

Optimizing Retinal Health & Function: Primary Eye Care's Essential Role



Mihir Parikh, MD, Moderator
NVISION Eye Centers
San Diego, CA



Kerry Gelb, OD
Contact Lens & Vision
Woodbridge, NJ



James M. Stringham, PhD
Duke Eye Center
Durham, NC



John Nolan, PhD
Nutrition Research Centre Ireland
Waterford Institute of Technology
Waterford, Ireland



Dear Colleagues,

Our central retinal health represents the central 18 degrees of our visual fields; it is pivotal to our visual experience. If the macula is not functioning optimally, it significantly affects our quality of vision. This can lead to a lack of visual sharpness, increased visual distortion and an overall decrease in day and sometimes night vision. Patients experiencing these symptoms can become unhappy and dissatisfied as a result.

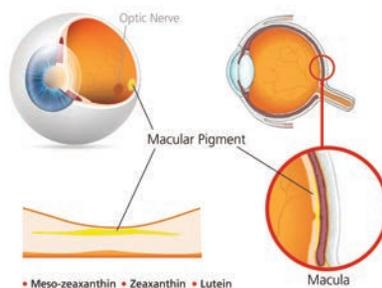
We also know that, as we grow older, our macula continues to age as well. The risk of age-related diseases such as macular degeneration increases in the later years of life. Since retinal damage can be permanent, it's extremely important to evaluate patients' retinal health regularly. Beyond routine examinations, we should be implementing preventive strategies, just as we do with the cornea and tear film, to support the retina and safeguard our patients' visual systems.

Statistics show that age-related macular degeneration (AMD) is considered to be a leading cause of irreversible blindness in older US adults and the third leading cause of irreversible blindness worldwide.^{1,2} So, as an increasing senior population heads for its golden years, retinal assessment is only going to become more critical.

One major barrier to maintaining patients' retinal health is the fact that 78 percent of AMD patients reportedly do not seek treatment until their vision is already irreparably damaged.³ Another obstacle is the fact that many AMD cases go undetected even with regular exams and use of advanced imaging tools.⁴ Primary care doctors are missing these diagnoses, and when patients with AMD signs and symptoms seek detailed evaluations and screenings from ophthalmologists and optometrists, both groups of doctors are missing AMD 25% percent of the time.⁴ So we have to do a better job of identifying these patients before they begin to lose vision.

We also have to be more vigilant about keeping the retina healthy over time through deliberate nutraceutical strategies. Since the macula relies on three diet-derived pigments — lutein (L), zeaxanthin (Z), and meso-zeaxanthin (MZ) — to function optimally, bolstering macular pigment can help slow damage from natural aging and blue light exposure. Blue light has been shown to increase oxidative stress on the retina and trigger the detrimental cycle leading to macular degeneration.⁵

Finally, increasing the density of the macular pigment layer can improve contrast sensitivity, decrease glare, and aid in photostress recovery.^{6,7} We are learning that L, Z, and MZ not only are instrumental in reducing cumulative damage that leads to age-related diseases later in life, but they are crucial for early visual development and long-term visual health, and play a vital role in delivering peak visual performance.



Macular pigments: lutein, zeaxanthin, and meso-zeaxanthin.

Image: Professor John Nolan

- Mihir Parikh, MD

The Need to Assess Patient Retinal Health & Function

Dr. Parikh: *Why is assessment of patients' retinal health and function equally as important as evaluation of corneal integrity or tear function, especially as patients age?*

Dr. Nolan: While we celebrate aging at many levels, it's only successful if we can retain function into our later years. From a physiologic perspective, as we all metabolize and use oxygen, we're producing unstable molecules called free radicals. These molecules are particularly problematic for the retina because the fovea's cone receptors act as the ideal substrate for the unstable free radicals to attack. As we age, free radical damage increases and our antioxidant defenses decrease; consequently, we end up with cells dying, and development of diseases like macular degeneration present a major problem. The question becomes: What can we do to protect the retina to enhance function over our lifetime and into our later years as well? Fortunately, science has identified the exact nutrients of the macula. We know that these pigments (L, Z, and MZ) are concentrated at the macula and that people with macular degeneration are deficient in them. However, when you optimize macular pigments, these natural antioxidants can keep the retina healthier and reduce the impact of oxidative stress. We've identified a way to do that with nutritional supplementation that contains the three carotenoids.

Dr. Gelb: Every part of the eye is important, but the retina is probably the most crucial because it gives us a fingerprint of the patient's overall health; it's where all the action is and where most of the oxygen is. Through the retina, we can diagnose more sys-

Macular Pigment Benefits for Contrast Sensitivity

In one study, 53 adult subjects who took a daily carotenoid supplement containing 10 mg lutein, 2 mg zeaxanthin, and 10 mg meso-zeaxanthin (commercially known as MacuHealth) to build macular pigment optical density (MPOD) showed significant improvements in contrast sensitivity at the end of 12 months.¹

1. 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(7):3429-39.

temic diseases than any other part of the eye.

Dr. Stringham: From a vision perspective, the incredible, rich detail of visual experience starts at the retina. In fact, getting the light into focus on the retina is only the beginning of how we process and see the world. Think about the intricate, complex process that occurs once light is absorbed by the photopigment in the outer segments of photoreceptor cells in the retina. If we can improve the health and function of the retina, we can realize improvements in visual performance beyond those found with refraction.

Dr. Parikh: *What questions should clinicians be asking to open a discussion about retinal health and function with their patients? Are there any lifestyle questions we should be asking patients to uncover if they have optimally performing vision?*

Dr. Stringham: One way to judge retinal function and avoid the potential mis-

match between clinic and real-world visual performance is to ask patients specific questions about their day-to-day vision. For example: 'Think of your morning commute to work. Is there anything about your vision that could be improved to make that experience better?' Or, if the patient participates in competitive sports: 'Do you feel like there is some aspect of vision that is holding you back from your best performance?' Much of visual performance in the real world relies on retinal function, so questions about optics such as spectacles or contact lenses, unfortunately, do not address this.

Dr. Nolan: That's correct. In fact, I believe the first question should be how happy the patient is with their overall visual performance. And we shouldn't just think about vision as getting from point A to point B. Vision plays such a major role in everything we do—from looking at a loved one's face to performing at high level in the military. It's important for doctors to have discussions with their patients about what environments are creating discomfort with their vision. For example, is driving at night, or going outside on a sunny day where there may be photostress issues caused by bright light? Are there circumstances when the patient experiences glare or focus stress? In terms of lifestyle questions, the data is clear that smoking degrades



Choroidal Neovascularization. (Left) A normal retina; (right) a Grade 2 choroidal neovascularization (CNV) lesion. Photos: Michael Tolentino, MD

In order for optometrists to incorporate retinal assessments into the practice, they need an understanding of diagnostic tests and devices available to get a comprehensive picture of the patient's retinal health. The experts discussed some of this technology here.

Dr. Gelb: Optometrists have access to many tests to help gauge retinal function, but the basic evaluation is retinal imaging. In addition, dark adaptometry can aid in determining how long it takes the patient to adapt to the dark, which could be an early warning sign of macular degeneration. Photostress recovery shows us how long it takes the patient to recover after shining a light into the eye. Of course, there's OCT [optical coherence tomography] to see if there's macular edema, retinal bruising, or microaneurisms. And preferential hyperacuity perimetry is moving from the office into the home, so a patient who's at risk for macular degeneration can assess themselves on a regular basis, which we have found is more effective than using an Amsler grid. We also have the scanning laser ophthalmoscope, a confocal imaging technique that offers good contrast and axial sectioning, along with fundus autofluorescence, which is helpful for detecting early metabolic changes secondary to geographic atrophy in the peripheral retina. Genetic tests can evaluate the patient's genetic profile and macular risk. Even the old-fashioned ophthalmoscope is still something that's important to use.

Dr. Nolan: I think we all accept that OCT represents a gold standard to assess the structure of the retina and morphology occurring within it. In terms of visual function, which is the result of how well the retina is functioning, optometry has the opportunity to start using improved monitors of visual function. Assessment of contrast sensitivity, which is the patient's ability to distinguish foregrounds and background, correlates much better with visual function in the real world than visual acuity. In fact, papers have demonstrated a weak correlation between visual acuity and how patients feel about their vision vs. a very strong correlation between contrast sensitivity and patient visual satisfaction.⁸ Something coming down the pike is the ability to measure macular pigment objectively. This will enable us to identify who is deficient, so we can offer good nutritional interven-

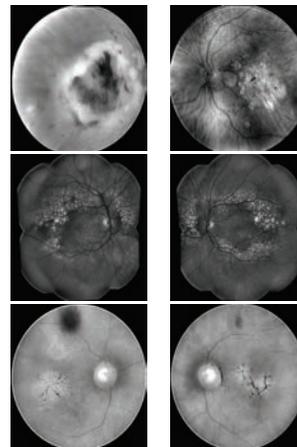
tion to improve that result. The Heidelberg Engineering Spectralis system now includes this measurement, and I expect it to become available for the clinic by early next year.

Dr. Stringham: I agree that contrast sensitivity is an excellent test of retinal function. Retinal circuits are wired to detect faint differences among objects across the visual field. If the retina is healthy, these circuits tend to produce less 'noise' and have significantly better sensitivity. Interestingly, in our studies on healthy, young participants, we see dramatic variability in contrast sensitivity, despite excellent acuity. Subjects with poor contrast sensitivity also tend to have other visual complaints, such as issues with glare and vision in dim lighting conditions.

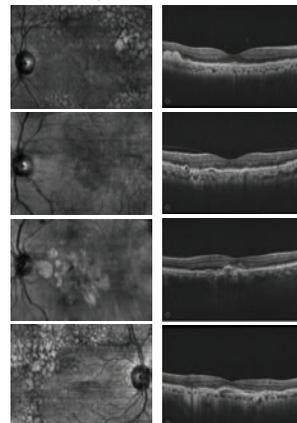
Dr. Parikh: Frankly we're still looking for an easy and inexpensive vital sign to accurately assess retinal health. The Amsler Grid has a sensitivity of 9% in early AMD detection to 34% in advanced AMD with choroidal neovascularization, so we aren't there yet.⁹ Currently what I do is obtain multiple data points and try to get an idea of what's going on with the patient's retina and the macula. I check central vision and contrast sensitivity measurements, do a brightness acuity test and a glare test, and get a central visual field and an OCT of the

Retinal Deterioration and Damage. Optometrists must aim, through proper ocular nutrition and supplementation, to help slow down or prevent the following scenarios.

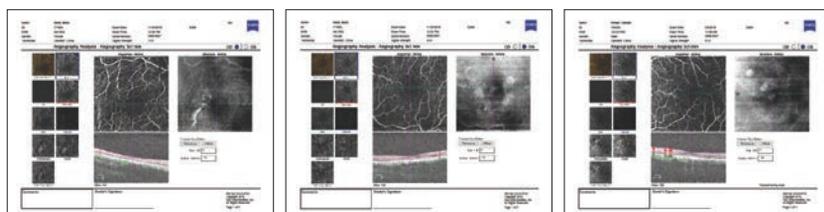
Photos: Kerry Gelb, OD



Advanced AMD. Patient showing advanced AMD after progression post-bariatric surgery.



Retinal Changes. Retinal images show hyper-pigmentation and hypo-pigmentation pigment stacking.



Changes on OCT. OCT shows macular edema, and OCTA shows subretinal neovascular membrane.

retina, if it's indicated. A test that's been out for a long time is a photostress test. I'm not doing that right now, but that might be an efficient way of getting more information that would be of interest. Right now I have to buy an expensive machine to do that accurately.

health because it contributes to the damaging process of oxidative stress. It's one of the most important modifiable risk factors. Other questions should focus on nutrition and the foods the patient is eating—whether there is a lot of color on the plate from natural foods containing carotenoids pigments. And if we live lifestyles that do not allow us to consume adequate amounts of these nutrients, we can make a case for supplements to increase these pigments at the targeted tissues and improve visual function. If patients want to optimize their performance, I think that's essential. Beyond that, we want to protect the eyes from sunlight.

Supplements are important because most of us are not getting adequate nutrients from our diets. I test macular pigment in my office, and many people are low in macular pigment. - Dr. Gelb

Dr. Gelb: In our intake form, we ask patients about their nutritional status. In 1900, almost no one had these modern chronic diseases such as cardiovascular disease, cancer, and macular degeneration. What's changed since then is mostly our diet, as ophthalmologist Chris Knobbe, MD, has noted. Now people are eating foods such as trans fats and inflammatory processed omega-6 oils in addition to increased sugar and refined flour. So I try to get an idea about what the patient is eating and whether their diet is high in processed foods.

As an optometrist, A question I al-

ways ask my dry AMD patients is if they have had any recent trouble with night vision, as this could be an early indicator that the patient is progressing from a dry to wet AMD.

In addition, trouble with night vision could be an indication that the patient has low macular pigment. Three good questions to ask are: Do you have difficulty changing from light to dark? Are you very sensitive to light (i.e., photophobia)? Do you have trouble adapting to the dark? You also want to ask about glare to find out if the patient isn't successfully scattering blue light near the macula.

Dr. Parikh: The most important thing any patient can do is to maintain healthy habits. So I'll talk to the patient about smoking cessation and controlling the blood pressure and cholesterol, as they directly correlate with AMD. Diabetes control is another priority. And I ask about exercising and diet. We try to get the patients to load up their plates with lots of dark green leafy vegetables. However, most people can't eat enough greens in their diet, so supplementation becomes a really important discussion.

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Ensuring Peak Retinal Health & Vision for a Lifetime

Dr. Parikh: Evidence-based science increasingly demonstrates the ben-



Macular Pigment Optimization. (Left) An eye with optimized macular pigment and (right) an eye not optimized with macular pigment.

Photo: Professor John Nolan

efits of macular supplementation to reduce patients' risk of AMD as they age, and enhance retinal health and visual function across the lifespan.^{6,10-22} What key recommendations should primary eye care providers be recommending to patients about strategies, which might not be pharmacologically based, to optimize peak vision and retinal health for a lifetime?

Dr. Nolan: We now have access to safe supplements that are impactful. What the studies have shown is that key recommendations from the eye care professional must be connected to a supplement that has appropriate scientific testing to confirm the presence of the three carotenoids (L, Z, M) and in the right concentrations.

Dr. Stringham: The benefits of macular carotenoids on visual performance and retinal health actually start in the first months of life²³ and extend into old age, with protection against AMD. In a wealth of studies, we have found associations between macular carotenoid status and improved visual performance. The enhancements include contrast sensitivity, speed of visual

Nutrient Decline Over Time

Researchers from the University of Texas published a study in 2004 showing “statistically reliable declines” in the amount of protein, calcium, phosphorus, iron, riboflavin (vitamin B2) and vitamin C in 43 vegetables and fruits over the past half century.¹ The researchers, who studied U.S. Department of Agriculture nutritional data from 1950 and 1999, suggested the declining nutritional content was due to the preponderance of agricultural practices designed to improve traits (size, growth rate, pest resistance) other than nutrition.²

1. Davis DR, Epp MD, Riordan HD. Changes in USDA food composition data for 43 garden crops, 1950 to 1999. *J Am Coll Nutr.* 2004 Dec;23(6):669-82.

2. Scheer R, Moss D. Earth Talk. Dirt poor: Have fruits and vegetables become less nutritious? Available at: <https://www.scientificamerican.com/article/soil-depletion-and-nutrient-loss/> (last accessed May 9, 2019).

AMD Basics

AMD, a leading cause of vision loss among people ages 50 and older, results in damage to the macula, which is needed for sharp, central vision. In some individuals, AMD advances slowly so vision loss does not occur for a long time; in others, the disease progresses rapidly, and may lead to vision loss in one or both eyes.

Risk factors:

- Smoking
- Caucasian race
- Family history and genetics

Lifestyle choices shown to reduce risk:

- Smoking cessation
- Regular exercise
- Maintaining normal blood pressure and cholesterol levels
- Eating a healthy diet rich in green, leafy vegetables, and fish

National Eye Institute. Facts About Age-Related Macular Degeneration. Available at: https://nei.nih.gov/health/maculardegen/armd_facts (last accessed May 9, 2019)

processing, and visual performance in both glare and low-light conditions. Importantly, visual performance parameters that are improved are meaningful for vision in the real world; AMD protection is simply icing on the cake. In terms of the supplementation level of lutein, zeaxanthin, and meso-zeaxanthin, a total daily dose of between 20mg and 25mg appears to represent the maximum benefit. The effects are noticeable within three to six months after initiation. Interestingly, our subjects will often mention significant visual improvements after about three months, but they can't necessarily put their finger on exactly what has changed.

Dr. Gelb: We want to recommend that patients eat an organic diet made up of whole rather than processed foods. But even with a healthy diet, the way our food is grown has

changed dramatically over time. For example, you have to eat many more cups of spinach today to get the same amount of nutrients that our grandparents received from one cup of spinach. Supplements are important because most of us are not getting adequate nutrients from our diets. I test macular pigment in my office, and many people are low in macular pigment. I have a strong family history of macular degeneration and eat a very healthy diet, but I still take lutein, zeaxanthin, and meso-zeaxanthin every day by using the MacuHealth with LMZ3 supplement.

Dr. Parikh: I agree with everything the panel has said. Bottom line: It's really important to supplement with the three macular carotenoids. Vitamin supplementation hasn't been shown to improve the health of the retina, but supplementation with lutein, zeaxanthin, and meso-zeaxanthin has.

Dr. Parikh: What benefits can patients experience if they follow the aforementioned recommendations about maximizing retinal health and function? And what are the mechanisms for the beneficial effects?

Dr. Stringham: Several parameters of visual performance are improved with macular carotenoid supplementation, such as contrast sensitivity, speed of visual processing, photostress recovery time, and visual performance in both glare and dim light. In most patients, these effects can be achieved within roughly six months of starting supplementation. From a scientific perspective, the most intriguing thing to me about these enhancements is that the macular carotenoids work in different ways to produce their respective effects. One definitive way

involves improving the health of the retina. Via their antioxidant and anti-inflammatory activities, these carotenoids keep the tissues in which they are embedded viable, and this leads to better overall function. There is additional evidence that mere presence of these carotenoids activates an epigenetic 'switch' that upregulates the body's own antioxidant systems and also activates the metabolism of retinal debris.²⁴ Because they are deposited anterior to the photoreceptors, the carotenoids (as macular pigment) absorb a significant amount of the short-wavelength 'blue' region of the visible spectrum. This accounts for effects involving glare: reduced visual discomfort, improved vision in bright light, and (at least in part) faster photostress recovery.

Dr. Nolan: Science has demonstrated that if you supplement with the three carotenoids using a 10/10/2 formula, you're going to enrich your macular pigment. In the CREST Normal Trial and CREST AMD, we saw with 100 percent certainty that all patients who were on that active intervention demonstrated improvements in their macular pigment.^{6,10} So patients are ensured gains in the tissue concentrations of these nutrients. What that means for function is that you're also guaranteed enhancements in your contrast sensitivity.

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Connection Between Retinal Health & Surgical Outcomes

Dr. Parikh: From a surgical perspective, how important is it for patients to demonstrate optimal retinal function in order to achieve the best possible short- and long-term cataract and refractive outcomes?

Dr. Gelb: The studies have been clear that diets high in lutein and zeaxanthin

decrease the progression of cataracts and risk for needing surgery.²⁵ As far as post-surgical improvements are concerned, the more you can protect the eye, the better.

Dr. Nolan: When you remove a cataract, you're basically taking out a yellow filter at the front of the eye. The problem this can present for the patient is that now that they have these pure lenses in the front of their eye, they have a lot more light going to the back of the eye than they have had for the previous 20 or 30 years. This can create a massive light influx on the back of the eye, which can be very negative for visual function, and it can increase risk of macular degeneration. So I would recommend strongly for a patient who is to undergo cataract extraction that the retina is appropriately supplemented with the macular carotenoids to give the retina protection after the yellow cataract is removed. In addition, optimizing the macular pig-

ment creates a better filtration system inside the eye, which we have shown gives patients better visual outcome. So, we want a successful cataract extraction to allow more light to go to the back of the eye. And, when that light reaches the posterior eye, we want to have appropriate levels of macular pigment to ensure ideal function and enhanced use of light for real-time performance and protection into the later years.

Dr. Stringham: I absolutely agree. Removal of a cataract represents a dramatic change in the amount of short-wave (blue) energy reaching the retina. In fact, amazingly, many cataract surgery patients report seeing the world tinged with a bluish hue for the first day or two after their surgery. This illustrates the increase in short-wave light at the retina and the fact that the retina is not used to receiving that much short-wave light. Moreover, this is a very unnatural situation—the

mature, aged eye has taken perhaps decades to accommodate to the slow clouding of the natural lens, and then suddenly a replacement lens that is equivalent in transmission to that of the average 10-year old's is inserted. It's a real shock to the system, and vulnerability to photo-oxidative damage is particularly high. Of course, without adequate MPOD, the central retina is left unprotected. As Prof. Nolan urged, pre-surgical supplementation with the macular carotenoids would help to guard against this kind of insult, and would greatly benefit candidates for cataract surgery.

Dr. Parikh: Cataract and refractive surgery are becoming more outcome dependent; meaning, patients want amazing outcomes with their LASIK, cataracts or whatever procedure they're having. The available technology today in cataract and LASIK surgery has gotten so good that we can get these patients extremely good vision with distance or near, or both after surgery. But to get the best vision, to get it really sharp and not distorted without glare, the retina needs to be healthy. And retinal health affects short-term outcomes because we're trying to get through the surgery and get the patient a good result over the next few days. But once the surgery is complete and the patient's happy, the retina needs to be preserved for the long-term to maintain that vision. This is where it comes back to healthy lifestyle, eating well, and protecting the macula from degeneration over time. Anything we can do to prevent vision degeneration, that's something that doctors don't really talk about, but it's really important because that's what patients ask me in the exam room. They'll say, 'This is great, I love my outcome, I never want it to change. What can I do to prevent that?'

Doctor Resistance to Supplementation

Dr. Parikh: *Despite the growing body of research supporting the need for macular supplementation to enhance patients' eye health and vision, why do you think some eye care professionals are hesitant to employ nutritional supplements in the practice?*

Dr. Gelb: We live in a drug-based culture. When I went to school, we received very little training on nutrition. Some doctors don't like to go outside their comfort zones. But I think optometrists can do better than to wait decades to take great work in visual science and bring that into their clinical practices.

Dr. Nolan: The failure to implement a nutritional strategy in a practice comes down to one of resistance to change and because the doctor is not used to doing it. I also appreciate that eye doctors have very busy practices, and chair time can become a problem. But I believe that the doctors must find a way to enhance their practices and patient care by safe implementation of visual function testing with contrast sensitivity, and recommendations about appropriate supplementation for macular health function and protection. We should look at the practices that have successfully implemented nutritional strategies and measure the benefits that their patients have experienced. This represents the benchmark for every optometrist to try and meet.

Dr. Parikh: I think there's several reasons. First, I think some doctors are concerned about getting into the natural pharmaceutical space, so to speak, and they just don't necessarily want to go there; they want to stay with their glasses or contacts or other procedures that they're more comfortable with or just know more about. It also requires a time investment to educate the patient on something they might only see to be beneficial later in their life, not right now. And finally, the strategy might be looked upon as low-margin for profitability. However, if you build a patient's trust, and you show that you care about their eyes and their wellbeing, not just today but for the next many years, I think that will give you a tremendous return on investment that you can't measure.

In addition to having a discussion about healthy lifestyles with the patient, the key to surgical success is to begin that conversation before you do the surgery. Starting to talk about building up the macular pigment layer after the procedure sometimes doesn't make a lot of sense to the patient, or it's harder to get their buy-in. I like to begin the conversation early, saying this is going to be a long-term outcome, and we need to work on that by starting a few things before surgery and then continuing them afterward.

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Helping Patients Select Macular Supplements

Dr. Parikh: *For eye care professionals who are considering prescribing/recommending supplements to support retinal health and vision, why is it important to recommend a brand vs. sending patients out to the local retailer to pick something up?*

Dr. Nolan: Sometimes doctors feel that they're doing their patients a service by allowing them to go to a retail store and pick up the cheapest brand of macular carotenoids formula. The problem with that is, we've published studies out of the Nutrition Research Centre Ireland that have demonstrated that if you look at the commercially available food supplements that don't have appropriate testing and regulation, in some cases the activity of carotenoids in those formulations is zero. So the patients may be spending less money to get a cheaper product, but they're not getting any value from it. So we must recommend a brand that has been tested for stability and efficacy over long periods of time. We know that presence of the three carotenoids is the only way we can guarantee improvement of macular pigment and visual function. And that's the rationale for taking these supplements,

so brand is crucially important.

Dr. Gelb: Questions that many of us get when we recommend supplements are: 'Can't I just go to [insert big box store name] and buy this; it's a quarter of the price?' Or 'Can I just go to the drug store and buy it?' Well, John's studies have shown that, with some supplements, what the company states is in the supplement or on the label is not accurate. I recommend that doctors prescribe the highest-quality supplements based on evidence-based research. As optometrists we're recommending these supplements, so we need to prescribe the best.

Dr. Parikh: A lot of doctors will tell patients to go to the store and buy an AREDS2 formulation. However, the data doesn't directly support the use of an AREDS2 formulation if the retina is normal.²⁶ Once you send patients out of the office to go shopping, you don't know what product they're going to get. They'll probably just buy a vitamin, and that hasn't been shown to be beneficial. My other concern is the patient might end up at another doctor's office. I think there's a better way to have that conversation. First engage patients in a discussion about maintaining a healthy lifestyle, and then recommend the product that they really need.

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Elevating the Eye Care Practice With Macular Supplementation

Dr. Parikh: *How can macular supplementation bolster the eye care practice? In what ways can this proactive strategy strengthen the doctor-patient relationship and cement "customer loyalty"?*

Dr. Gelb: I became interested in nutrition and lifestyle medicine about 15 years ago. I was sick all the time; I had a cold eight months out of the year, so my wife came home with a juicer to help me try to improve my health. About that time, I also picked up a book called "Ultraprevention," co-authored by MDs Mark Hyman and Mark Liponis, that changed the way I looked at things. Since the doctors' approach to repairing the body through personalized nutrition helped me personally, I became very interested in learning about how I could also help my patients through lifestyle medicine and nutrition. Some doctors might think that patients don't want to hear about this, but 95 percent of my patients do. I often say, 'I can teach you how to treat the cause of your problem or we can just treat the symptom; would you like me to explain further?' Once I start explaining, they see that I am well-versed in the subject of lifestyle medicine. I actually get my most referrals from functional medicine MDs, and it's helped me build my practice.

The optometrist has a unique and a key role to play at a starting point to try to offer their patients the best vision and protection possible. When we look at the level and totality of evidence, we see that doctors have an opportunity to advance medical care and the practice in a way that was only dreamt about 20 or 30 years ago. - Dr. Nolan

Dr. Nolan: This is another reason to work with your patient and to give them data about the health and function of their eyes, which you now can change over time. Eye care needs to move to a stage to where it's not just waiting for diseases to come and then struggling to fix them. It has the opportunity, using macular and carotenoid nutrition, to enhance vision today and protect it into the later years. This represents a very good business model for doctors who implement supplements

on a case-by-case basis.

Dr. Parikh: Anything you can do to actively engage patients in their health, which requires having them come back once a year or more, is going to keep them in your practice for the long-term. It's going to help you in terms of your eye exams, and through referrals from friends and family. Ultimately, you're participating in patients' wellbeing, and I think that's something that patients really want. They want doctors who care for them and their eyes. Actually, the best way to grow your business is just by caring, and this is one of the ways to do that.

Dr. Parikh: Why should retinal health be an integral part of providing patients with advanced eye care, as optometry takes on a more primary role in healthcare?

Dr. Nolan: Our center alone has more than 100 papers published on macular nutrition. These findings are only a success if optometrists take this information to their patient bases. Optometry represents the first line of care for patients. If the practitioner doesn't empower their patients to make the right decisions about optimizing nutrition at the retina and enhancing function, everything we've done is for nothing. So the optometrist has a unique and a key role to play at a starting point to try to offer their patients the best vision and protection possible. When we look at the level and totality of evidence, we see that doctors have an opportunity to advance medical care and the practice in a way that was only dreamt about 20 or 30 years ago.

Dr. Stringham: Using nutritional strategies to maintain retinal health and visual performance is really the domain

of the OD—and the potential is huge. Literally hundreds of studies from my lab and others have demonstrated time and again the benefits good nutrition and use of supplementation on vision and visual health. And not a single adverse event has been reported from these studies. Optometrists can act as the interface between patients and nutrition, and, therefore, have a great opportunity to establish a preventative approach to visual health. If you can meaningfully improve visual performance while building protection against the potential for age-related eye disease, even better. In my opinion, this is a no-brainer.

Dr. Gelb: I once heard a speaker say that the OD is the new PCP. That statement really resonated with me. Every day, all day, the optometrist examines the retina—vascular and neurological tissue that we now can view down to 8 microns, thanks to advanced technology. We have the opportunity to detect disease long before many other doctors do because we are looking at tissue on a micro vs. a macro level. Many times we're the first doctor that diagnoses systemic diseases such as diabetes and hypertension. So the retina is the key to the kingdom, to the body. To be a great doctor you have to be great at retina.

Dr. Parikh: This is especially important given that clinical exams and retinal photographs that doctors are using on a regular basis often appear normal, but macular degeneration can occur very subtly initially. When patients start talking about quality of vision issues, if you look carefully, you might start seeing early changes in the retina that you normally would have missed. And as our baby boomers age, we're expecting unprecedented levels of AMD. So we have to stay on top of this early, otherwise patients are going to

lose significant vision as they get older.

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1. Common Eye Disorders. Vision Health Initiative (VHI). Available at: <https://www.cdc.gov/visionhealth/basics/ced/index.html> (last accessed May 1, 2019).
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