



The Importance of Triple Carotenoid Therapy

BY MICHAEL TOLENTINO, MD



WHAT IS MACULAR DEGENERATION?

Around the world, macular degeneration is a leading cause of vision

loss and blindness affecting millions of people.¹ Macular degeneration is a medical condition affecting the center of the visual field and occurs the more we age.² As vision is blurred or lost, this condition takes away a person's ability to identify faces, read, drive, and eventually, their independence. It truly affects their quality of life. Because macular degeneration is mostly an age-related condition, the number of people it will affect grows exponentially due to the aging population. In other cases, macular degeneration can affect younger generations through exposure to high-energy visible light from our smartphones, tablets, and TVs. When you compound these two factors, the problem is critical and will be much worse in the future.

Today, we understand macular degeneration much better than before due to clinical trials and basic molecular understanding of its pathogenesis.³ One of the largest factors outside of genetics, smoking, and age is an imbalance between our ability to protect against oxidation.⁴ In general terms, oxidation is rust caused by time, exposure to the elements, and decay. The eye is no different. When we

understand that macular degeneration is an oxidative process, we can understand its counterbalance. The counterbalance within the eye is the innate, potent antioxidant called macular pigment, which is found in the foveal and juxtafoveal regions. Research has discovered that macular pigment is made up of three important carotenoids.

CAROTENIDS AND MACUHEALTH

Carotenoids are a pigment designed by nature to protect against light damage and oxidative (rusting) stress. There are more than 700 carotenoids found in nature.⁵ Fifty are found in our daily diet, 21 are found in our serum, and only three are found in our macula.⁵ These three carotenoids are meso-zeaxanthin, lutein, and zeaxanthin; they are the most potent antioxidants that can localize to the macula.⁶ This is extremely important because the macula, which provides us with central vision, is the most metabolically active structure in our body. As a result, there is a great deal of oxidative stress focused directly in the form of high-energy visible blue light directly on the macula. Furthermore, the high-energy visible light—blue light from mobile devices, sunlight, and high-definition screens—is a photooxidant aimed and amplified about 16-fold by our cornea and IOL straight toward our fovea. We need to



Figure. MacuHealth carotenoid dietary supplement.

have a strong antioxidant to protect our macula and to counterbalance this intense oxidative process. The discovery of the three carotenoids that make up macular pigment and the purification of these carotenoids from organically-grown marigold flowers has given us a potent oral supplement, MacuHealth (MacuHealth), that can help regulate macular pigment and enhance the macula's innate antioxidant (Figure).

MacuHealth is a triple carotenoid formulation that accumulates in the macula no matter the age of the patient. The more of these three powerful carotenoids we can accumulate in the macula, the stronger protection we have from oxidative stress—especially from high-energy visible blue light as well

as retinal photoreceptor metabolism. One of the problems today is that many of us do not eat enough green, leafy vegetables. It is for this reason I recommend, to both young and old patients, to undergo MacuHealth; it is the only commercial formulation available that contains all three critical carotenoids, which are required to uniformly up-regulate the macular pigment, especially through the fovea.

HOW CAN YOU PREVENT MACULAR DEGENERATION?

Macular degeneration is one of the most common genetic diseases. If you have a parent who lost vision from macular degeneration, then your chances of developing the disease are approximately 50%. If both parents developed macular degeneration, then you are almost guaranteed to develop it yourself.⁷ In this kind of scenario early intervention can help immensely. Starting triple carotenoid therapy is a great first step toward protecting your central vision and helping deter the onset of macular degeneration no matter what age. Starting young is best of course, but there is no age that is not worthwhile in protecting your vision. The way you protect your vision can be summarized by two important actions. The first is by using melanin pigment impregnated blue light-filtering lenses, such as TrueBlue glasses (TrueBlue Vision), to externally protect your eyes from high-energy visible light. The second is to internally protect the macula by undergoing triple carotenoid therapy.

HOW TRIPLE CAROTENOID THERAPY CAN IMPROVE YOUR VISION

An interesting, and positive, side effect of triple carotenoid therapy with MacuHealth is that it improves visual performance and vision.⁸ I see many patients who have macular degeneration. Because this disease targets the central vision, these patients have trouble driving. Many of them fail the vision part of their driver's license test. What I do for these patients, especially those with a borderline

driving VA of 20/60 to 20/80, is to start them on triple carotenoid therapy. I have found, and research has shown, that most patients improve their vision by up to 50%.⁹ I prescribe them MacuHealth with a suggested dose of two to three pills per day, and I instruct them to wear TrueBlue glasses. With this combination therapy, patients on the cusp of losing their license because of low vision will score a VA of 20/30 or 20/50, which allows them to continue driving legally.

ANTI-VEGF INJECTION SYNERGY

The development of anti-VEGF therapy has made wet macular degeneration, a once inevitably blinding disease, a treatable disease preserving vision in millions of elderly patients.¹⁰ Oxidation is the most important stimulator of VEGF production in macular degeneration. Combining the antioxidative properties of triple carotenoid therapy with intravitreal anti-VEGF injections potentiates the effect of the injections and reduces VEGF production while the anti-VEGF injection eliminates the existing VEGF.¹¹ Furthermore, the addition of triple carotenoid therapy enhances the visual quality and performance, which in turn enhances subjective visual improvement and patient compliance to the anti-VEGF injection regimen.¹² In my clinic, I have been able to increase the interval between injections while maintaining a VA gain from anti-VEGF injections in many of my patients. I have also been able to enhance the effect of anti-VEGF injections by eliminating pigment epithelial detachments or persistent subretinal fluid in patients who have suboptimally responded to anti-VEGF injections with the addition of a high dose of triple carotenoid therapy. To quantify this benefit, prospective clinical trials should be performed.

CONCLUSION

Addressing the oxidative stress that your eyes will endure is of great importance to your health and independence. MacuHealth accomplishes this with naturally-derived nontoxic substances, which enhance the macula's

WATCH IT NOW Reducing Oxidative Stress on the Macula



→ EYETU.BE/BDMIL

natural protectant. I strive to help my patients continue to live as healthy and independent a life as possible by enhancing their vision and potentiating the medical treatments that preserve their vision. ■

1. American Macular Degeneration Foundation. What is macular degeneration? <https://www.macular.org/what-macular-degeneration>. Accessed March 11, 2019.
2. National Eye Institute. Facts about age-related macular degeneration. https://nei.nih.gov/health/maculardegen/armd_facts. Accessed March 11, 2019.
3. Chew EY, Clemons TE, SanGiovanni JP, et al. Lutein, zeaxanthin and omega-3 fatty acids for age-related macular degeneration: the Age-Related Eye Disease Study 2 (AREDS2) randomized clinical trial. *JAMA*. 2013;309(19):2005-2015.
4. Lambert NG, ElShelmani H, Singh MK, et al. Risk factors and biomarkers of age-related macular degeneration. *Prog Retin Eye Res*. 2016;54:64-102.
5. Fiedor J, Burda K. Potential role of carotenoids as antioxidants in human health and disease. *Nutrients*. 2014;6(2):466-488.
6. Conrady CD, Bell JP, Besch BM, et al. Correlations between macular, skin, and serum carotenoids. *Invest Ophthalmol Vis Sci*. 2017;58(9):3616-3627.
7. Shahid Y, Khan JC, Cipriani V, et al. Age-related macular degeneration: the importance of family history as a risk factor. *Br J Ophthalmol*. 2012;96(3):427-431.
8. Nolan JM, Power R, Stringham J, et al. Enrichment of macular pigment enhances contrast sensitivity in subjects free of retinal disease: central retinal enrichment supplementation trials — report 1. *Invest Ophthalmol Vis Sci*. 2016;57:3429-3439.
9. Tolentino M, Paez M, Deupree D. Case study: utilizing high-dose carotenoid supplementation to treat early exudative AMD without anti-VEGF injections. *Optometric Management*. <https://www.optometricmanagement.com/newsletters/nutritional-insights-for-clinical-practice/january-2018>. Accessed March 11, 2019.
10. Ba J, Peng RS, Xu D, et al. Intravitreal anti-VEGF injections for treating wet age-related macular degeneration: a systematic review and meta-analysis. *Drug Des Devel Ther*. 2015;9:5397-5405.
11. Kuroki M, Voest EE, Amano S, et al. Reactive oxygen intermediates increase vascular endothelial growth factor expression in vitro and in vivo. *J Clin Invest*. 1996;98(7):1667-1675.
12. Crosby-Nwaobi R, Hykin P, Peto T, et al. An exploratory study evaluating the effects of macular carotenoid supplementation in various retinal diseases. *Clin Ophthalmol*. 2016;10:835-844.

Michael Tolentino, MD

- Vitreoretinal Specialist and Surgeon, Vision Integrated Partners/The Macula Center, Clearwater, DelRay Beach, Lakeland, Lake Worth, The Villages, Wellington, West Palm Beach, Florida
- mtolent88@me.com
- Financial disclosure: Equity (Aviceda Pharmaceuticals, Panther Pharmaceuticals, Vision Integrated Partner); Research grants and speaker support (Alcon, Apellis, Bausch + Lomb, Bayer, Genentech/Roche, Ionis, MacuHealth, Novartis, Promedior, Regeneron, TrueBlue Vision)