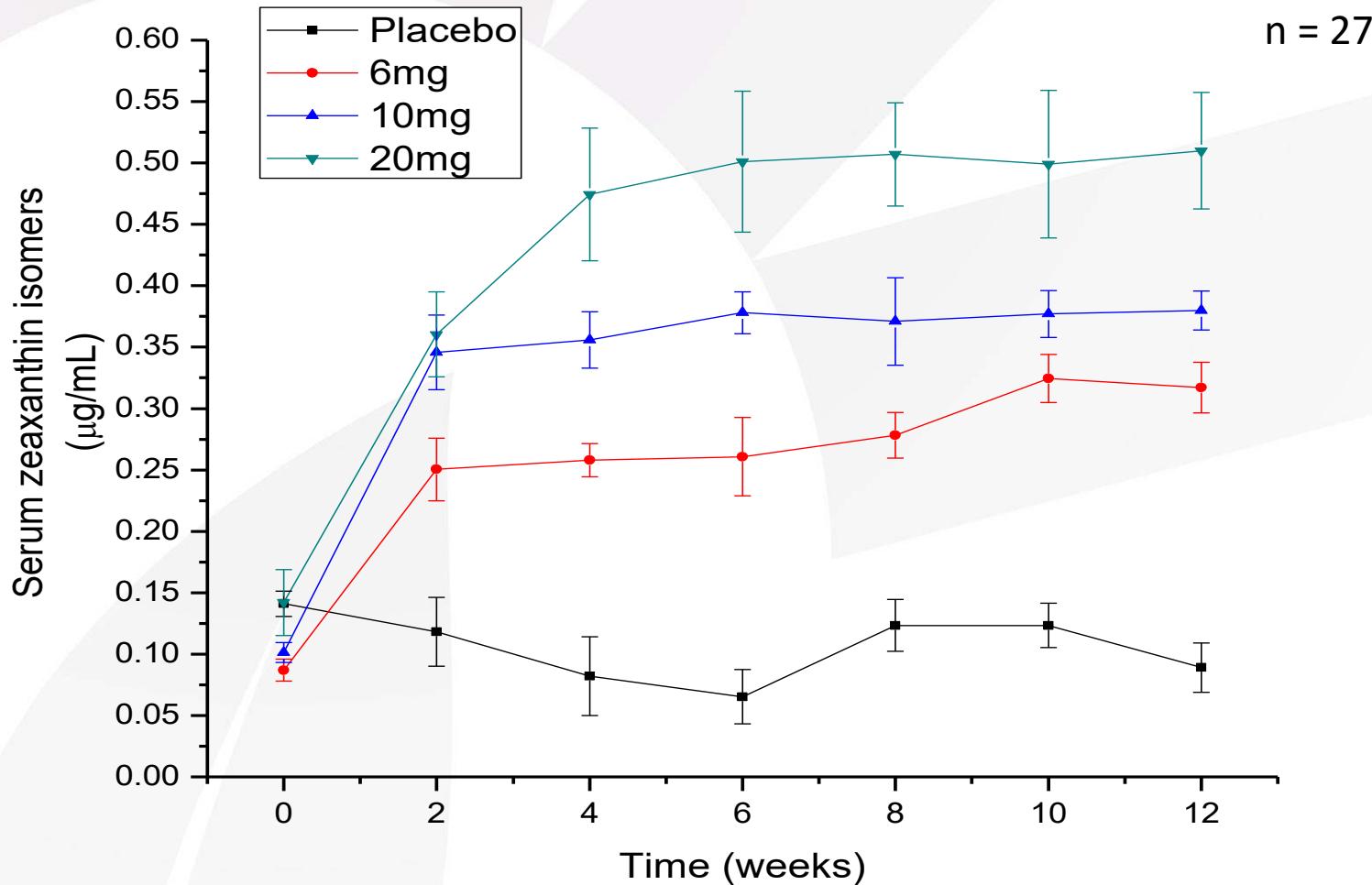
n = 27



MCC 2015

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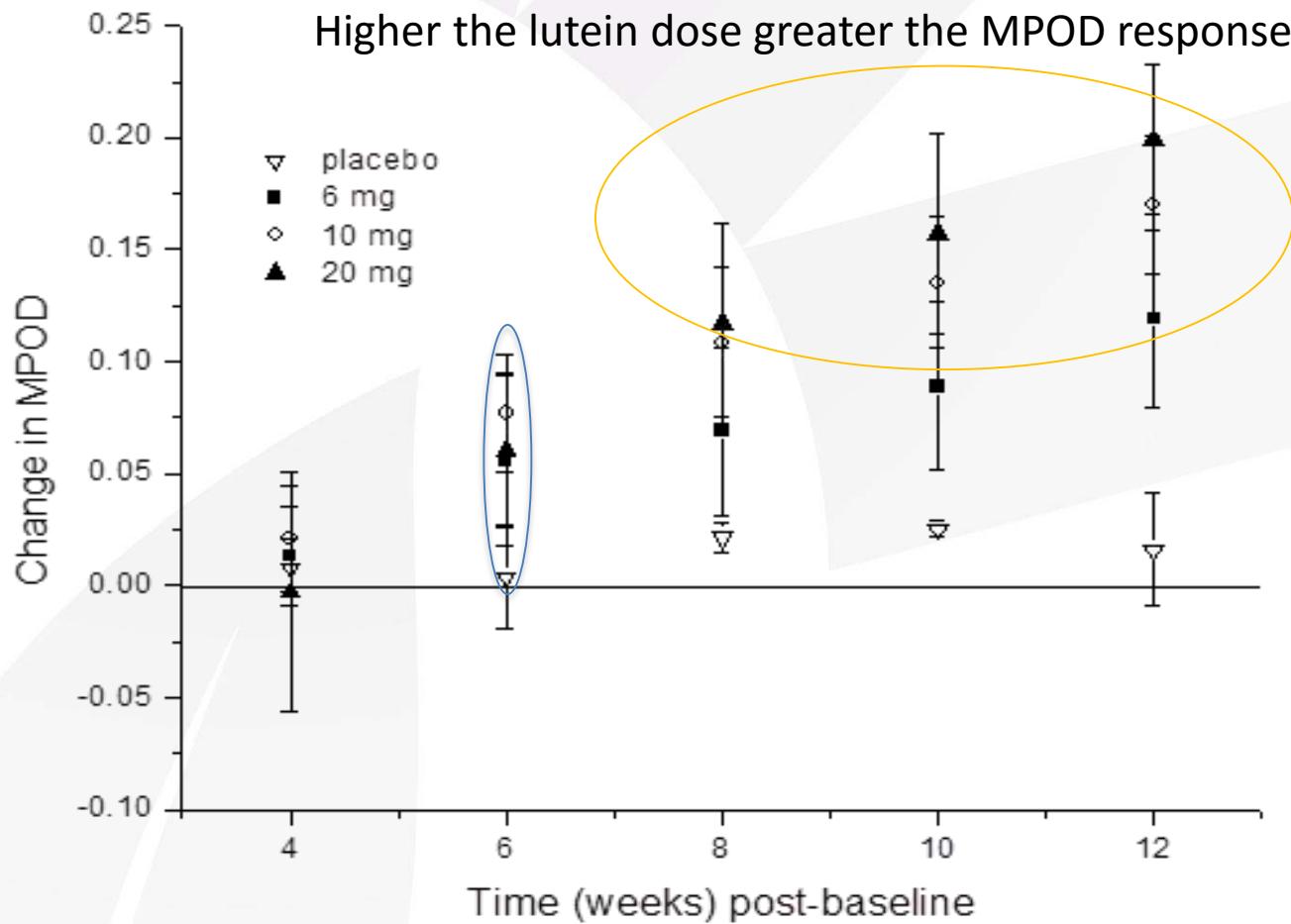
Significant dose-dependent serum response for Total Zeaxanthin



MCC 2015

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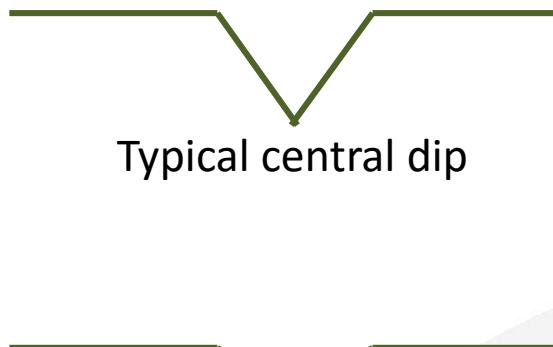
Lutemax 2020 supplementation significantly ↑ MPOD at all doses vs placebo



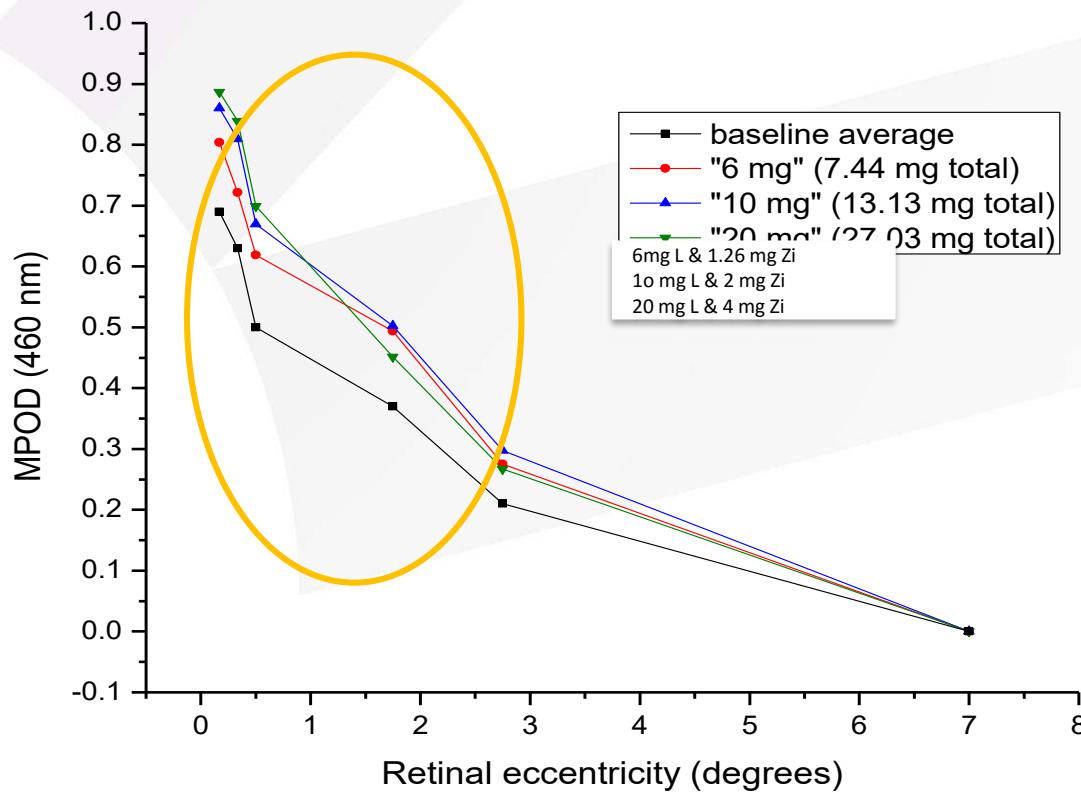
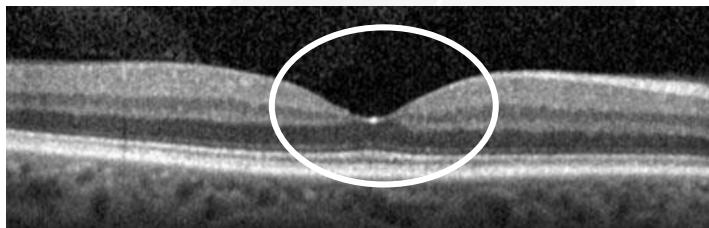
MCC 2015

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Improved spatial profile of MPOD at 12 weeks with Lutemax 2020



Increased central macular pigment smooths out dip



<http://www.gaeyeinstitute.com/vitreoretinal-surgery/>
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MCC 2015

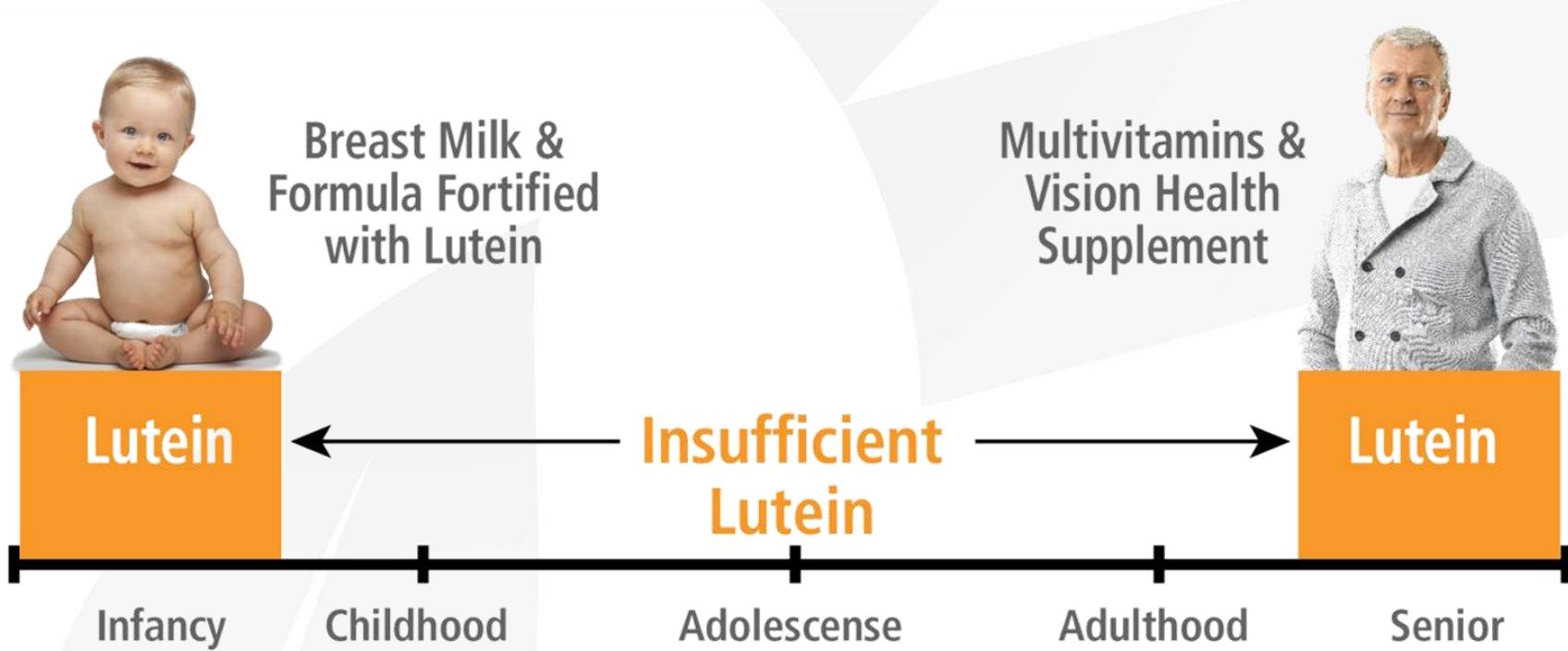
Is dietary intake sufficient to support eye health?



Fisher 2009; Burke 2009; Fisher 2009; Pascucci 2010; Massaki 2010; Rock 2011

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↑ blue light exposure + ↓ dietary intake = a need to for Lutemax 2020 for all age groups



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Macular carotenoids for your digital lifestyle

- Exposure to high-energy blue light is a growing concern
- Use of digital devices/ energy efficient lighting leads to eye strain/visual fatigue
- Cumulative effects lead to progressive loss of visual function
- All three macular carotenoids act as natural blue light filters and provide broader protection to high-energy blue light



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Award-winning Lutemax 2020: Complete eye health for your digital lifestyle

- Lutemax 2020 provides all three macular carotenoids in a 5:1 ratio as found in nature
- Manufactured under a fully vertically integrated supply chain
- FDA-accepted GRAS notification
- Proven faster retinal response and increased MPOD for quicker protection from high-energy blue light



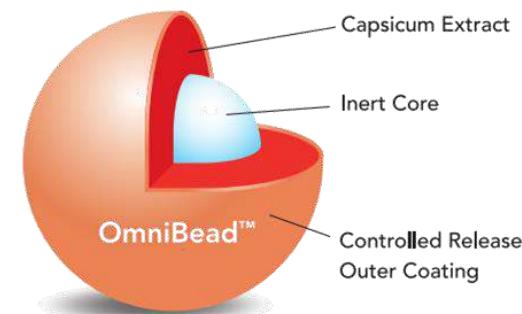
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Capsimax & **CurcuWIN**

Key points on formulation and science

The Capsimax Difference

- For consumers looking to mobilize more energy to support their active lifestyle
- Clean, science-backed, food-source ingredients containing actives shown efficacious in over 90 clinical studies
- Delivers effective levels of capsaicinoids without oral and gastric burning sensation of unprotected red hot peppers
- 2 mg capsaicinoids from Capsimax:
 - Supports lipolysis—the mobilization of fats—for energy production
 - Helps control appetite
 - Helps promote thermogenesis
- Flexibility in variety of formulas – tablets, capsules, protein/meal replacement powders and beverage powders



For representative purposes only

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Set your brand apart with CurcuWIN in the vast curcumin market

- Long history in curcumin
- 46-times greater relative absorption than standard curcumin
- Increased BA compared to other enhanced forms
- Long-lasting action
- Robust human clinical program
 - Lower dose in healthy population for claims substantiation
 - Once daily



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Thank you

For more information, please visit us at

www.omniactives.com