

Answering the "Myopia or Glaucoma?" Question, P. 60 • Clinical Quandaries: Herpes Zoster, P. 20

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10 Questions
on Digital Devices
and Eye Health
—Answered!

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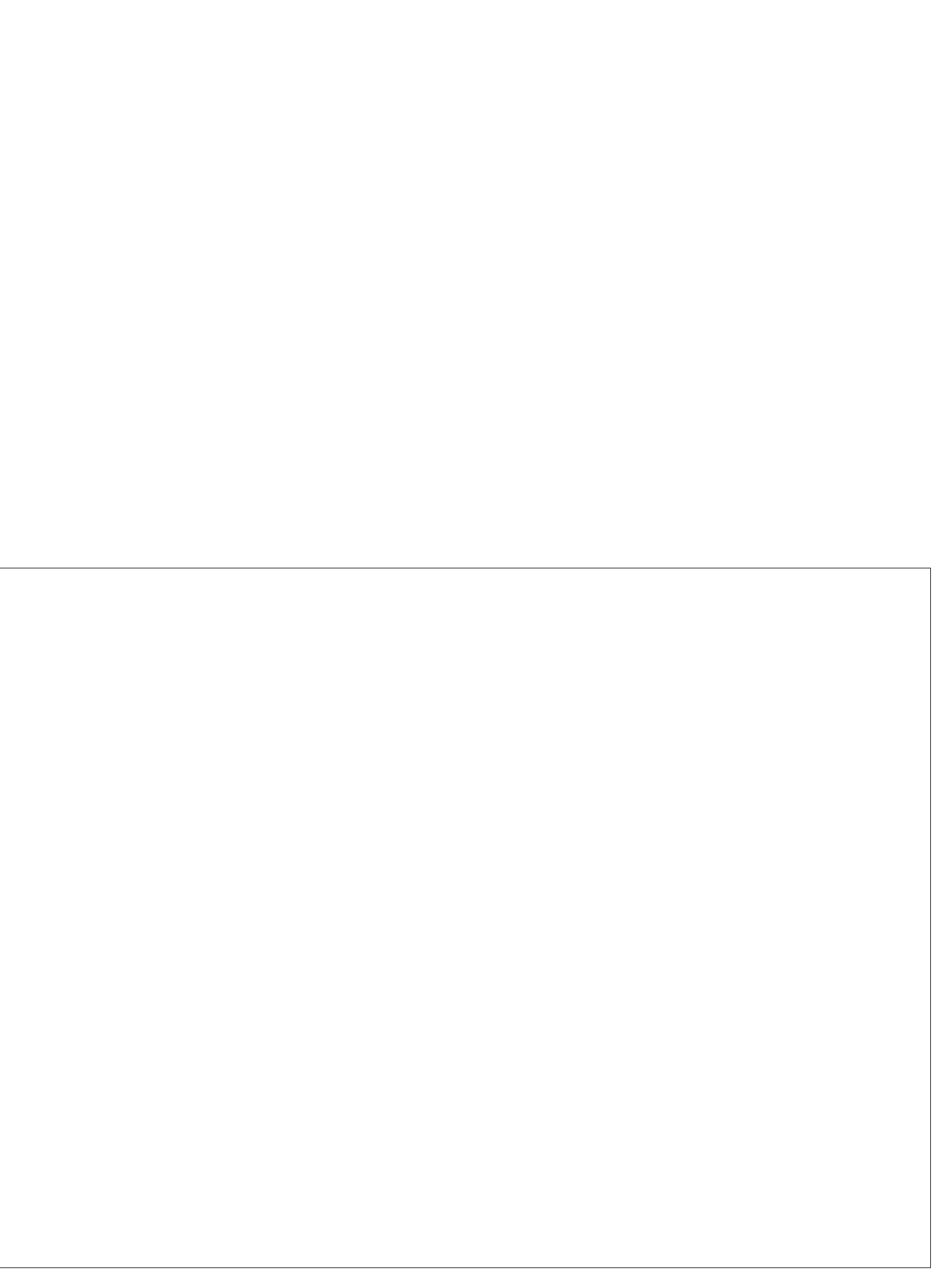


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Rethink Glasses in Infants with Astigmatism, Hyperopia

Most of these eyes emmetropized to a greater degree than eyes with myopia.

Emmetropization during early child development is thought to be affected by age and initial refractive error (RE), with greater initial RE leading to faster rates. Currently, the American Academy of Ophthalmology (AAO) bases its recommendations for glasses on specific RE ranges at specific ages; however, researchers pointed out in a new study that these recommendations are based mainly on expert consensus and that application varies among prescribing doctors.

To help doctors make more informed decisions, researchers conducted a retrospective cohort study to better understand the proportion of children with high RE during infancy that emmetropize to a point where it would alter their clinical management.

The researchers studied 362 eyes of 194 infants (mean age at first exam: seven months), 168 hyperopic eyes of 92 children, 40 myopic eyes of 27 children and 201 astigmatic eyes of 114 children. A total of 26 children received glasses at their first exam. All children underwent cycloplegic refraction at six, eight, 12 and 24 months. The children also had, during earlier periods, a RE in one or both eyes of hyperopia +3.5D or greater, myopia -2.0D or greater or



Photo: Getty Images

Delaying giving glasses prescriptions to infants may result in better visual outcomes, this study found.

astigmatism +1.5D or greater. The researchers didn't include children with ocular disease that could affect RE or ocular growth.

Here are their key findings:

	Improvement (% patients)		
	Large	Moderate	Small
High astigmatism	48%	29%	23%
Moderate astigmatism	30%	23%	47%
High hyperopia	19%	24%	57%
Moderate hyperopia	27%	25%	48%
Moderate/high myopia	5%	27%	68%

“We found that eyes with hyperopia or astigmatism emmetropized to a greater degree than eyes with myopia, and the greatest degree of emmetropization occurred among eyes with

high astigmatism, followed by those with moderate astigmatism, moderate hyperopia and high hyperopia, in that order,” they explained in their paper. “Our observations stand in contrast with prior studies that showed no significant improvement in RE in hyperopic eyes of older children. Our results suggest a different pattern earlier in childhood.”

They say their results support “some but not all” of the AAO’s recommendations for prescribing glasses to infants under age one. “Prescribing glasses early for children with high myopia may be clinically appropriate as they are unlikely to emmetropize sufficiently by two years,” they wrote. “The decision to prescribe glasses early is less clear in infants with high hyperopia, as one quarter of children will no longer meet AAO guidelines when they are one year of age. Finally, almost two thirds of infants with astigmatism high enough to meet AAO guidelines emmetropize sufficiently to no longer meet guidelines for age one to less than two years. It appears appropriate to delay giving glasses and recheck RE later in these children.” ◀

Schein Y, Yu Y, Ying G, et al. Emmetropization during early childhood. *Ophthalmology*. November 29, 2021. [Epub ahead of print].

IN BRIEF

Postmarketing reports of adverse events such as retinal vasculitis (RV) and retinal occlusive vasculitis (RO) with brolucizumab (Beovu) use triggered an investigation by Novartis and an external safety committee, which concluded that **patients**

receiving brolucizumab injections may be at increased risk for RV and/or RO, usually accompanied by intraocular inflammation (IOI).

More recently, a research team looking at two large databases of patients with wet AMD (21,815 eyes total) who received at least one brolucizumab injection found

the incidence rate of IOI and/or RO to be about 2.4%, as was the incidence of RV and/or RO (0.6%). The researchers identified the following **two risk factors: a history of IOI and/or RO occurring within the previous year and female gender** (although the latter was much less significant).

Due to study limitations, **brolucizumab cannot be tied directly to these inflammatory events**, the authors note. More controlled studies will help better determine causality.

Khanani AM, Zarbin MA, Barakat MR, et al. Safety outcomes of brolucizumab in neovascular age-related macular degeneration: results from the IRIS registry and Komodo Healthcare Map. *JAMA Ophthalmol*. November 24, 2021. [Epub ahead of print].

Red-light Therapy Promising for Myopia Control

The treatment was well-accepted and kids demonstrated no functional or structural damage.

Researchers recently tested a new strategy for myopia control in children called low-level red-light therapy, abbreviated as RLRL, with encouraging results. The approach involves delivering light to the retina directly, repeatedly, for a short duration. Bright light exposure outdoors has been demonstrated to be protective against myopia, but the study authors point out that certain approaches, such as renovating classrooms with glass walls and ceilings, are expensive and not necessarily practical.

Instead, they used a device that emits red light at a wavelength of 650nm to try to simulate this effect. “It has already been approved and widely used for amblyopia treatment in China,” the authors wrote. Unpublished anecdotal findings have observed choroidal thickness, blood flow and axial elongation stabilization in children who used the device for amblyopia treatment.

The multicenter, randomized clinical trial enrolled 264 children between the ages of eight and 13, 246 of which were included in the analysis. All subjects had myopia with a cycloplegic spherical equivalent refraction (SER) of -1.0D to -5.0D, astigmatism $\leq 2.5D$, anisometropia $\leq 1.5D$ and BCVA $\geq 0.0\log\text{MAR}$ (Snellen 1.0 or 20/20).

The researchers assigned children randomly to the intervention group (n=117) to receive RLRL plus single-vision spectacle (SVS) or to the control group (n=129) to receive SVS only. RLRL treatment was done with a desk-top light therapy device that emitted red light at a wavelength of 650nm, 1,600lux and 0.29mW for a 4mm pupil. The test sessions lasted three minutes and were done twice daily at a minimum interval of four hours, five days per week.

Here are some of the study’s findings:

- The adjusted 12-month axial elongation and SER progression were 0.13mm and -0.20D for the RLRL group and 0.38mm and -0.79D for the SVS group, respectively.

- The difference between groups in axial elongation and SER progression was 0.26mm and -0.59D, respectively.

- The researchers reported no severe adverse events, functional visual loss (by BCVA) or structural damage (observed on OCT).

“Orthokeratology, specially designed spectacles and atropine eye drops are the most common optical and pharmacological interventions for myopia control,” the researchers wrote. Though studies show these methods achieve between 30% and 59% efficacy in myopia control, ortho-K has a “small but significant risk of developing sight-threatening corneal infection, and compliance with wearing a tight contact lens every night can be challenging.” Additionally, they noted that atropine, used at 0.01% to 0.05% concentration, has a 50% efficacy in myopia control.

“In addition to orthokeratology and atropine eye drops, two recent innovatively designed lenses which impose myopic defocus on the retina, the Defocus Incorporated Multiple Segment (DIMS) lens and Highly Aspherical Lenslet Target (HALT) lens, have shown strong myopia-controlling effects of 52% and reduced axial elongation by 62% when compared over two years with SVS. A further report has shown that this myopia control effect is sustained in the third year. While study design differences make direct comparison difficult, the RLRL efficacy results reported here appear at least competitive with these other treatment modalities,” the team said.

“In our study, we demonstrate that RLRL treatment was able to achieve greater than 0.05mm axial length shortening in 70.1% of participants at one



Photo: Getty Images

Over two-thirds of the myopic children achieved a 0.05mm axial length shortening through red-light therapy.

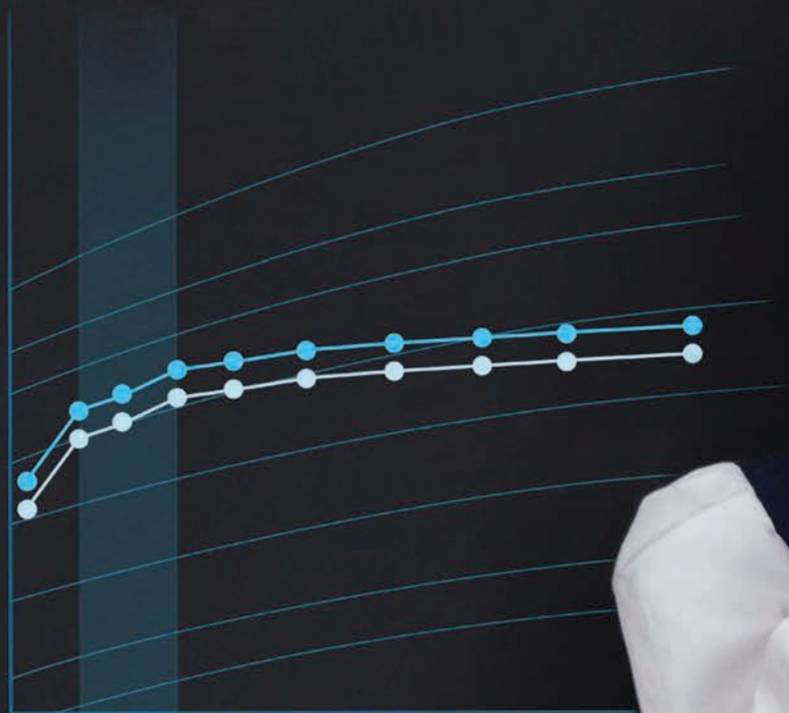
month and 31.6% at 12 months,” they continued. They also found choroidal thickness changes at two of their study sites and increasing thickness by an average of 16.1 μm at the one-month follow-up visit.

“Axial shortening was measured as -0.04mm at this visit; axial shortening therefore cannot be fully explained by choroidal thickening either,” they wrote. “As recent evidence confirms scleral hypoxia as a promoter for scleral remodeling and myopia development, we hypothesized that the RLRL treatment increases blood flow and metabolism of the fundus, thus ameliorating scleral hypoxia and restoration of scleral collagen levels.”

They noted that treatment efficacy increased with improved treatment compliance. “This strong dose-response effect may imply that an extension of the treatment duration from three minutes to a longer treatment time per session may result in improved treatment efficacy.” The authors concluded that RLRL is a promising new alternative treatment for myopia control, but advocated for further research using with double-masked, placebo-controlled designs. ◀

Jiang Y, Zhu Z, Tan X, et al. Effect of repeated low-level red-light therapy in myopia control in children: a multicenter randomized controlled trial. *Ophthalmology*. December 1, 2021. [Epub ahead of print].

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Wet AMD Patients Who Skipped Treatment Lost VA

Those who deferred injections during lockdowns lost up to 3.8 letters in one study, while a second found those who delayed therapy showed increased exudative activity.

As COVID-19 continues to have rippling effects across the globe, researchers look for clues on how eye care was impacted during the lockdown and ways to apply lessons learned two years into the pandemic. Two recent studies published in *Retina* considered how COVID has impacted the continuity of care for wet AMD patients, with one international study citing notable vision loss based on fewer anti-VEGF treatments and the other suggesting the effectiveness of an “injection-only” approach.

The first investigation considered the lockdown’s impact on about 5,800 eyes of 4,700 individuals who had either wet AMD, DME or RVO and resided in either Australia, France, Ireland, Italy, the Netherlands, New Zealand, Spain or Switzerland.¹ All participants received anti-VEGF injections prior, during and after the national lockdown. The baseline visit was defined as the last visit within three months prior to lockdown, and pre- and post-lockdown periods were six months before and after lockdown.

The researchers found eyes with wet AMD (n=4,649) lost vision in all countries in proportion to the reduced number of injections. VA change post-lockdown ranged from -0.4 to -3.8 logMAR letters, while the number of injections/visits decreased from 4-5/4-7 to 2-4/2-4 post-lockdown. Vision loss occurred even after the condition had been prioritized in all the national and international clinical guidelines, the authors noted.

Clinical outcomes in DME and RVO eyes were slightly different, as intravitreal injections for both were deferred in favor of wet AMD patients in all the participating countries. Specifically, the VA change in DME (n=654) and RVO (n=479) eyes ranged from -2.8

Photo: Leonid Skopin Jr., MD, MD, MS



Lockdowns have caused many wet AMD patients to miss or skip anti-VEGF injections, which has resulted in negative visual outcomes.

to +1.7 letters and -1.6 to +0.1 letters, respectively. Additionally, the number of injections/visits decreased from 2.5-5/4-6 to 1-3/2-4 in DME eyes and from 3-5.5/4-5 to 1-3.5/2-3.5 in RVO eyes.

In general, countries that only missed one injection (Australia, France and the Netherlands) had better outcomes (VA loss of less than one letter) compared with those that reduced their treatment rate by two injections (Ireland, Italy, Spain), with the exception of New Zealand, which had one or fewer letters lost and two fewer injections.

Six months into lockdown, RVO patients had the highest treatment dropout rate at 28%, followed by 27% for individuals with DME and 20% for wet AMD patients. These findings may help clinicians prepare strategies to mitigate vision loss in future pandemics, the investigators suggested. “It appears appropriate to prioritize intravitreal therapy for eyes with wet AMD in this scenario,” they wrote.

The second investigation found patients who temporarily stopped intravitreal injections during the lockdown showed increased exudative activity with worsened visual and anatomical parameters compared with patients who pursued an “injection-only” treatment approach, where

exams and OCT were omitted but therapy was given.² While anatomical parameters recovered to pre-lockdown values, visual function did not recover entirely in patients who delayed treatment.

This study was a retrospective review of 314 patients (394 eyes) who were scheduled to receive injections during the Swiss lockdown between March 17 and April 27 of 2020. Researchers compared outcomes of 215 individuals who continued to receive scheduled anti-VEGF treatment without clinical consultation and 179 patients who completely deferred treatment.

Not surprisingly, the baseline and post-lockdown VA were about the same in those who continued treatment. On the other hand, participants who deferred treatment had a significant deterioration in their vision compared with baseline. Although these patients’ VA improved slightly after injections resumed, it didn’t reach baseline levels.

The findings suggest that visual benefits of therapy may be lost if regular dosing is not maintained, showing no difference in relation to the type of anti-VEGF agent in use, the researchers suggested. Furthermore, treatment during a lockdown was a never-before-seen unique scenario that could reoccur in the future, they added.

“Our experience denotes the feasibility of an ‘injection-only’ management plan for implementation in future pandemics, especially in a cohort of patients following an observe-and-plan regimen,” the researchers concluded. ◀

1. Zarranz-Ventura J, Nguyen V, Creuzot-Garcher C, et al. International impact of the COVID-19 pandemic lockdown on intravitreal therapy outcomes: Fight Retinal Blindness registry. *Retina*. December 1, 2021. [Epub ahead of print].

2. Montesel A, Gigon A, Giacuzzo C, et al. Treatment deferral during COVID-19 lockdown: functional and anatomical impact on neovascular age-related macular degeneration patients. *Retina*. December 2, 2021. [Epub ahead of print].

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Evidence Supports Vascular Hypothesis For Glaucoma

A number of related risk factors were associated with low-tension disease, research finds.

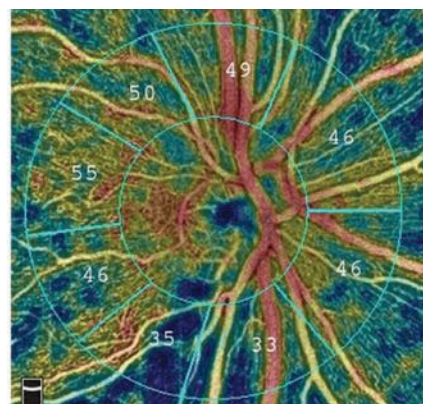
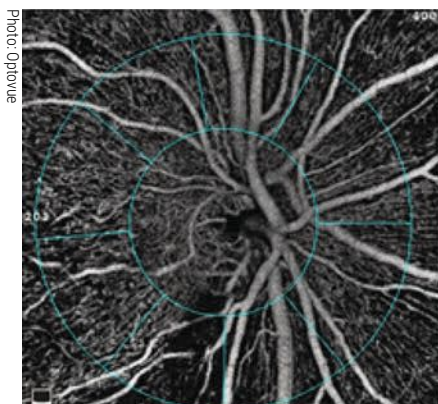
While intraocular pressure (IOP) is the driving force behind glaucomatous optic neuropathy (GON), those with low-tension glaucoma (LTG) don't present with elevated pressures. Researchers say there are other variables at play that can cause cellular injury in the initiation and/or progression of GON besides IOP.

"Genetic predisposition, inflammatory and immune responses, structural and mechanical stress, mitochondrial dysfunction, oxidative stress and vascular dysfunction may modulate the pressure-associated perceived stress of the retinal ganglion cell or may even act in an IOP-independent mechanism," the researchers explained in their paper.

Their study reported that multiple systemic, vascular-associated conditions are associated with LTG, including systemic hypertension and hypotension, diabetes, migraine headache, peripheral vascular disease, Raynaud's syndrome and anemia. "This study strengthens evidence for the vascular hypothesis of LTG," they noted.

They conducted a retrospective case-control study to identify patients seen at the Mayo Clinic Department of Ophthalmology for LTG between 2005 and 2015 (n=277). An age- and sex-matched control group was also included (n=277). Researchers selected patients with LTG because "GON is likely a multifactorial disease with a number of systemic risk factors including those that may affect a patient's hemodynamics and ultimately their ocular perfusion pressure."

They reported that the LTG group had more myopic refractive errors (-1.6D vs. -1D), lower IOP (14.2mm Hg vs. 15.2mm Hg) and a higher cup-to-disc ratio (0.7 vs. 0.3) than the control group. They also noted that the LTG group was less likely to be obese (BMI >30).



The pathogenesis of GON may involve systemic vascular dysregulation.

Additionally, the low tension glaucoma group had a higher prevalence of certain systemic conditions, including hypertension, diabetes, peripheral vascular disease, migraine headache, anemia, systemic hypotension, Raynaud's syndrome, angiotensin-converting enzyme inhibitor and calcium channel blocker use. The researchers reported no significant differences regarding hyperlipidemia, obstructive sleep apnea (OSA), coronary artery disease, carotid stenosis, stroke, statin, ACE inhibitor, angiotensin receptor blocker, beta blocker or metformin use.

The researchers say that according to the vascular hypothesis, systemic vascular dysregulation "may play a more prominent role in LTG compared with other types of open-angle GON." Patients with high or low blood pressure, anemia, cardiac disease or stroke are more likely to experience lower-end organ perfusion and systemic vascular dysregulation, they said.

"From a blood pressure standpoint, our study supports the parabolic nature of risk with both systemic hypertension and hypotension being risk factors for LTG," they wrote. "Coronary artery disease and stroke have been reported to have an association with glaucoma; however, our

study did not find an association with either condition."

The significant associations between LTG and Raynaud's syndrome and between LTG and migraine in the study also support the idea of reduced perfusion as a factor in GON, the researchers explained. Raynaud's syndrome is caused by peripheral vasospasm, leading to dysregulation of peripheral perfusion. "It's been suggested to be an independent risk factor for LTG."

They wrote that systemic inflammation and metabolic stress (*e.g.*, diabetes, obesity and OSA) may disrupt axonal transport and lead to retinal ganglion cell death. While they noted that diabetes and other causes of metabolic stress may have multiple mechanisms contributing to retinal damage, overall, they said that diabetic patients have demonstrated higher rates of LTG prevalence and glaucoma progression. "Our data show that LTG patients were more likely to have diabetes, supporting the hypothesis for diabetes being a risk factor for LTG."

Overall, the researchers say their study supports the vascular hypothesis for glaucomatous neuropathy. ◀

Funk RO, Hodge DO, Kohli D, et al. Multiple systemic vascular risk factors are associated with low tension glaucoma. *J Glaucoma*. November 3, 2021. [Epub ahead of print].

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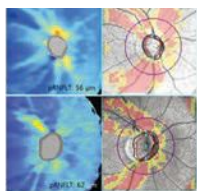
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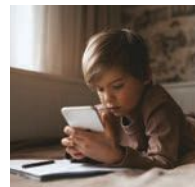
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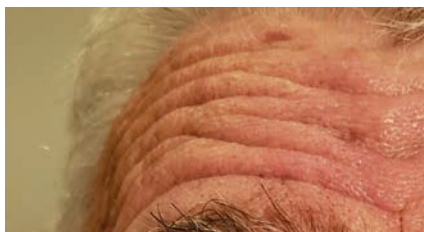
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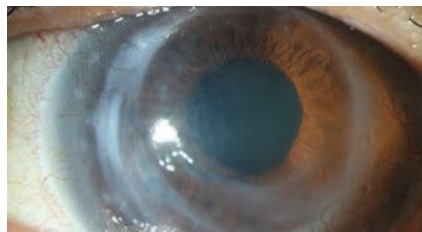
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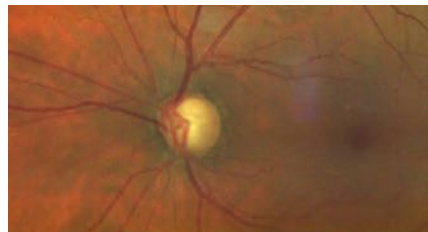
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THE ESSENTIALS

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Find out how nitric oxide plays a role in the treatment of POAG by boosting the efficacy of prostaglandin analogs.

Bisant A. Labib, OD



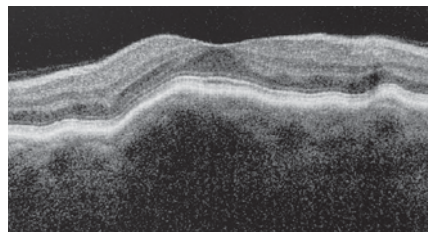
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Do the findings here provide a definitive diagnosis, or merely a clue to the full story?

Andrew S. Gurwood, OD, Michael Rebar, OD



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BY JACK PERSICO
EDITOR-IN-CHIEF
OUTLOOK

This Time, It's Personal

A look at the many ways your patient's life experiences matter inside the clinic, too.

We always aim to ensure that the scientific merit of the clinical guidance we publish shines through. Articles often give diagnostic or treatment advice in a way that's so evidence-based it almost, in a way, makes the patient irrelevant. How they feel, speak or act doesn't factor into your clinical assessment, right?

Wrong. Patients are more than just as a set of eyes to be examined, of course; they're complex, unique people with personalities and values shaped by their lives, families and peers.

This month, we're bringing the individual into the equation with a series of articles that explores how race, ethnicity, culture, sexual orientation and other markers of identity can manifest in the exam room. Why, you may ask? To fill in an important part of the puzzle that's often ignored, to the detriment of the doctor-patient relationship and possibly the outcomes of the care provided.

At last fall's Academy of Optometry annual meeting, guest speaker Beverly Daniel Tatum, PhD, a psychologist who studies cross-racial dynamics, discussed an exercise she uses to uncover deep-seated feelings of marginalization. If you ask a group of people to describe themselves as many ways as possible in 15 seconds, you'll get a lot of results about jobs, hobbies, family responsibilities and so on—what they *do*. But people whose race, ethnicity, religion, gender or orientation differs from the broader society will write down those characteristics, too—what they *are*.

"If you are seen as outside the norm, people remind you of that and you have it as part of your social understanding of the world and so it becomes salient for you," Dr. Tatum explained.

Recognizing these experiences and the feelings of discrimination or alienation that often accompany them is the first step toward building a stronger rapport with people of different backgrounds.

However, it's important to avoid conceiving of a person from a different walk of life as some exotic "other" to be studied like a rare plant or bird. Striking the right balance can be tricky: we should aim to recognize individual distinctions and understand their implications, but then pivot to finding common ground. Hopefully, a concerted effort might eventually reduce disparities in health care among various groups (along with lowering tensions).

In our corner of the world, a recent study in the *Ophthalmology* journal found that the normative databases of OCT devices are largely comprised of data from Caucasian individuals, leading to false readings of possible glaucomatous damage in some Asian patients, who can have thinner-than-average RNFLs. That's one small way eye care is engineered for the past—when US demographics were more homogenous—instead of the present and future. Deeming one group "normal" skews the delivery of care toward their needs (and away from that of others).

Unfortunately, some of these topics have become politicized, creating friction over pronoun use, racial representation and other hot-button issues. Consider: aside from the social benefits of striving for greater inclusivity, there's valuable data to be gleaned from seeing all facets of your patient. You wouldn't do an eye exam and fail to look at the retina. Bring that same inquisitiveness and attention to the rest of the person to get the complete picture. ■

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BY PAUL M. KARPECKI, OD
CHIEF CLINICAL EDITOR

THROUGH MY EYES

New Beginnings

Start preparing for the therapeutics potentially coming this year.

There is something special about beginnings. It's an opportunity to start again, learn from the past and anticipate and even accelerate the future. If you position your practice now for what is likely to come, you can thrive in the new year. Fortunately, there are numerous exciting innovations we can anticipate in 2022 that will allow us to do exactly that.

Prepare for Presbyopia

With Vuity (Allergan) recently hitting the market—the first FDA-approved eye drop to treat presbyopia—and another low-dose pilocarpine that is preservative-free potentially coming in 2022, we have to anticipate the presbyopia opportunity, especially since there are about 32 million patients who have never seen an optometrist and use reading glasses.¹

The first visit requires a comprehensive eye exam, binocular vision testing, a dilated fundus evaluation, assessment of chronic inflammation and advanced pupil testing.

The opportunity is more than just a new therapeutic for reading via pupil constriction, it's also about educating patients about PALs, presbyopic contact lenses and, in some cases, light-adjusting or multifocal IOLs.

Dilating Drops Replacement

A new microdose (8 μ L) dispenser known as MydCombi (Eyenovia) may become available this year. Compared with three drops at 30 μ L to 50 μ L each (topical anesthetic, phenylephrine and tropicamide), the option of delivering a dilating agent through an easy-to-use

dispenser seems appealing for doctors (cost-saving and quicker administration) and patients (minimal burning, reduced tearing, less makeup smearing and only one application). It may also increase efficiency and possibly reduce the duration of dilation after the exam.

“**In the interest of patients and your practice, the most prudent thing you can do is prepare and accelerate to ensure you thrive as each key development comes to fruition.**”

MGD/DED Lipid Solubilizing Agent

There is also a good chance we will see a new therapeutic from Bausch + Lomb that can solubilize thickened meibum. It's the first dry eye drug in the United States that achieved a statistically significant improvement in pre-specified signs and symptoms in only two phase III clinical trials. If you consider the fact that 86% of all DED involves MGD, having a drop that could liquify hardened meibum would be a valuable addition.

With the recent approval of Týrvaya (Oyster Point) and availability of Parasymp Plus Eyes (TJ Nutrition), we can tackle the neurological component of DED. Likewise, the use of these neurological agents results in stimulation of meibum, mucin and aqueous.

Taming Demodex

The first drug for *Demodex* blepharitis, TP-03 (Tarsus Pharmaceuticals),

achieved positive results in trials and may be approved this year. Currently, mechanical blepharoexfoliation (Blephex, Alcon) and a Manuka honey extract/coconut oil cleanser (MyboClean) coupled with a unique silicone brush is showing success in managing *Demodex*.

It has been shown that 58% of all patients observed in an optometric office show the presence of collarettes (clear sleeves at the base of the lashes that are pathognomonic for *Demodex*). It's time to begin the new year by having patients look down while at the slit lamp and scanning across the base of the lashes.

Dry Macular Degeneration

An exciting potential injection to treat dry AMD, which constitutes 90% of all cases in the United States, may see approval. The drug, from Apellis, works on the complement system and was shown to reduce the size of geographic atrophy in patients with dry AMD. But even patients with wet AMD may see a significant advancement with Susvimo (Genentech), which was FDA-approved a few months ago. It's a port system for delivering anti-VEGF into the vitreous to alleviate the need for frequent injections and office visits. I suggest starting to educate your dry AMD patients now about a potential treatment that may be available soon.

The inevitable future can sometimes be slowed but, as it's been said, what you resist, persists. So, in the best interest of patients and your practice, the most prudent thing you can do is prepare and accelerate to ensure you thrive as each key development comes to fruition. ■

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About
Dr. Karpecki

Dr. Karpecki is the director of Cornea and External Disease for Kentucky Eye Institute, associate professor at KYCO and medical director for Keplr Vision and the Dry Eye Institutes of Kentucky and Indiana. He is also chair of the New Technologies & Treatments conferences. He consults for a wide array of ophthalmic clients, including ones discussed in this article. Dr. Karpecki's full disclosure list can be found in the online version of this article at www.reviewofoptometry.com.

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Time to Go Deep

Ready to uncover what's lurking beneath the surface?

Doctors, it's time to take a moment for introspection. No, this is not a column about colonoscopies (again). Google "introspection." It's way different. Now, let's all take a deep cleansing breath and be honest with ourselves and each other. It's calming, I promise!

1. What's the first thing that pops into your head when I say the word "optometry"? Your profession? Your income? Helping people see stuff? Vision plans? Online refractions? (For me? Lunch. I would have turned into a raving loon many years ago if it weren't for my lunch breaks.)

2. What's the first thing that pops into your head when I say the words "contact lenses"? Sclerals? CRT? Overwear? Ulcers? (For me? Lunch, again. That's when, every day, I try another multifocal to see if it works better.)

3. What's the first thing that pops into your head when I say the word "family"? Your kids? Your grandkids? Your mom and dad? Too much hubbub? (For me? Yet again, lunch—you guessed right! It's the only time a family member isn't jabbering in my ear.)

4. What's the first thing that pops into your head when I say the word "lunch"? Vickers, quit talking about lunch? (For me? Uh, I can't really think of anything. Come back to me again later.)

Okay, you get it. We are a part of a huge machine involving life in general. It's easy to get sucked into the black hole of activities, products and

well, lunch. Stuff is constantly popping into our puny minds. Maybe we all need to stop for a second and let ourselves breathe. But if we do that, the vast majority of us optometrists will feel, unfortunately, awkward.

You heard me right. Why awkward? It's because we have allowed the outside world to dominate the inside world. This creates stress and anxiety, and the only way to cure stress and anxiety is to look within, but we have all forgotten how to do that, right?

In the mid-80s (not *my* mid-80s, *the* mid-80s!), I had a three-year bout with anxiety and agoraphobia. Married with two young children, I only felt "normal" at the office and at home. In many instances, I could barely leave home unless I was going to work. The low point was when I almost didn't go with my wife to see Barry Manilow in concert. Now that I think about it, all things considered, that may have been an advantage, but Barry surprised me and turned out to be pretty good after all.

I finally visited a psychiatrist. It reminded me of the Soupy Sales show, a children's TV show from my era way back when. In one scene, this guy comes to Soupy's front door and

says, "Hey! You gotta help me! My wife thinks she's a couch!" Soupy answers, "Why don't you take her to a psychiatrist?" The guy responds, "We need the extra furniture when company comes over!"

So, I saw the doctor three times. I told him that I was too anxious to even go to optometry meetings because I was afraid I might pass out. He calmly responded, "You're in a room full of doctors. I think they'll know what to do." I thought about my colleagues giving me mouth-to-mouth. This mental image only made things worse for me, much worse.

He gave me a prescription for Valium (diazepam, Roche). There were no real anxiety meds at that time. I never took it, but, for some reason, carrying the bottle around in my pocket seemed to help enough to make a difference.

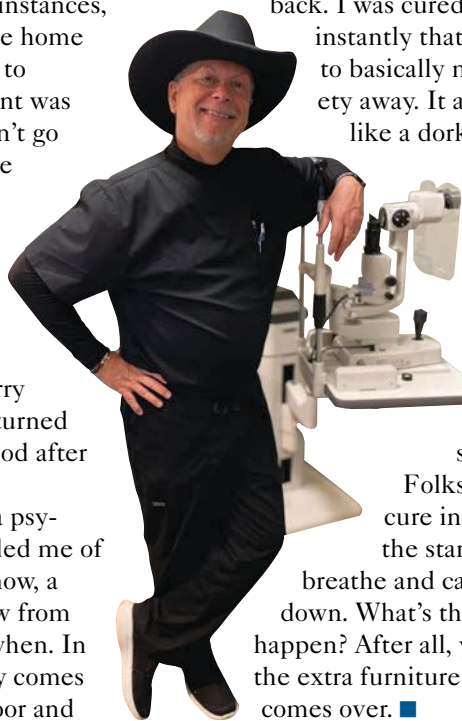
We did one session of biofeedback. I was cured. This taught me instantly that I had the power to basically meditate my anxiety away. It also made me feel like a dork for paying that

guy for three visits when I had the cure inside me the whole time.

So, what's the first thing that pops into your head when I say "peace"?

Folks, you've had the cure inside you from the start. Look within,

breathe and calm yourself down. What's the worst that could happen? After all, you may need the extra furniture when company comes over. ■



From the experts

Why encourage patients to follow an eye hygiene regimen?

Answered by Dr. Paul Karpecki, OD, FAAO

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EDITED BY PAUL C. AJAMIAN, OD

CLINICAL QUANDARIES

Shingle Repair

Chronic, debilitating pain following herpes zoster must be managed promptly.

Q I have a patient that presented with shingles on his left arm and trunk three months ago. The skin lesions are resolving, but he is still in severe pain. What is his prognosis, and what can he do to alleviate the suffering?

A With nearly every adult in the United States exposed to the varicella zoster virus (VZV), the same virus that causes chickenpox, an individual has about a 30% lifetime risk of the virus reactivating and causing herpes zoster (HZ). Postherpetic neuralgia (PHN) is the most common complication, affecting 20% of patients.¹⁻⁶

PHN, or pain that persists at least 90 days after the initial rash, can be described as severe burning, electric shock-like sensations or itching at the site of the original rash.¹⁻³

“Many patients will suffer from a modest amount of pain during the acute phase only to be blindsided with excruciating pain weeks later when physically they appear to be healing,” says Taia DeLano, OD, of Columbia, MO. “Watch your older patients who have severe pain in the acute phase, ophthalmic involvement, a more severe eruption and underlying systemic conditions.”¹

Acute Therapies

Chronic pain therapy should start with appropriate management of the acute

phase of HZ. If possible, oral antivirals such as acyclovir (800mg five times a day for seven days) or valacyclovir (1g TID for seven days) should be initiated within the first 72 hours.^{3,4} While this doesn't reduce PHN risk, it decreases the time that new lesions form while speeding up the time to lesions' full crusting. It also reduces pain during the initial episode and reduces the pain's duration by about 50%.^{1,3,5}



Even mild zoster lesions, as seen on the forehead, can cause severe PHN.

Glucocorticoids, oral analgesics and nonsteroidal anti-inflammatory drugs are often used in conjunction with oral antivirals for patients in the acute phase with mild-to-moderate pain.^{1,3}

Dr. DeLano also suggests a cool compress to the affected area, a simple yet effective therapy that can be implemented in-office or at home.

Chronic Therapies

Many times, severe pain will need to be managed with systemic treatments by pain management specialists. First-line therapies include antidepressants such as amitriptyline (initial dose of 10mg to 25mg orally at bedtime, increased by 10mg to 25mg per week to a target of 75mg to 150mg daily), and anticonvulsants such as gabapentin (300mg to 600mg three times a day). The latter can reduce pain by almost

half, but the time needed to achieve this makes it less desirable.^{1,3,4,7}

Topically, two options have been approved for PHN treatment, although evidence to support either is lacking. A 5% lidocaine patch can help with short-term pain control, and capsaicin 0.075% cream has been used but does not offer substantial relief for most.^{1,4,7}

Opioids offer good pain relief in PHN; however, due to their common misuse, addiction and high side-effect profile, they are a third-line option.^{1,4,7}

Newer treatments that warrant further investigation are more invasive. Botulinum toxin has been shown to offer relief for neuropathic pain. Neuromodulation allows for a more targeted approach and has shown promise in PHN prevention.^{2,7}

“Prevention is key with HZ and PHN,” Dr. DeLano says. The recombinant adjuvant Shingrix (GlaxoSmithKline) is the two-shot vaccine that is much more effective and lasts longer than the Zostavax shot that is now off the market. Dr. DeLano says this vaccine is approved for adults 50 years and older, even if they have had Zostavax. Its two doses are more than 90% effective at preventing shingles and PHN. Protection stays above 85% for at least the first four years after vaccination. ■

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About
Dr. Ajamian

Dr. Ajamian is the center director of Omni Eye Services of Atlanta. He currently serves as general chairman of the education committee for SECO International. He has no financial interests to disclose.

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THE ROLE OF RACE AND ETHNICITY IN OPTOMETRY

Biologic factors combined with social patterns create distinct patterns in how eye diseases manifest. Though not foolproof, these give us at least a sense of a patient's elevated risk for certain conditions.



BY BRIAN CHOU, OD
SAN DIEGO

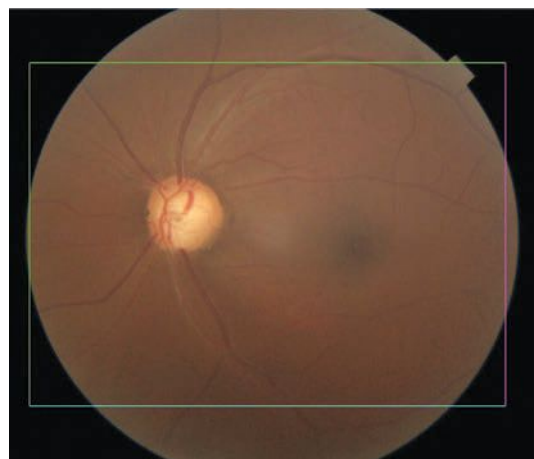
While *race* and *ethnicity* are often used interchangeably, race has to do with biological and physical features which generally cannot be hidden. Ethnicity refers more to cultural identification, language and customs adopted by people from a geographic region. Discussing race and ethnicity is fraught these days. Blame social media for stoking tribalism while amplifying hate and polarization. Profitability for the social media giants lies in optimizing user engagement by appealing to our paleolithic emotions. Users stay glued to these platforms when triggered into outrage, which amplifies culture wars. By first recognizing that social media latches onto the attention economy and succeeds when we are emotionally triggered, we can purposely begin a reflective, calm and meaningful discussion on the role of race and ethnicity in eye care.

Knowing a patient's race and ethnicity can help optometrists with diagnosis and treatment when it comes from a place of compassion and empathy.

What follows is a look into how race and ethnicity factor into diagnosing and treating select ocular conditions, including glaucoma, macular degeneration, diabetic eye disease, keratoconus and myopic degeneration. Finally, learn what to expect as healthcare moves from assessing patient race toward individual genetic make-up.

The Healthcare System

In law enforcement, racial and ethnic profiling is frowned upon, as it can discriminate against a minority population based on negative stereotypes. By comparison, in healthcare, physicians use race and ethnicity to predict disease risk and treatment efficacy. Classic medical examples include how cystic fibrosis is more common in white patients, specifically those of Northern European ancestry, and how sickle cell anemia affects predominantly Black people. In eye care, a retinal hemorrhage in a Black patient may signal sickle cell retinopathy. An Asian patient who complains of eye redness after drinking may be experi-



Glaucomatous optic nerve with inferior notching.

encing conjunctival hyperemia related to alcohol flush syndrome, as 60% to 80% of East Asians have a reduced ability to metabolize alcohol.¹ Despite how race and ethnicity can help a clinician, doing so comes with certain dangers.

The shortcoming of using race and ethnicity to assess health risk is that it involves stereotyping and applying populational data to an individual. As clinicians, we must ask ourselves if this is always valid. Understandably, people of color may question race-based healthcare, particularly if it could lead to discriminatory care.

About the author

Dr. Chou practices at ReVision Optometry, a referral-based scleral contact lens and keratoconus clinic in San Diego. He authored *Practical Spanish in Eyecare* and has served on the Transitions Optical Diversity Advisory Board for over a decade. He has no financial interests to disclose.

Indeed, there is evidence that racial and ethnic bias and stereotyping can lead to inequities in quality of care. For example, a 2016 study in *Proceedings of the National Academy of Science* investigated why Black Americans are systemically undertreated for pain compared with white Americans.² The researchers found that half of medical students and residents surveyed believed that Black and white people are biologically different and that Black people are more tolerant of pain. This assumption was born from the slavery era when it was thought that Black people have thicker skin than white people, according to the researchers.

Black patients are almost four times more likely to suffer from kidney failure than non-Hispanic white patients.³ There is ongoing debate in nephrology on whether it is appropriate for doctors to routinely apply a “race correction” to their formula for the estimated glomerular filtration rate (GFR). This “correction” results in Black patients ending up with higher GFR values, suggesting better kidney function. In turn, this can contribute to worse kidney care for Black patients. For this reason, a growing number of medical institutions are abandoning race adjustment for estimated GFR. Critics say that lower health indicators among Black patients reflect the experience of being Black.

Finally, the COVID-19 pandemic has exposed differences in access to healthcare and preventive measures. People of color disproportionately bear the brunt of COVID-19 illness and mortality. However, Black and Hispanic people are not genetically more susceptible to coronavirus; rather, it appears that external factors hold greater influence.⁴ People of color commonly live in more crowded situations with less healthcare access, and a larger number tend to work in the food service and transportation industries where there is an increased contagion risk, a higher burden of cardiovascular and other chronic diseases and elevated exposure to stress related to violence and racism, all of which contribute to higher rates of COVID-19 illness and mortality.⁵

In 2020, the House Ways and Means Committee requested input from professional societies in healthcare to re-examine how race is misused within clinical care.⁶ In part, this was prompted by an article in the *New England Journal of Medicine*, which highlighted examples of race correction used in cardiology, nephrology, obstetrics and urology and considered how these clinical algorithms can perpetuate or even amplify race-based health inequities.⁷

Let’s now turn toward select eye conditions and the role race and ethnicity play in each.

Glaucoma

The world’s leading cause of irreversible vision loss, glaucoma is a group of eye conditions that cause optic nerve damage, leading to blindness and visual impairment. Primary open-angle glaucoma shows increased prevalence and greater clinical severity in populations of African ancestry compared with those of European or Asian origin. It is six to eight times more likely to cause blindness and 15 times more likely to cause visual impairment in African Americans than Caucasians.^{8,9} The age-adjusted prevalence of open-angle glaucoma among African American residents of Baltimore receiving Medicare is 7.84% compared with 1.96% among their Caucasian counterparts.¹⁰

There is also a high prevalence of open-angle glaucoma among self-identified Latinos of primarily Mexican ancestry 40 years and older. According to the Los Angeles Latino Eye Study, in which 6,142 participants underwent a complete ophthalmologic examination at a clinical center, the prevalence of open-angle glaucoma was 4.74%.¹¹

Despite the high prevalence of open-angle glaucoma among African Americans and Hispanics, the largest affected group in the United States is older non-Hispanic white women. However, this is expected to shift to Hispanic men over the next few decades.¹²



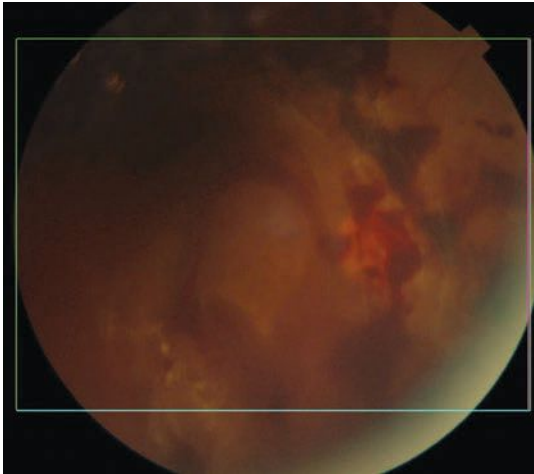
Pigmentary changes in dry AMD.

In terms of glaucoma detection, researchers recently suggested that normative databases for commercial OCTs must shift from predominantly Caucasian-based to include more ethnic-specific data. This would decrease the chances of glaucoma misclassification in different patient demographics whose OCT findings may vary.¹³

Importantly, a recent study published in *Ophthalmology* found that in a representative sample of Medicare beneficiaries with glaucoma, significant racial disparities exist in eye care utilization.¹⁴ After stratification by socioeconomic status, Black beneficiaries were less likely than whites to have outpatient follow-up and glaucoma testing but more likely to undergo procedural intervention for glaucoma. The authors concluded that this suggests systemic racism may independently drive these differences in Blacks, whereas disparities between Hispanic and Asian vs. white beneficiaries were largely explained by socioeconomic status.

Another recent paper, also in *Ophthalmology*, found that Black adults with glaucoma are significantly less likely to see an ophthalmologist or optometrist for glaucoma care, which may contribute to worse visual outcomes.¹⁵

Certain types of glaucoma are more common in specific groups. Vietnamese patients have a much higher prevalence of narrow angles and a greater risk of angle-closure glaucoma than white patients.¹⁶ Japanese American patients



Diabetic retinal and vitreal hemorrhages.

are at a much greater risk of normal tension glaucoma than white patients.¹⁷ Scandinavian patients are more likely to develop pseudo-exfoliative glaucoma.¹⁸

Glaucoma treatment can have different effects depending on a patient's race. Prostaglandin analogs are the first-line pharmaceutical treatment due to their efficacy in reducing IOP, once-daily dosing and excellent safety profile.¹⁹ Curiously, the drug travoprost has greater efficacy among African Americans. In a large Phase III trial, travoprost 0.004% lowered IOP in African American patients by almost 2mm Hg more than non-African Americans.²⁰ Furthermore, a higher percentage of African American patients responded to travoprost 0.004% and reached lower target IOPs than with either latanoprost 0.005% or timolol 0.5%.

On the other hand, certain glaucoma surgeries such as trabeculectomy may be less successful for Black patients due to an exaggerated healing response, suggested by a tendency for the conjunctivae of Black patients to contain more fibroblasts and conjunctival macrophages.²¹

Macular Degeneration

AMD, a degenerative retinal disease impacting the elderly, arises from a complex relationship between genetics, age and external factors including smoking and diet. AMD is the leading cause of vision loss and blindness

in Americans aged 65 and older.²²

Older white patients are at the greatest risk of developing AMD. In 2010, 2.5% of white adults aged 50 and older had AMD, whereas 0.9% each of Blacks, Hispanics and people of other races had AMD.²³

Multiple studies have reported a higher rate of AMD in white vs. Black patients. Pooled data from the Baltimore Eye Survey, Blue Mountains Eye Study, Beaver Dam Eye Study, Rotterdam Study, Melbourne Vision

Impairment Project and Salisbury Eye Evaluation Project showed that in whites aged 80 and older, 16.4% of women and 11.9% of men had AMD.²⁴ The same meta-review of pooled data for Black people from the Barbados Eye Study, Baltimore Eye Survey and Salisbury Eye Evaluation Project showed that female and male Blacks aged 80 and older had an AMD prevalence of 2.4% and 1.6%, respectively.

Caucasians with light irises may be more prone to AMD, according to one study.²⁵ However, a meta-study found that it is not clear if this is always the case.²⁶

A leading hypothesis is that the greater amount of melanin in RPE cells in Black populations may protect the RPE cells and Bruch's membrane, either by acting as a free radical scavenger or absorbing high-energy wavelength light, and reduce drusen formation and pigmentary changes.²⁷

Optometrists should anticipate older Caucasian patients' concerns about AMD and take a proactive stance to discuss lifestyle modifications to minimize risk. In the same breath, this does not mean that optometrists should disregard the potential of AMD in other patient populations. It is possible that practitioners have bias in under-detecting and under-treating AMD in other racial groups. Studies have found that Black patients with AMD are 23% less likely to receive intravitreal anti-VEGF treatment and 18% less likely to have

regular eye examinations compared with their white counterparts, although it is not known if this reflects clinician bias or other factors.²⁸

Diabetic Eye Disease

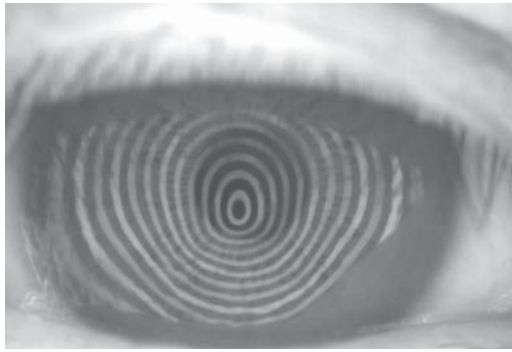
Among the US population, numbers from 2018 estimated that 34.2 million people of all ages, or 10.5%, had diabetes.²⁹ Diabetes is well-known to disproportionately impact racial and ethnic minorities.³⁰ There are multiple factors that underlie these disparities, including biological, clinical, health system-related and social factors. Diabetes can increase the risk for cataract and glaucoma and lead to sight-threatening outcomes such as diabetic retinopathy.

The prevalence of diagnosed diabetes in US adults aged 18 and older is greatest among American Indians and Alaska natives (14.7%), followed by Hispanics (12.5%), non-Hispanic Blacks (11.7%), non-Hispanic Asians (9.2%) and non-Hispanic whites (7.5%).²⁹

A retrospective study of 53,900 American Indians and Alaska natives with diabetes served by the Indian Health Services' teleophthalmology program using ultra-widefield imaging found that 28.6% had diabetic retinopathy, 3% had diabetic macular edema and 3% had sight-threatening disease.³¹

The Veterans Affairs Diabetes Trial, involving 1,283 patients (~20% Hispanics and ~20% African Americans), found that severe diabetic retinopathy was more frequent in Hispanics and African Americans than in non-Hispanic whites.³² The authors indicated that these differences did not seem to be explained by age, duration of diabetes diagnosis, A1c or other standard risk factors. Although it might appear that Blacks are biologically at a greater risk for developing type 2 diabetes, a study published in 2017 in the *Journal of the American Medical Association* suggests that this may not be the case and that obesity is the primary culprit for the difference.³³

Furthermore, among adult patients with diabetic macular edema who received intravitreal injections of beva-



Irregular placido rings in corneal topography.

cizumab, Black patients had a significantly lower likelihood of visual acuity improvement compared with white and Hispanic patients.³⁴

As every optometrist knows, an eye exam may be the first indicator of systemic disease, including diabetes. Due to lower rates of racial and ethnic minorities seeking general healthcare, optometrists can play an important role in reinforcing why and when our patients need to see a physician to maintain their general health.

There are several online resources serving minority groups with elevated prevalence of diabetes. For example, the CDC has the Native Diabetes Wellness Program.³⁵ The National Eye Institute and the National Eye Health Education Program have tip sheets encouraging clinicians to help African Americans and Hispanics/Latinos to reduce their risk of diabetic eye disease with the acronym TRACK: **t**aking their medications, **r**eaching and maintaining a healthy weight, **a**dding physical activity to their daily routine, **c**ontrolling their blood sugar, blood pressure and cholesterol, and **k**icking the smoking habit.^{36,37} To help communicate with native Spanish speakers, the National Eye Institute has Spanish language brochures on diabetic retinopathy available for download.³⁸

Keratoconus

While keratoconus comes nowhere close to the prevalence of glaucoma, macular degeneration or diabetic retinopathy, affecting about one in 375 individuals, it now gets a disproportionate amount of attention due to our

ability to compellingly manage it with corneal crosslinking and scleral contact lenses.

Perhaps the most instructive study to date on race demographics and keratoconus was published in *Ophthalmology* in 2016.³⁹ The authors looked at an entire US managed care network, identifying 16,053 beneficiaries with keratoconus. After accounting for confounding factors, Black patients had 57%

higher odds of developing keratoconus, Latinos had 43% higher odds and Asian Americans had 39% lower odds compared with whites. Previous studies on race demographics and keratoconus did not include adequate populations of racial minorities to measure differences in risk.

The roughly 50% higher odds of keratoconus among Black and Latino patients was not previously described in the literature. This finding suggests value in increased screening for keratoconus in these populations. One of the leading manners of diagnosing keratoconus is during laser vision correction consultation. One study found that 8.59% of candidates seeking laser vision correction had keratoconus.⁴⁰ Due to the high cost of elective refractive surgery, there may be fewer laser vision correction consultations among Black and Latino underprivileged populations and consequently fewer opportunities to diagnose keratoconus this way. This is similar to how these minority populations are disadvantaged by experiencing greater COVID-19 illness and mortality.⁴¹

Optometrists should be more inclined to suspect keratoconus in their Black and Latino patients and to order corneal topography when clinical findings include high and oblique astigmatism, reduced best-spectacle corrected visual acuity, lower measured IOP, steep keratometries, variable refraction outcomes, error messages on autorefraction and degraded image quality on retinal imaging and ocular coherence tomography. The stakes of early diagnosis are elevated due to

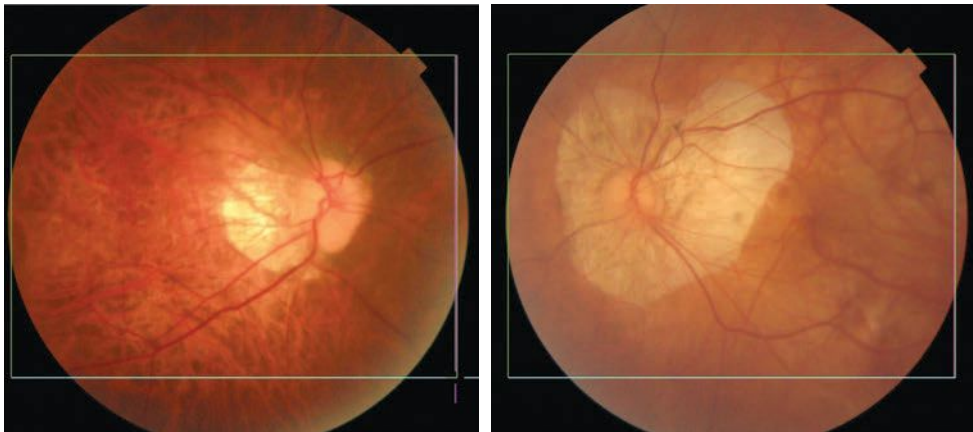
the FDA's 2016 approval of corneal crosslinking system iLink (Glaukos) and the opportunity to slow or arrest disease progression. However, even if keratoconus is diagnosed when stable, prompt identification is valuable due to the efficacy of scleral contact lenses in restoring functional vision and quality of life.⁴²

The *Ophthalmology* study's finding of lower risk of keratoconus among Asians differs from two previous studies out of the United Kingdom. The first UK study, with 338 keratoconus patients, found a four-fold increase in incidence of keratoconus among Asians.⁴³ The second study (74 keratoconus patients) found over a seven-fold increase in incidence of keratoconus, with the authors noting that most of their Asian patients were from Northern Pakistan where the community has a tradition of consanguinity.⁴⁴ Both UK studies did not perform multivariable regression modeling to account for confounding variables, which may explain the discrepancy with the *Ophthalmology* study.

Myopic Degeneration

A literature review indicated myopia prevalence in school children ranges widely by geography (73% in East Asia, 42% in North America, 40% in Europe and 10% in Africa and South America).⁴⁵ Genetic and environmental factors play a role in the increasing worldwide prevalence of myopia. Many clinicians are concerned about myopic progression potentially leading to vision loss due to myopic maculopathy and retinal pathology, including retinal detachment. Low levels of outdoor activity and prolonged near work are risk factors for myopia, according to recent studies.

Particularly among Chinese American parents, there is an elevated level of anxiety about their children's myopia development. Anecdotally, practitioners with robust overnight corneal reshaping practices report that a disproportionate majority of these patients are Chinese American children. This ethnocentric observation may have underpinnings based on national policies in China.



Myopic degeneration showing thinning and atrophy of the posterior pole. Eyes of Asian patients have more pigment (left) than eyes of Caucasians (right).

In 1963, the Chinese Ministry of Education introduced daily eye exercises in all schools throughout China with the intent of reducing and preventing myopia.⁴⁶ These exercises involve applying pressure to acupuncture points around the eyes, supposedly to improve blood circulation, reduce fatigue and minimize myopia development. Despite the longstanding national requirement for these exercises, their efficacy is questionable, with one study conducted over a two-year period not finding any statistically significant reduction in myopia onset or progression.⁴⁷ In addition, some schools in China have used metal bars on student desks to prevent children from getting too close to their reading material and curtail myopia development.⁴⁸

In 2018 Xi Jinping, president of China, urged his citizens to pay greater attention to the myopia epidemic in China.⁴⁹ In May 2021, the country's Ministry of Education revealed a five-year plan to reduce myopia, with school measures including limited digital screen time, paper-based homework and increased outdoor activities.⁵⁰ Some of these measures are based on evidence, whereas others are based on popular beliefs. The collective effect of these policies is a cultural stigma surrounding myopia among the Chinese.

The heightened concern among Chinese American parents about their children's myopia is common enough that practitioners should proactively

discuss myopia management options as part of their treatment plan. An increasing number of optometrists view myopia management, which orbits around low-dose atropine, multifocal contact lenses and corneal reshaping, as a practice growth opportunity.

A Societal Shift

Healthcare seems to be moving in the right direction, identifying more appropriate treatment methods on an individual basis and increasing awareness of the need for such management options for better overall patient outcomes.

Personal genomics. A growing number of Americans identify as multi-racial. In the 2020 census, 9.6% of the total population was two or more races.⁵¹ With an increasing multi-racial population, the paradigm for using race and ethnicity to assess risk of eye disease becomes less clear. For example, how is an optometrist to assess glaucoma risk for a biracial Black and white woman? Instead, knowing the genetic make-up of a patient through genomic testing will become more relevant. The field of precision medicine is already making its mark on cancer treatment, using data-driven outcomes to guide the most effective management option based on an individual's genetic make-up.⁵²

Optometrists may envisage a day when glaucoma patients receive topical therapy or surgery according to their genomic data rather than self-reported

race and ethnicity. There has already been a genome-wide association study (GWAS) of African ancestry populations to evaluate potential mechanisms of pathogenesis associated with primary open-angle glaucoma.⁵³ GWAS has also been performed for exfoliation syndrome, which better elucidates the genetic basis of this condition and how secondary glaucoma may develop.⁵⁴

Looking into the future, Avellino recently launched AvaGen, a genetic test claimed to definitively identify TGFBI

gene corneal dystrophies including epithelial basement membrane, granular types 1 and 2, lattice type 1, lattice type 3a, Reis-Bucklers, Schnyder and Theil-Behnke. AvaGen also provides a risk assessment for keratoconus. The clinical validity and utility of many of these personal genomic tests is still unknown, but the hope is that they may allow for clinical interpretation with less clinician bias and stereotyping, with improved outcomes based on the most effective approach for an individual.⁵⁵

Diversity recognition. Awareness of diversity, which also extends to religion, sexual orientation and gender identity, among other factors, is increasing. Millennials and Generation Z are much more likely to outwardly identify as LGBTQ than older generations.⁵⁶ Similar to racial or ethnic risk for disease, there are health risks associated with the LGBTQ population. For example, there is mounting evidence that the LGBTQ population is at increased risk for cardiovascular disease compared with their cisgender heterosexual peers, posited to be driven primarily by psychosocial stressors.⁵⁷ Cigar, cigarette and e-cigarette smoking is higher among transgender adults than adults whose gender identity corresponds with their birth sex.⁵⁸ Recognizing increased risk can help better serve the patient, particularly when the clinician also acknowledges that there is individual variability.

Just like how an 80-year-old woman may wonder how a 25-year-old male optometrist can relate to her eye care needs, a similar dynamic may occur when a Black woman is examined by a white optometrist. The same can be said about other disparate characteristics between the patient and the clinician. Self-awareness is a good first step, but this doesn't mean calling out obvious differences and making them an emphasis of the relationship.

Another key is recognizing that good care transcends racial and ethnic differences, language barriers, socioeconomic status and age. In each of these situations, human connection and trust can develop over shared emotions and feelings. Ultimately, humans are more in harmony with one another than we are different. We can still relate to each other based on commonalities while also celebrating our differences and the variety that they bring. ■

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FRAME SELECTION

Optical dispensaries can cater to their practice's racial and ethnic demographics. For example, a practice with primarily Asian patients may find that European style eyewear does not accommodate flatter Asian noses. An "Asian-fit" frame line, TC Charton, is designed so that their eyewear does not slide down the nose and impact the cheeks. Other frame lines such as Oakley offer an Asian style nose bridge in most of their popular designs.

An optical serving a largely Black community may find it helpful to skew their frame selection to include frames for larger interpupillary distances (IPD) that are customary of this patient demographic. One study found that the adult Black male has an average IPD of 70mm vs. the adult white male who has an average IPD of 62mm, while the adult Black female has an average IPD of 66mm vs. the adult white female who has an average IPD of 60mm.⁵⁹

There are new technologies to assist in frame selection according to individual facial anatomy, including Topology Eyewear, which uses an iPhone or iPad with depth sensor technology to scan a patient's face. The resulting scan and app allow the optician to either select the best frames from stock to accommodate the patient's facial anatomy or, alternatively, to design custom-made eyewear specific to the patient.

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CONNECTING ACROSS CULTURES: HOW TO REACH OUT TO HISPANICS

This burgeoning group offers an ideal example of the need to develop “cultural competence” in the clinic. Other distinct communities are profiled here as well.



BY HECTOR C. SANTIAGO, OD, PhD
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The face of America is changing. By 2050, more than 50% of the population will be comprised of minority groups, which can cause unease for some who feel the changing demographics are also altering the character of the United States.¹ But hopefully, this demographic inevitability will be an impetus for optometrists to better understand the needs, attitudes and interpersonal dynamics of individuals with backgrounds that differ from their own.

Hispanic growth is particularly astounding. This group alone contributed more than 50% of the US population growth in the last decade. The 2020 Census revealed that there are now 62 million Hispanic individuals in the US.² By 2040, one of every four Americans will be Hispanic.*

Who are they? The Census defines Latinos as people descended from



Photo: Getty Images

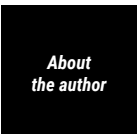
Optometrists who can make Hispanic patients feel welcome will engender trust and loyalty among this growing population.

Cuban, Mexican, Puerto Rican, Central/South American or other Spanish cultures. Mexican Americans represent almost two-thirds of all Hispanics. This is not surprising since a great

deal of the Southwest was once part of Mexico. Also, millions of Mexicans have worked in the United States for many decades, including the agricultural fields. Puerto Ricans, who are American citizens by birth, are one of every 11 US Hispanics; outside of the island, they usually live in enclaves in the Northeast and Central Florida. One of every 30 US Hispanics are Cuban, and most reside in Florida and the Northeast. Hispanics also include many other groups from Central America, South America and the Spanish-speaking Caribbean.

Hispanic people are descendants of three groups: European (mainly from Spain and Portugal), Indigenous and African. Latinos may have more or less of each component, depending on their country or region of origin. For example, I was born in Puerto Rico. I have 79% European, 12% Indigenous and 6% African ancestry. It is clear that it makes no sense to label Latinos into any traditional racial categories.

* In this article, the terms Hispanic and Latino are used as synonyms. Both are used here to refer to people of Latin American culture of any gender. Nowadays, the term Latinx is also used by a growing number of academics and individuals.



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TABLE 1. SIX REASONS TO PURSUE CULTURAL COMPETENCE³

1. Meet regulatory mandates.
2. Respond to demographic changes in the United States.
3. Address longstanding health and healthcare disparities.
4. Improve the quality of health care and health outcomes.
5. Gain a competitive edge.
6. Decrease likelihood of liability/malpractice claims.

Photo: Getty Images



Hispanic families can be large. Try to accommodate the inclusion of relatives in the clinic when feasible and desired by the patient; for example, to assist with translation.

Latinos are younger (median age close to 30 years) than the US population (median age nearly 39 years). This fact means that you are more likely to see younger families. It is an opportunity to be the optometrist of several generations of them.

These individuals tend to have larger households: 26% live in five-person families or more, about twice that of other groups. This implies that caring for one family member is more likely to be known and appreciated by other members of their families.

Latinos represent over 10% of the nation's buying power (\$1.7 trillion). In just nine years (2000 to 2009), Hispanic buying power increased 69%, compared to 48% for other groups. This implies that you have great opportunities to provide quality eye care services and eyewear to them.

What is Culturally Competent Care?

The notion of cultural competence implies developing the knowledge, skills and attitudes that allow us to understand, become aware and adapt

our care to the patient's needs and expectations. The purpose is to reduce healthcare disparities that arise from cultural barriers, improving outcomes and the patient's sense of receiving empathic care.³ It has also been defined as "the ability of systems to provide care to patients with diverse values, beliefs, and behaviors, including tailoring delivery to meet patients' social, cultural and linguistic needs."⁴ The Association of Schools and Colleges of Optometry (ASCO) cites six critical reasons for ODs to develop skills in this area (*Table 1*). Some US states already require optometrists to fulfill an annual continuing education requirement in cultural competency, and others are likely to follow.

Becoming culturally competent implies cultural humility, which has been described as "a lifelong process of self-reflection and self-critique whereby the individual not only learns about another's culture, but one starts with an examination of her/his own beliefs and cultural identities."⁵ For instance, even aside from our family backgrounds and cultural

identities, we optometrists all practice and espouse medical culture, a data-driven and pro-treatment mindset that can be at odds with patients who value their personal or spiritual beliefs at least as highly.

Of course, some skeptics brush all this off as another form of political correctness, arguing that it is the task of US citizens from other cultures to assimilate into mainstream American society. I feel that attitude creates blind spots in the way one approaches eye care, reduces our effectiveness and limits the growth of our practices.

Opinions and willingness to pursue cultural competency will differ, but adopting this approach takes less effort than you may realize. Some practitioners believe that becoming culturally competent is a complicated task. I often tell them that most of us already practice some form of cultural competence. For example, when we examine children, we adapt our language, gestures, equipment and examination to their needs. When we examine the elderly, we may modify the speed of our exam, lighting, contrast and tone of voice. It is no different when we examine patients of different ethnicities, values, ages, religions or national origins: we adapt our methods and demeanor to serve their needs better and achieve better outcomes.

Eyecare professionals who want to serve Hispanics and prosper as a result of their growth must become culturally competent. We all have cultural eyeglasses that filter our perceptions and judge other groups' judgements. As Huff and Kline have expressed, to provide culturally competent care, one must "examine our own perceptions, stereotypes and

Editor's note: To augment Dr. Santiago's commentary about Hispanic Americans, we have asked several optometrists who see other distinct population groups to share their experiences. Look for these contributions in a series of sidebars throughout this article. For an in-depth discussion of the Black experience in optometry, see the article by Dr. Essence Johnson that follows this one.



prejudices toward the target group and be willing to suspend judgments (where they exist) in favor of learning who these people really are rather than who or what you might think they are.”⁶

Beware of Generalization, Stereotyping and Chauvinism

There are barriers to the goal of becoming culturally competent. As we approach our patients, we form hypotheses about them.

Consider: Mrs. Maria Rodriguez from Brownsville, TX, with a Spanish accent, comes to my office. I wonder if she is Mexican American, a devout Catholic with a large extended family. This statement is a hypothesis or

THE ASIAN POPULATION: DIVERSE UNTO ITSELF

By Mary Hoang, OD, Memphis, and Gary Chu, OD, Boston

Dr. Hoang is an assistant professor at SCO. Dr. Chu is vice president of professional affairs at NECO.



The Asian American group is a growing minority.¹ However, the population is far from homogenous and more nuanced than statistics depict. Though they (or their ancestors) are from the same continent, most do not share the same language, beliefs, customs or history. Grouping this population into a single entity masks meaningful distinctions. Nevertheless, we will attempt to elucidate some beliefs based on the limited research available.

Asians have immigrated to North America for myriad reasons. Some came for educational opportunities, while others immigrated because of occupational shortages. Some Asian groups may have entered the United States via refugee status. Hence, the history and socioeconomic status of each group is vastly different; their understanding of US culture and the English language also varies considerably.

Some commonalities include respect for authority, value of education, providing for one's family above all else and a stigma related to mental health issues. When caring for an Asian American patient, providers must have cultural considerations in mind, such as the patient's belief regarding etiology of illnesses, unfamiliarity of Western medicine and methods, and language barriers.^{2,3} While diverse Asian ethnic groups share some commonalities regarding healthcare beliefs, it's important to note that each group also has unique cultural beliefs about health and illness. These may also be further influenced by religious dogma. There are also situations to consider within the context of multigenerational households. For example, a patient is likely making their medical decisions collectively with their family members instead of by themselves.

Understanding an Asian American patient's health beliefs and perception of present illness is important to care for them effectively. For example, improper diet and stress as causation of illness and routine exercise as illness prevention are consistent beliefs across many Asian American subgroups. The Chinese perspective is influenced by traditional Chinese medicine, which is rooted in maintaining a balance between yin and yang. An imbalance in these forces, it is believed, may result in illness.⁴

A traditional Vietnamese belief is that there is a balance of hot or cold wind in one's body, better known as "hoi", and "giac" is a remedy to balance the elements in which heated glasses are placed onto the skin to draw out the bad wind. This treatment leaves a round, red mark that has

Photo: Getty Images



led to Vietnamese parents being prosecuted for child abuse. Nowadays, this is better known by the mass media as "cupping" after it was popularized by athletes like Olympic swimmer Michael Phelps as a way to heal faster. Despite the popularity of alternative medicine such as cupping, healthcare providers have limited knowledge of traditional Asian interventions, which impacts outcomes for Asian Americans. Patients may not take their medicine for a variety of reasons. It is the provider's responsibility to find out why. They may be using alternative traditional treatments. Spending time to understand these practices will aid the provider to negotiate the best ways to manage the patient's ocular conditions.

Studies indicate both Western and non-Western patients prefer a partnership style of communication when discussing their health care, but a paternalistic communication style prevails among Asian American families. This is likely in part due to Southeastern Asians adhering to a social hierarchy, even in the context of their health care. Doctors are generally accepted to be higher on the social hierarchy and respect must be given to people of this high status; patients will defer to the doctor and their medical recommendations out of respect. Subsequently, a partnership communication style may not be the most appropriate in the cultural context of many Asian American patients. If mutual medical decision making is desired, doctors must overcome the patient's default to deference and politeness and encourage them to become more active participants in their health care.⁵

It is especially challenging to provide care for a patient who does not speak your language, and initially, our Asian American patients may appear to be agreeable to the prescribed treatment plan if some communication is lost in translation. Many will use their children to interpret, but that

adds other challenges, since the child is not equipped to handle diagnoses that are vision- and life-threatening. To overcome this, it is recommended to use certified medical interpreters who understand the cultural context and can act as a liaison for both cultures. Offering interpretation relieves anxiety because the patient's concerns and complaints will be addressed and engenders a trusting relationship between doctor and patient.

It is also important to remember that there will be various subcultures within an Asian American family. Keep in mind the culture of the family's origin, the culture of the immigrant family moving to North America and the culture of their children—who may feel they do not belong to their culture of origin or the culture of North America. Noting these struggles and providing compassion to these challenges will aid the provider in navigating how one may approach the delivery of care. For example, a parent may not want their child to wear soft contact lenses because of cost but their child may want contact lenses to fit in at school.

Each Asian American group faces vastly different challenges, and their understanding of US culture and English varies widely. Caring for a patient who speaks a different primary language requires thought and skill, and a cooperative approach will appeal to the preferred partnership style of communication and keep family members involved. Even though many Asian American groups hold some common beliefs regarding health care, each subgroup holds its own cultural views about health and illness. Understanding these perspectives will help the provider effectively to manage the patient's ocular conditions.

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generalization that I am willing to test during my conversation with her. I am open to other alternatives and willing to suspend my judgment until I find out. On the other hand, if based on the same facts, I conclude that she is Mexican American, devout Catholic with a large extended family, and I am not willing to test this hypothesis, I am stereotyping her—a barrier in the road to becoming culturally competent.

Chauvinism—the belief that one’s group, nation or culture is superior to others—is often a barrier to accepting others. Each of us may feel that “our” way of life seems normal and right, while others may appear abnormal, irrational or inferior. Chauvinism may show in our interactions with our patients. For example, we may ignore their explanation of their illnesses. We may belittle or even prohibit the use of traditional remedies. This behavior is a sure way to lose the confidence of your Hispanic patient.

Hispanic Cultural Values

The patient’s habits and beliefs are often the best guides to culturally competent care. Each cultural value will guide our behavior toward each group. Here we must walk a fine line: it is essential to treat each person as an individual and not assume that their membership in a particular group necessarily means they will behave in a certain way. However, I would like to articulate several traditional core values of Hispanics that may be present in your patient:

Respeto. This means the consideration and deference each person deserves as a human being, but also as a function of their age, education, reputation and achievements.

Implications: As an eye care professional with a high level of education, optometrists receive *respeto* from their patients. By the same token, the patients expect *respeto* from their doctors. One of the most common faux-pas of non-Hispanic optometrists is to greet the patient with their first name on their first encounter (“Good morning, Pedro”) as a way to seem



OPTOMETRY INSIDE THE ARCTIC CIRCLE

By Gregory Black, OD, Ft. Lauderdale, FL

Assistant professor at Nova Southeastern University

On Alaska’s northwestern coastline near the Bering Strait, 33 miles north of the Arctic Circle, lies the village of Kotzebue. There, Maniilaq Eye Clinic is the sole provider for an area the size of the state of Indiana. Dr. Meagan Lincoln, who was born and raised in Kotzebue, established the current optometry and opticianry programs within the hospital in 2016, and I have been involved in village travel since 2017.

There are 11 villages within the Maniilaq service area, with Kotzebue as the regional hub. Among the population, 83% of the 8,623 residents are Inupiat.

As with every population, there are subtle and not-so-subtle differences. With a population density of 0.20 per square mile, it is understandable that patients will have a larger personal space bubble than elsewhere in the US. In this isolated area, patients are more independent in most aspects of life. In the optometry clinic, for instance, they prefer to insert and remove their contact lenses themselves. Discussion of the impact of birth control pills and hormone replacement therapy for dry eye and LASIK considerations is a more delicate conversation in Kotzebue than it is in South Florida. Accustomed to a good deal of personal space, patients need to be warned that they will be tilted back for BIO prior to the procedure rather than while I tilt them back, otherwise they will flinch. These were learned very quickly due to the reactions experienced, and my approach changed.

The use of nonverbal communication is more common in this region; for example, kids will use an upward eyebrow movement to signal yes and scrunch their nose to signal no. I no longer ask a yes/no question if a child is behind the phoropter or I have my back to them.

A couple of characteristics of the population have made refraction and drop instillation significantly easier. Patients actually know which is better one or two and will even volunteer “same” without prompting. The vast majority of pediatric patients accept drops if it is explained that it will only sting for 30 to 45 seconds. The pediatric patients have a bravery that I have not seen in other populations. In speaking with nurse practitioners and dental colleagues, they report a similar response to injections and dental procedures.

As a provider who has cared for many different cultures, races and religions in both South Florida and now rural Alaska, I have learned that by displaying respect, concern and compassion for your patients, you will be seen as a trusted provider. You will make mistakes, but learn from them. Look for clues of discomfort, which are usually going to be nonverbal. Listen when a patient gives you advice. Also remember that everyone is an individual; just because something is common in a population doesn’t mean that it applies to everyone. If at all possible, seek out advice from an optometrist representative of the population you are serving. Dr. Lincoln is extremely helpful in that regard for me.

Caring for Indigenous populations may not be an everyday experience for many optometrists; when it arises, knowing some basic characteristics of the group will help you build a rapport one-on-one.

friendly and put them at ease. You should instead refer to the patient with their surname (“Welcome, Mr. Rodriguez” or “Señor Rodriguez”). It may be acceptable to use their first name as you get to know them over time.

The patient may be using complementary medicine (such as herbs) and even consulting a folk healer (*curandero*). It’s essential to push back against your own bias toward medical culture and instead respect the patient’s cul-

tural traditions while still counseling them on what you consider the best course of care, without expressing disdain or ridicule.

Some older Hispanic patients may avoid direct eye contact. You may misinterpret this behavior as a lack of interest in your conversation. Avoidance of eye contact from the patient is a sign of respect to you as a doctor and an authority figure. Accept that and maintain your eye contact with the patient.



Photo: Getty Images



THINGS TO CONSIDER DURING MUSLIM PATIENT ENCOUNTERS

By Mawada Osman OD, MS, Columbus, OH

Assistant professor of clinical practice and outreach coordinator at OSU College of Optometry

The Islamic faith encompasses a largely diverse group of people from many different ethnicities, cultures and backgrounds. In the United States, the majority of Muslims are immigrants from Middle Eastern/North African and South Asian countries, which make up about 30+ nations. Although the diverse cultural and ethnic background is intertwined with an individual's religious beliefs, there are certain aspects that are unique to the Islamic religion that may have an impact on health behaviors and overall health-care experiences and outcomes.



Photo: Getty Images

In Islam, both men and women are required to behave and dress modestly. This includes wearing loose-fitting clothing for both genders and wearing a head covering known as a "hijab" for women. As modest behavior is highly recommended in Islam, you may find some patients reluctant to shake hands with a provider of the opposite gender. This should not be taken personally or interpreted as offensive. Instead, you could greet your patient with a head nod and raising your hand to your chest as a way of showing respect and understanding. Patients may also prefer and request to have a provider of the same gender. When possible, these services should be provided to the patient. However, if not possible, especially with smaller clinics, it is important to request permission from the patient whenever performing clinical examination/procedures that require direct touch of the patient—for example, lifting the eyelids. Wearing medical gloves would also be preferred.

One aspect that we do not think much about as optometrists is a patient's dietary requirements. Pork consumption is prohibited in Islam. We need to keep this in mind when prescribing oral medications such as antibiotics that come in capsule form. The capsules are made of pig-based gelatin and some patients might feel uncomfortable consuming such medications. Another medication we tend to prescribe as optometrists are AREDS2 supplements. Most come in softgel form, which also contains gelatin. Alternatives should be used when possible.

Family plays an integral role in the Muslim community. Family members, both nuclear and extended, are consulted regarding important medical decisions, especially surgical procedures. Communicating and building trust with family members should be as much of a priority as it is with the patient—especially those family members that come in with the patient.

Creating a welcoming environment in your office space allows your patients to feel more comfortable and included. This can be done by displaying images of a diverse group of people on your office walls and website. You can take the extra step and reflect that interest by hiring a diverse group of individuals to be a part of your office team. A very important aspect in delivering culturally competent care to your Muslim patients is just getting to know them. Muslims are multi-ethnic and make up the second largest religion in the world. Have a conversation with your patient expressing your interest in learning more.

The main holidays celebrated by Muslims are Eid Al-Fitr, which is celebrated after the holy month of Ramadan (a time of fasting and spiritual connection), and Eid Al-Adha, which is celebrated on the 10th to the 13th of the twelfth Islamic month (lunar calendar). Extending a simple "Happy Eid" greeting to your patient (or if you want to try the Islamic/Arabic greeting, you can also say "Eid Mubarak," which translates to "blessed Eid") reflects your appreciation for their culture and belief system. At the end of the day, the goal of cultural competence is to create a connection between you and your patient that allows for open communication, building of trust and ultimately providing excellent care.

For a more detailed guide on the delivery of culturally competent care for Muslim patients, see "A Health Care Provider's Guide To Islamic Religious Practices" by the Council on American-Islamic Relations.

Familismo. This cultural value implies that the family is the pillar of society, and there is a strong sense of worth associated with belonging to a family. The family typically includes the father, mother, siblings, grandparents, nieces, nephews and godparents.

Implications: Hispanics may come with family members to the appointment. Consider a larger waiting room if you practice in a neighborhood where many Hispanics visit your office. Be willing to allow a family member inside the exam room if the patient desires.

Family members usually assist others when they need help with their care. For example, they may help dispense eye drop medications to an elderly relative as required. They may be the ones to remind their family members of their medical appointments. Therefore, it is practical and helpful if that family member accompanies the patient to the exam room.

Also, be aware that many decisions about eye care and eyewear are made with the counseling and assistance of other family members. Although the patient has the ultimate voice, you and your staff should allow the family member's involvement in the decision process.

Personalismo. This value relates to the importance of developing sincere, authentic and caring relationships among human beings above other priorities.

Implications: Get to know your Hispanic patient's interests, hobbies and close family members. Before initiating your examination, devote time to chat about personal matters.

Sit closer (less than one meter), lean forward and provide handshakes as needed. This behavior will help you obtain *confianza*—your patient's trust—to envisage you as someone who cares about them. Gaining *confianza* will allow you to be not only the optometrist for the patient but more likely the optometrist that other family members will choose and prefer.

The Concept of Time

Many Americans display the characteristics of what can be described as a linear-active culture—they perform tasks one at a time, sequentially, and punctuality is considered very important. On the other hand, many Latinos display the characteristics of a multi-active culture. They may perform different tasks almost simultaneously. Human relations and transactions are considered more important than following a schedule.

You may find that some of your Latino patients may not show on time and you may be irritated by this, pos-

sibly coloring your impression of this individual. To avoid such an outcome, prepare yourself for at least the possibility of this. You may want to ask them to arrive earlier than expected to make sure you keep your schedule, or you may decide to have some flexible appointments where they are examined in the order they come to your office.

The Concept of Space

The Latino distance of comfort for interaction is about 80cm (roughly 2.5 ft.)—closer than the typical American. Hugging, handshakes and kissing on the cheek among Hispanic women are acceptable.

As you examine your patient, learn to sit closer to them and express friendship through handshakes. Distancing yourself is a sure way to be perceived as a cold, unfriendly doctor.

The Language Barrier

One of the biggest obstacles to optimal care is the language barrier, especially for older Hispanics. The ideal solution is learning basic conversational Spanish by the optometrist. The second best is hiring caring bilingual staff members who may serve as interpreters.

If you do this, make sure they are trained and understand the rules of interpretation. They must not add or omit any words nor hold side conversations with the patient. The first-person approach is recommended—if the patient says, “I have pain in my right eye,” the interpreter should say and interpret it as “I have pain in my right eye.” The doctor must always look and address the patient during the interview, not the interpreter. Possibly the best positioning is the interpreter sitting beside and slightly behind the patient, facing the doctor. Alternatively, you may use telephone or video interpreting services.

You should also provide printed information in the native language of the patient. You may acquire educational materials in Spanish printed by the American Optometric Association.

You may use or refer the patient to websites and YouTube videos with information on eye diseases; just make sure that the information is accurate and up to date.

Health Care Needs

Hispanics have the second-highest prevalence of adult obesity (45%) and hypertension (44%) after Black individuals.^{8,9} They also have the second-

highest prevalence of diabetes (17%) after Hawaiians/Pacific Islanders.¹⁰ However, for some Latinos, chubbiness is seen as a sign of healthiness. You should be comfortable counseling them with sensitivity and respect about weight, blood glucose control and healthier lifestyles.

About one-third of Hispanic individuals with diabetes have diabetic retinopathy.¹¹ This high prevalence



CARING FOR ORTHODOX JEWISH COMMUNITIES

By Daniella Rutner, OD, New York City

Associate clinical professor and chief of vision rehabilitation at SUNY College of Optometry

Judaism is an ethno-religion (i.e., conferred both through birth and through conversion) comprised of the beliefs and practices of the Jewish people as recorded in their several-millennia-old scriptures (chiefly, the Torah) and oral traditions (compiled in the Talmud). Since roughly the mid 19th century, it has consisted of three major denominations: Reform, Conservative and Orthodox. The latter, Orthodox Judaism—which counts itself historically the oldest of the three traditions—is strictest in practice, most recognizable in dress and, by intention, the least integrated into mainstream American culture. Notable examples of strict practice are dietary restriction (“keeping kosher”) and refraining one day per week from work-related activities (Sabbath observance every Saturday). Perhaps the most universally notable example of recognizable dress is the male head covering.



Photo: Getty Images

The “Orthodox” umbrella is quite wide, including within it “Ultra-Orthodox” subgroups such as Hasidic, Chabad and Yeshiva. A clinician treating patients from these Ultra-Orthodox subpopulations should be sensitive to some potential sources of cultural friction:

Language. The more stringent Orthodox denominations (Hasidic and Yeshivish) are inclined to live and work in communities that proactively foster cultural insularity, and that reality may present the clinicians with some language barriers. Often, English is not the primary language spoken at home so much as Yiddish or Hebrew. Frequently, women moving within these subpopulations are more fluent in spoken and written English than their husbands or male relatives.

Education. Adult educational levels vary greatly among the Orthodox Jewish population, spanning anywhere from advanced degrees to the equivalent of middle grade-school. It should be noted that in the more stringent yeshivas (schools), the English alphabet is not introduced until age 6 or 7.

Physical modesty: touch. Typically, Orthodox Jews will avoid any form of touch with members of the opposite gender outside immediate family, often preferring to avoid even shaking hands. Accordingly, the physical examiner should minimize touch and attempt to educate the patient prior to touching. Gloves are advised, as they naturally work to emphasize the clinical nature of the interaction.

Physical modesty: dress. Modesty is also reflected in Orthodox Jewish attire, extending even to the types of frames the young male patient might be permitted to adorn himself with in school or within his social milieu.

General propriety: speech. Many Orthodox Jews actively work to ethically monitor their own conversation, purging from their habits of speech aggressive commentary such as sarcasm and even, in some cases, needless discussion of trivialities. As a result, they may well be more sensitized to certain forms of “casual” or quasi-intimate conversation, with discussions that tread on private or personal matters very possibly making them uncomfortable.

General propriety: physicality. A male and female ought not to be alone in a room with a closed door. If there are no cameras in the clinician’s room or window panels on the door, leaving the door slightly ajar will assist the patient’s general sense of propriety, as will having another person in the room (with the patient’s permission). Finally, it is important to note that eye contact is understood to belong to the realm of potentially intimate interactions and is best minimized by members of the opposite gender. The same is true of physical space; the clinician should try to avoid standing invasively close to the Orthodox Jewish patient.



OPTOMETRY IN APPALACHIA: CHALLENGE YOUR ASSUMPTIONS

By Kurt Steele, OD, Newport, TN

Private practitioner at Vision Source of Newport

The people of Appalachia have been unfairly stereotyped by Hollywood as uneducated and backwards in just about every way. Having practiced in Newport, TN (population: 6,868) for the last 26 years, I've seen this unfair bias against rural America disproven time and time again.

Yes, a significant percentage of this community typically does not pursue higher education. In the 2020 census, only 12% of Newport residents reported having a college degree. But this affects their earning potential more than anything else. The median household income of \$24,124 is well below the national average of \$67,521 and the poverty rate here is 42.9% (vs. 11.4% nationally). However, this tight-knit, hardworking community takes care of one another and is part of the reason we also have an extremely low cost of living.

While 90% of the population may be white, I don't see this manifest as a bias against other races, although I'm sure that many of my patients would feel like a fish out of water in Los Angeles or New York. It is interesting to note that two of our last three city mayors have been African American.

This is a devoutly Christian community, and in fact, one of the things I enjoy doing with my patients after giving bad news is praying. Most of our patients love that. I always pray with them when I am referring them for cataract surgery and especially for a sight-threatening issue. Sometimes we even pray just if they are having some bad times in life. That might be something different we do here that may not be done in other areas of the country.

This strong religious conviction does not, however, mean my patients are opposed to heeding medical advice—another stereotype out there. As a matter of fact, as someone who's been a member of a small rural community for so many years, I feel the trust our patients have in us is unmatched in any other geographical area. These are people I go to church with, see at the grocery store and encounter in all walks of life. They know me, they respect me and they listen to me.

Financially, there are definite hardships to address without sacrificing quality of care. We often have to work with our cataract surgeon and/or retina surgeon to allow flexible payments when a patient requires tertiary care. We have to get creative on charging. For anyone without insurance, we charge a flat fee per year that covers not only that emergency visit but all follow-ups and a full exam with a pair of single vision glasses.

Also, being in a small town, we can often barter with patients for our services. For the first corneal foreign body I removed, I was reimbursed four jars of moonshine!

In terms of eye disease prevalence, we see lots of diabetic retinopathy, as people in rural Appalachia certainly have dietary staples that are not the best. Also, we have lots of welders and see a fair amount of foreign body cases from local medical providers. We are also in an area that sees more retinitis pigmentosa than most ODs would.

I think it's safe to say most optometrists in the US don't have much experience with rural life. It's definitely different than what we see happening in the rest of the country. I certainly have no complaint of an "overabundance" of optometrists, and we serve on staff at our local hospital. We get all referrals from local medical facilities, and it makes for a very interesting and varied career. I love my community and cannot imagine practicing anywhere else.



Photo: Getty Images

patients. Be aware that some of these generalizations may not apply to your patient. Be open-minded and be willing to learn about the patient you have in front of you.

Latino presence is here to stay. Their numbers are growing fast, and within 20 years, the group will fully constitute one-quarter of American society. Their buying power is also increasing at a rapid pace. The demand for eye care services will dramatically increase during the coming decades. Understanding Latino cultural values and becoming culturally competent can serve them better and promote the growth of our practices. ■

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implies that all Hispanics must have a comprehensive dilated fundus examination at every visit.

About one-fourth of Latinos lack a primary health care provider.¹¹ You may maintain a list of primary physicians that you deem are more likely to be Latino-friendly to refer your patient as needed. One of every five

Latinos may lack health insurance.¹² However, many are willing to pay out-of-pocket if they value their doctor and eye care services.

Caveats and Takeaways

In this article, we have expressed generalizations about Hispanics and other groups. Avoid stereotyping your

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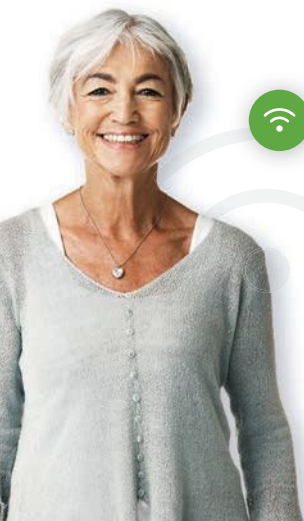
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BREAKING DOWN BARRIERS: THE BLACK EXPERIENCE IN OPTOMETRY

How to establish trust and provide effective communication to create a stronger connection between optometrists and the Black community.



BY ESSENCE JOHNSON, OD
DALLAS

Let's be reminded of the oath we took when becoming a doctor of optometry. When we recited the optometric oath, we affirmed that the health of our patients will be our first consideration; we will provide professional care for the diverse populations that seek our services with concern, compassion and due regard for their human rights and dignity; we will work to expand access to quality care and improve health equity for all communities; we will place the treatment of those who seek our care above personal gain and strive to see that none shall lack for proper care; and we will do the utmost to serve our communities, our country and humankind as a citizen as well as a doctor of optometry.¹

When you take a minute to reflect on certain aspects of the optometric oath, it is a mighty task that nearly 46,000 optometrists have committed to assume the care of the eyes of over 331 million individuals in the United States. The population of Blacks or

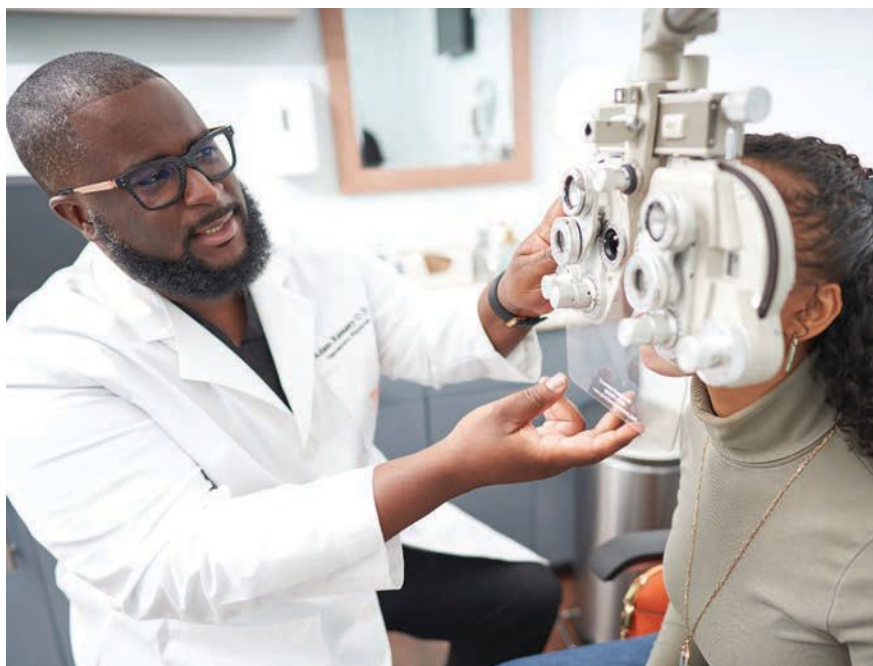


Photo: Adam Ramsey, OD

Adam Ramsey, OD, co-founder of Black EyeCare Perspective (BEP), treats a patient at his practice in West Palm Beach, FL.

African Americans alone or in combination with other racial groups totals 46.9 million people.² Providing eye care to this demographic is a formidable task for all providers. Relegating the care of the entire Black community to the

1.8% of optometrists that look like them proves to be an even more daunting task.³

Studies show minority physicians are more likely to practice in underserved areas and have patient populations

About the author

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with higher percentages of minorities than their white colleagues.⁴ There are also studies that show better health outcomes for Black patients when they are in the care of a Black doctor. Although about a quarter of Black adults would prefer to receive care from a Black doctor, 65% found it difficult to find a doctor that shared the same experiences and background as them, but 75% of Black adults found it easier to find a doctor that treated them with dignity and respect.⁵

While it is a preference for some to have a Black doctor, the reality is, finding a Black doctor can be like searching for a needle in a haystack. While a history of racism, discrimination and mistreatment has created a communal mistrust, disengagement and sometimes avoidance of the healthcare system altogether in the Black community, there is more myth than truth that Black people generally harbor negative attitudes and beliefs regarding their health, specifically when it comes to eye care.

Society has created the narrative and many providers have adopted the perception that Black patients do not care about their health and do not prioritize



Photo: Essence Johnson, OD

From left to right: Jacobi Cleaver, OD, director of program management, BEP; Emely Miniño Soto; Tiffany Humes, OD; Essence Johnson, OD, chief visionary officer, BEP; Avia Dolberry and Ijem Ozodigwe. Photographed at the 2021 American Academy of Optometry meeting.

their eye care. Comments collected from 17 focus groups of 119 older African Americans residing in Birmingham and Montgomery, AL “were predominantly positive (69%), highlighting the importance of eye care and behavior in

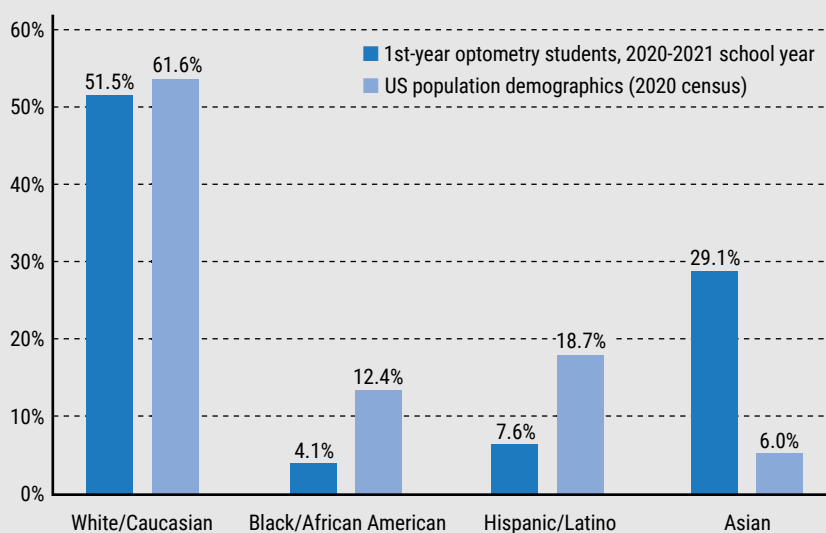
their lives and attitudes that facilitated care.”⁶ Affordability and accessibility to care are more commonly reported than generalized apathy as reasons to why many Black patients have not had an eye exam.

Biases—conscious and unconscious—prove to be barriers to care for our minority patients, especially those of the Black community. It is most often assumed that when a patient is lost to follow-up, they have given up on their care instead of considering whether they had a positive experience, had a life-changing event, lost insurance coverage or just simply forgot. Doctors from all backgrounds can better connect with Black patients by establishing trust, effective communication (time and tone), patient education (teach) and assisting their patients with ways to make it easier to access care (transportation).

Increase Accessibility

Expanding office hours (evening and/or weekend options), providing a list of alternative transportation options and patient appreciation gifts in the form of gift cards for gas or rideshare services

RACE/ETHNICITY OF OPTOMETRY STUDENTS VS. US POPULATION



Sources: Association of Schools and Colleges in Optometry; US Census Bureau. Data do not include individuals who identify as mixed race in any categories

This graph shows the disproportionate ratio of Black/African American individuals pursuing a career in optometry relative to the population as a whole.



From left to right: Breanne McGhee, OD, trustee at-large, National Optometric Association (NOA); Essence Johnson, OD, region IV trustee, NOA; Sherrol Reynolds, Immediate Past NOA President and Edward Larry Jones, OD, current NOA President.

are a few ways to help patients get to the office. Another way to improve accessibility is by bringing your services into the Black community. Schools, churches, nursing homes, mobile clinics and volunteer opportunities connect the Black community with optometrists to receive eye care, eyewear and education.

If you are personally unable to increase accessibility for patients due to local socioeconomic factors (*i.e.*, low income, lack of insurance, difficulty making appointments due to work schedule or lack of childcare), being able to refer patients to other offices or clinics, or direct them to programs for assistance helps them keep their health a top priority while also feeling like they are the doctor's top priority. Breaking down barriers to care can be achieved by getting to the patient.

It Begins With Trust

The infamous Tuskegee Syphilis Study was not about eye care, but the trauma it imparted on the relationship the Black community has with health care overall has transcended specialties and families, passing on an understanding of distrust from generation to generation. What many would prefer to write off as an old wives' tale is a part of history and sadly remixed in other

examples that resonate even currently in the Black community. Whether it be Henrietta Lacks, Serena Williams, their own mother/sister/friend or themselves, many members of the Black community can unfortunately raise their hand admitting they have been victimized by yet another system they thought was in place to help them.

Studies that have looked at the racial differences in patient trust have correlated it with the effectiveness of the communication behaviors of the

physician. Trust in minority patients, particularly in the Black community, has been associated with patient satisfaction, treatment adherence, continuity of care and improved health.⁷ Therefore, breaking down barriers to care simply starts with building trust.

Be Aware of Behavior

An observational cross-sectional study on the impact of perceived discrimination in health care on patient-provider communication defined perceived discrimination "as the perception of differential and negative treatment because of one's membership in a particular group."⁸ Similar to the association of the lack of trust to lower patient satisfaction and poorer health outcomes, a patient's perception of discrimination in healthcare settings can cause a cascade of negative mental and physical health outcomes.

The study also highlighted that discrimination in the form of racism and classism was perceived most often amongst African Americans, whereas white patients felt like their provider did not listen to them. Consciously or unconsciously, when a patient does not feel heard by their doctor, not only do they feel disrespected, but their trust, satisfaction and motivation to stay engaged in their healthcare diminishes.



Photo: Darryl Glover, OD

Darryl Glover, OD, co-founder of BEP.

When doctors communicate with patients, it is important to be aware of both informational and affective behaviors. Informational behaviors, such as data collecting, had a lesser effect on trust in Black patients when compared to affective or partnership building behaviors. Doctors are not dictators giving commands, but the doctor-patient relationship is an ever-evolving partnership where together they collaborate coming up with treatment plans and learning from one another. Creating a positive rapport helps remove barriers to care especially in the Black community, although it takes time to establish. Physicians can monitor their affective behavior by knowing these aspects of rapport building:⁷

- positive (compliments, laughter)
- emotional (empathetic or concern statements)
- negative (criticism, disagreements)
- social (small talk)
- understanding (paraphrasing or repetition)

Remember, it is not only what you say but how you say it or do not say it. Verbal as well as nonverbal communication can equally convey a tone. Even with a mask on, people can tell if you are speaking to them with a smile and it takes self-awareness and practice to not mirror a patient's negative affect. Similar to how imagery is used to help combat jitters before speaking in front of a crowd, picture your patient as a member of your own family and ask yourself if that was your parent/grandparent/sibling, how would you like them to be treated?

Be mindful of pronouns and whether or not a patient prefers to be addressed by their first and/or last name. If you are unsure how to pronounce someone's name, simply ask them to say it for you so you don't mispronounce it. Breaking down barriers to care can be achieved by talking to patients with a positive tone.

Take Time With Each Patient

With patients scheduled 10, 20 or even 30 minutes, the goal is to see each one

as effectively and equitably as possible. Be mindful of how it may look from a patient's perspective: How long are they in the office? How many patients are they witnessing being seen before them? Not every patient can understand the complexity of each individual's case. Creating a standardized approach to every patient will create a cadence and routine patients will become familiar with over time, and they will grow to understand the elements of an exam and base their visits on quality over quantity.

An element of the exam that is often short-changed is patient education.

Economic factors aside, the average health literacy in the Black community is perceived to be low. Quite frankly, in general people "don't know what they don't know." They may not know their family's health history due to complex family dynamics or a familial hierarchy. At least once in an optometrist's career they will meet a patient with a "stigma" or "cadillacs." This is another opportunity to break a barrier and bridge a gap through educating the Black community on astigmatism and cataracts, as well as the top diseases that cause blindness in racial and ethnic minorities—the "three silent killers:" diabetes, hypertension and glaucoma. Breaking down barriers



Darryl Glover, OD, and future optometrist Emely Miniño Soto.

to care can be achieved by spending more time with patients and making patient education a priority.

Are We There Yet?

It is not uncommon in the Black community to take on a "do as I say" and not "as I do" mentality. Surveys show that four out of five Black people acknowledge eye exams should occur every year, but year after year less than half of the people in the Black community get their eyes examined.⁹ The same plan employed to get more Black people to the polls or to get the COVID-19 vaccine should also be employed for eye care with the same level of excitement and societal and

WAYS TO SUPPORT NATIONAL ORGANIZATIONS

The National Optometric Foundation (NOF) and Diversity Perspective are the philanthropic and charitable arms of the National Optometric Association (NOA) and Black EyeCare Perspective (BEP), respectively. All tax-deductible donations go toward advancing their missions. Individuals and corporations can make donations by selecting the NOF when shopping at Kroger or AmazonSmile, or at www.nationaloptometricassociationdonations.square.site. Donations can also be made to Diversity Perspective at www.paypal.com/paypalme/13promise by choosing Diversity Perspective when making qualifying purchases using AmazonSmile.



Photo: Nicole Brody

Nwamaka Ngoddy, OD, practices in Atlanta and is also the creator of Anwuli Eyewear, a line of frames specifically to fit the facial features of the Black and African American community.

political support. When asked, affordability and accessibility rank high on barriers to receiving eye care. On a national level, inadequate transportation options continue to have a negative impact on the health and well-being, particularly of the elderly in the Black community.⁶

Support National Organizations

While research currently supports patients of the Black community that may be treated by non-minority doctors are at higher risk of adverse medical outcomes, it was the recommendations from American educator Abraham Flexner’s 1910 report that has negatively impacted Black doctors, and patients and the ramifications are still felt centuries later. Flexner’s findings resulted in the closing of all but two of the seven historically black medical schools that educated Black doctors at the time—Meharry Medical College and Howard University—and infected society with the belief that Black doctors should only treat Black patients, but if not properly trained and treated, the Black community would be a health threat to affluent white communities.

Preceding the release of the Flexner report, what is now known as the National Medical Association (NMA) was founded in 1895 by a group of physicians who were denied membership into other professional organizations and societies, like the American Medi-

cal Association which was founded in 1847.¹⁰ The American Optometric Association was founded in 1898; for some of the same reasons the NMA was established, 25 African American optometrists gathered with the purpose to establish a nationally recognized optometric association comprised of Black doctors. That meeting took place in the spring of 1969 and was the first of many for the National Optometric Association (NOA).¹¹

With the mission of “Advancing the Visual Health of Minority Populations,” membership into NOA is open to all ODs with diverse backgrounds willing to make an investment in the future of optometry and eye health, and passionate about supporting NOA’s purpose to recruit minority students into the schools and colleges of optometry and placement into appropriate practice settings upon graduation, in addition to educating and caring for the community to eliminate

barriers and disparities in eye health.

To become a member of NOA and help advance its mission, please visit nationaloptometricassociation.com.

Black EyeCare Perspective

It is in part from the network created by the NOA and its student organization (the National Optometric Student Association) and various summer programs (Texas Optometry Careers Opportunity Program at the University of Houston College of Optometry and the Pennsylvania College of Optometry’s Summer Enrichment Program), that optometrists Adam Ramsey, Darryl Glover, Jacobi Cleaver and myself were brought together. Collectively, we are working to redefine the color of the eyecare industry 1% at time through an organization called the Black EyeCare Perspective (BEP).

BEP was designed and created to cultivate and foster lifelong relationships between African American eye care professionals and the eyecare industry. BEP believes one must be united in their efforts and intentional in their impact to truly see the percentage of Black optometrists increase and reflect that of the Census-reported population (1.8% vs. 13%).

In 2020, BEP launched its 13% Promise initiative to encourage commitment and action among individuals and corporations to increase Black and African American representation in eyecare to align with the US Census for better health outcomes of underrepresented communities. Industry partnerships and targeted programming help support the vision of the

WAYS TO SUPPORT BLACK EYECARE PERSPECTIVE

- Join the 13% Promise by committing to a monthly or annual donation of \$130, \$1,300, \$13,000 or more. All donations are tax-deductible and support scholarships, programs and initiatives.
- Refer a future optometrist or volunteer to speak at a Black EyeCare Perspective Pre-Optometry Club meeting held on the 13th of every month.
- Save the date for Black EyeCare Perspective Pre-Optometry Club’s second annual Signing Day in Spring 2022. All students entering into a school or college of optometry in the fall are invited to participate. Follow @bepoc on Facebook and Instagram for more information.
- Purchase merchandise at the BEP Store: www.blackeyecareperspective.myspreadshop.com.
- Share the Black EyeCare Professional locator on www.blackeyecareperspective.com. To be added to the locator, email sam@blackeyecareperspective.com.

13% Promise: to create a pipeline for Black students into optometry, connect communities with Black eye care professionals and Black eye care businesses and cultivate relationships between Black optometrists and opportunities in the eye care industry.

BEP is also creating brave spaces and facilitating courageous conversations within the eyecare community through diversity, equity and inclusion initiatives and influencing the mindset of the next generation of eyecare professionals to raise awareness and impact the industry in ways we have yet to see.

Black Eye Care Perspective Pre-Optometry Club

The Black EyeCare Perspective Pre-Optometry Club (BEPOC), established in 2020, is the first pre-optometry club nationally recognized by the Associations of the Schools and Colleges of Optometry to ensure not a single potential Black or African American student or optometrist is ignored, discouraged or disadvantaged. Nearing a membership of 100 Black future optometrists representing 54 undergraduate institutions—15 being Historically Black Colleges and Universities—membership is free and meetings are held on the 13th of every month. BEPOC is an integral part of the pipeline for increasing the number Black students entering the eyecare profession.

Minding our “T”s

Black Americans, Asian Americans, Hispanic Americans, white Americans—we all are all a part of this nation and the term *American* should ring synonymously with people from all backgrounds, not exclusively with just one group and independent of any other identifying or classifying factors. The health of our patients who are from diverse populations is our first priority. We all should continue to work to expand access to quality care and improve health equity for all communities and strive to see that no one lacks proper care.

HOW TO BROACH DIFFICULT DISCUSSIONS ON RACE

Last November at the AAO meeting in Boston, the Plenary session was devoted to conversations about race—in society and in the clinic. Beverly Daniel Tatum, PhD, an expert on the psychology of racism and race relations and best-selling author of *Why Are All Black Kids Sitting Together in the Cafeteria?*, was the featured speaker. In a “fireside chat” with Academy president-elect Susan Cotter, OD, Dr. Tatum dove into issues of prejudice and racism, describing how they impact health care as a system and eye care specifically. The objective of this session was to have a better understanding of what racism is and how it impacts optometry and healthcare and patients.

Dr. Tatum talked about how hard it is to have conversations about race, but noted that everyone has some experience in this topic—whether they’ve talked about it or not. “We learn early on, in this country at least, that you’re not supposed to talk about some things,” she said. “Thus, an adult’s first instinct is to shush and not talk about sensitive things.”

She explained that when we don’t have these types of conversations, we are learning and reinforcing the idea that we’re supposed to ignore what we can all see happening around one another. That in itself is part of the problem, she argues, and it inevitably bleeds into our professional lives.

Getting rid of stereotypes is also part of the challenge. Here’s three ways Dr. Tatum suggested you can turn conversation into action to limit stereotypes and help you breakdown barriers in your practice:

Interact. Counteract with positive images. If you have limited experience with a particular group and you only know the stereotype, getting to know people in that group in some ways can minimize the impact of stereotypes. Come to understand they are an exception.

Educate Early. Expose children to a wide range of people to help prevent stereotypes from getting drilled in their head. Today, there are several children’s books with diverse images and positive stories of children of all backgrounds that can help this.

Engage. Start engaging with people different from yourself. If you have that skill, you’ll be successful. If not, you’re going to be increasingly isolated, Dr. Tatum noted.

Edward Larry Jones, OD, was part of a group discussion panel following the initial discussion. Some of the things that transpired included him driving home how important it is to make his patients of color feel comfortable. He starts his exams by associating the patient with someone he personally knows and says out loud that he is going to treat him/her just like they are family or a friend, which can put not just the patient more at ease, but himself as well.

He also continued Dr. Tatum’s previous point, saying that by ignoring what’s right in front of you, you become ignorant.

“All of us are educators,” he said. “We can’t walk away from that knowledge. According to the research, 74,000 Black people a year are dying from health disparities. That’s a travesty. We can’t ignore that or walk away from that.”

The secret to creating a stronger connection between ODs and the Black community? Stop creating and accepting as inevitable a self-fulfilling prophecy that there are disparities in healthcare that disproportionately affect minority communities but there is nothing that can be done now to start breaking down the barriers that should’ve never been placed centuries ago.

By minding our “T”s—*trust, time, tone, teaching* and *transportation*—we can break down a few of those barriers to care for patients in the Black community. Together, we can do the small things that make a great impact not just in connecting with the Black community, but in enriching healthcare, advancing eye care and strengthening every doctor-patient relationship. ■

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EVALUATING PATIENTS WITH NEURODEVELOPMENTAL CONDITIONS

Learn how to modify your practice and clinical approach to best manage this population.



BY CATHERINE HEYMAN, OD
FULLERTON, CA

Neurodevelopmental conditions are defined as chronic mental or physical impairments that occur at conception or shortly after birth. These impairments continue indefinitely, and individuals can present with varying functional abilities. Early identification and intervention are important to offering individuals who are differently abled the best opportunity to develop to their fullest potential.

Optometrists play an important role in these patients' care. Epidemiological information tells us that visually handicapping conditions such as strabismus and amblyopia are prevalent in this population.¹⁻⁵ Therefore, early and comprehensive vision care is vital.

While the need for comprehensive eye care is great in these patients, optometrists who feel comfortable evaluating them are rare. However, with a few easy and simple modifications to our schedules, examination techniques and communication

styles, some of the apprehension can be eased. This article offers some clinical pearls and tips for those wanting to incorporate this much-needed service into their practices.

A Welcome Start

Providing vital optometric care is paramount and can be done even in busy offices with easy adjustments. Scheduling patients with special needs can be challenging in a busy practice setting when large groups of people can make some individuals uncomfortable. To best address this concern and still see these patients, ask your staff to set the clinic's expectations about what to expect in your office so the patient can be prepared. Offer a separate waiting area if this is at all possible.

Also, when scheduling these patients, have the scheduler ask the caregiver if there is a time of day that is best for the patient to be seen. Try to accommodate this request so that the patient is more likely to respond well to testing.

Once the patient arrives, try to limit the amount of time they must wait in the reception area prior to the exam. Limit pre-testing with the technician, such as automated visual fields and retinal photos, as these are often techniques that offer limited data and stress the patient.

In the exam room, eliminate clutter on counter tops and remove distractions

such as equipment or objects within reach of the patient as these can be detrimental to the patient's ability to respond.



Signs that a patient is comfortable include relaxed posture, smiling or engaging in any type of friendly interaction with the optometrist.

About the author

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Use a 20D lens and transilluminator for an ocular health evaluation.

Carefully consider the best positioning for each individual patient. This can include leaving the patient in a comfortable wheelchair and having the patient sit on the caregiver's lap or laying on a mat on the floor. Choose the position that will allow the patient to be most comfortable and allow them to respond to testing without expending muscle energy to hold up their head or sit upright if this is difficult for them.

“**Explain what is going to happen and help the patient anticipate a transition to the next task by giving them forewarning.**”

Remember that first and foremost patients with special needs are people. Don't define these patients by their condition. When communicating, use people-first language: “a child with autism,” not “an autistic child” or, worse, “an autistic.”⁶ Never put the diagnosis before the person. Always address case history questions with the patient first and allow them to answer as they are able. The caregiver can fill in the blanks. To the extent possible, have your office staff collect as much case history as possible prior to the patient arriving at the office. This can be done through a web-based

secure history form or over the phone once confirmation of the caregiver's identity is established.

Extended case history during the exam can cause anxiety for the patient, so keep this brief. During the exam, speak in short, declarative sentences and visually support what you say with pointing. Match

your facial expressions to your words and avoid speaking loudly, using sarcasm or repeating instructions over and over. Often, there is a delay in auditory processing; count to five before you repeat yourself as your patient is likely to respond during that time once they have completed processing your instruction.

Adjust Your Technique

Techniques to gain the patient's cooperation during the exam are important. Offering choices allows the patient to decide to participate. Would the patient like to watch Elmo or Mickey Mouse while retinoscopy is being done? Talking your way through the exam also helps. Explain what is going to happen and help the patient anticipate a transition to the next task by giving them forewarning. Let them know you have one more minute with this activity and then you will do something else.

Ask the caregiver for best practices when working with a patient to motivate them and make them feel comfortable. Does this patient respond well to clapping after a task is successfully completed? Are they motivated by stickers or food?

Have the caregiver share the techniques they use with the patient to best motivate this individual. The caregiver can also give the optometrist insight into whether the patient uses sign language to communicate and can show you a few signs that will help throughout the exam. Singing songs during the exam and playing the patient's favorite music or video on a phone or tablet can also help improve cooperation.

Many patients with special needs have sensory issues, such as tactile defensiveness, or an aversion to touch or being touched. Be considerate of this and inform the patient of the need to touch them prior to performing a technique that requires touch or holding an object near the patient's face, such as during a cover test, lens rack retinoscopy or binocular indirect ophthalmoscopy (BIO). Demonstrate the technique with the caregiver or a stuffed animal to help acclimate the patient. Start by touching the patient away from their face and slowly work up to there.

Recognize that behavior is communication. If the patient is becoming tense or beginning to perform self-stimulating behaviors, allow them to take a break. Stimulation



Consider the best positioning for each patient, such as leaving them in a comfortable wheelchair. Choose the position that will allow them to respond to testing without expending muscle energy to hold up their head or sit upright if this is difficult for them.

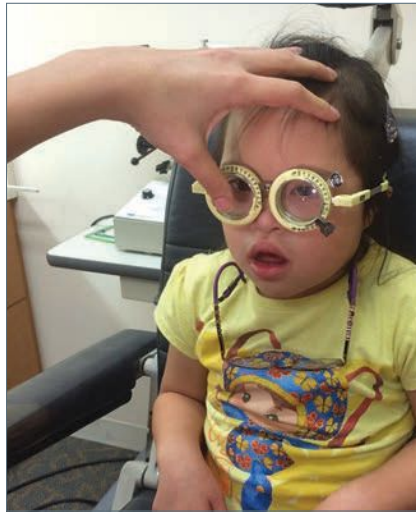


Don't rush, but be efficient. Set a goal of limiting data collection to a total of 30 minutes in the chair at the most.

of large muscle groups is calming, and you can have the patient take a moment to stretch or walk around the room, if they are able. Additionally, ask the caregiver if the patient can have a snack or bottle as way of a break during the exam. A weighted blanket can calm a patient who is upset.

Establish a rapport with the patient to make them feel comfortable with the optometric exam and with you. Watch for signs that the patient is comfortable such as relaxed posture, smiling or engaging in any type of friendly interaction with the optometrist. Have a battery of different lighted toys and high contrast toys, *i.e.*, black and white. Employ the “one toy, one look strategy” when deciding on the number of toys that you will need. If the patient has seen it, grab a new toy to hold their interest.

Begin the exam with versions, gross visual fields and near point of convergence prior to visual acuities to help the patient become comfortable. These allow optometrists to make initial observations about the patient's overall visual functioning that will help guide the rest of the examination. The gestalt of the overall visual function will be developed once the examination is complete.



Be considerate and inform the patient of the need to touch them before performing a technique that requires contact.

Testing should be done to the highest level possible, *i.e.*, using as close to standard techniques as the patient can handle and moving down the level of complexity as needed to meet the needs of the individual patient.

The exam will often be primarily comprised of objective testing. Clinicians will need to be open to using forced choice or preferential looking types of visual acuity testing if the patient cannot perform Snellen acuity, cycloplegic retinoscopy using lens bars, and use a 20D lens and transilluminator for an ocular health evaluation.⁴ Use your observational skills, ability to adapt testing to meet the developmental needs of the patient and your knowledge of what to expect for the patient's particular condition to fill in the data. Limit testing to those data points that provide the most bang for your buck, *i.e.*, look for any amblyogenic factors or treatable disease first and foremost.

The evaluation of a patient with special needs should be efficient: get in, get it done, get out. Set a goal of limiting data collection to a total of 30 minutes in the chair at the most.

Perhaps more than any other population, working with patients with special needs brings with it some unique psychological chal-

lenges. This includes understanding where patients stand with medical procedures they have previously had to endure. One thing that can cause anxiety in these patients is the white coat. Do not wear one when seeing this population.

Other common triggers of anxiety include unexpected or explained procedures and, of course, drop installation. To help with the anxiety of drop installation, be sure to make it quick with limited or no prior discussion. Ask the caregiver to help hold the patient and have an extremely interesting toy to distract the patient once the drops are instilled. Once the drops are instilled, allow the patient to exit the exam room and take a break, have a snack or some other soothing experience.

Let the caregiver know that less patient response is required for the subsequent techniques (retinoscopy and BIO) and that very young patients can actually be asleep during the completion of the examination.

To triage these patients, be familiar with common eye conditions associated with the patient's specific neurodevelopmental condition to help prioritize the most important aspects of the optometric examination.^{2,3}

“Testing should be done to the highest level possible, *i.e.*, using as close to standard techniques as the patient can handle and moving down the level of complexity as needed to meet the needs of the individual patient.”

Resources and Care Team

Optometrists are uniquely able to provide resources for families of patients with special needs. Because vision plays a primary role in learning, the link between optometric services and education is strong. Parents of

Apellis is exploring the role of complement in Geographic Atrophy¹

C3 is the linchpin of complement overactivation in GA.²⁻⁷

All three complement pathways converge at C3 and it drives multiple downstream effects — inflammation, opsonization, and formation of the membrane attack complex — all of which can ultimately lead to retinal cell death. Increased levels of complement activity have been found not just in the lesion itself, but also in the area just outside the lesion, known as the pre-lesion.²⁻⁹



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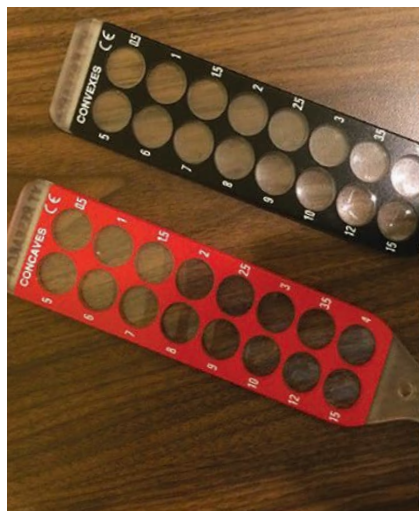
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children with special needs must learn to advocate for their children and navigate what can be a confusing educational system, so offer them resources that could help before they leave your office.

Providing information and support can not only help the family but can also connect the optometrist to the educational system and build their practice. Contact the schools in your local area and introduce yourself to make them aware that you offer this service in your practice.



Retinoscopy lens racks are useful for young children who are unable to sit behind the phoropter.

An interdisciplinary approach is necessary to success. Working as a team with the patient, parents, educators and other professionals involved in the care of a patient allows the optometrist to provide their input towards collaborative and comprehensive care and support.

ANSWERING THE “THREE QUESTIONS”

During their lecture, “Pediatric Special Populations for the Primary Care Optometrist,” at the AAO 2021 Meeting in Boston, Jenelle Mallios, OD, and Matthew Vaughn, OD, relayed to attendees three questions that helps treat this population:

- 1. Can the child see?** Is there significant refractive error affecting their visual demands?
- 2. Are the eyes aligned?** Are there binocular issues affecting their visual demands?
- 3. Are the eyes healthy?**

“If you answer these three questions to the best of your ability, you did your job,” Dr. Vaughn asserted. “You may feel like you didn’t do much, but this is likely the most that anyone has done concerning eye care for these children.”



Be open to using forced choice or preferential looking types of visual acuity testing if the patient cannot perform Snellen acuity.

Have a list of resources in the office, such as brochures with information about parent support groups or local schools that provide additional services for patients with neurodevelopmental conditions. Provide the contact information for other professionals who see children with special needs in your area, such as occupational therapists for patients needing sensory, feeding or gross/fine motor treatment, physical therapists for patients needing muscular/skeletal intervention, speech pathologists who can provide communication devices or speech development services or psychologists who can provide overall support to the patient and the family.

Each professional can provide rehabilitative care for patients with neurodevelopmental conditions. If vision is not the primary or only concern, making referrals to the appropriate professional allows the optometrist to provide comprehensive care as well as build their network of providers who can become a referral source for the optometrist as well.

Providing the family and other professionals with a summary of your

findings and recommendations as well as your referrals should be part of the plan of care when providing holistic rehabilitation for these patients.

Be sure to define the optometric jargon in your reports using laymen’s terms and include visual acuity, refractive status, ocular health and all recommendations including, but not limited to, spectacle wear schedule, patching schedule, classroom accommodations and activities to improve visual function.

Takeaways

The visual needs of patients with neurodevelopmental conditions are prevalent at rates above those of the unaffected population and can be severe. Providing early, comprehensive, interdisciplinary care for these patients is important to improve these patients’ quality of life.

Optometrists who are able to provide this care also enjoy the professional fulfillment of collaborating with like-minded professionals in their communities to care for this underserved population. ■

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HOW TO OFFER INCLUSIVE CARE FOR LGBTQ+ PATIENTS

Recognize inherent biases in practices and implement more supportive behavior to interact with members of this community respectfully.



BY MATTHEW J. ROBERTS, OD,
AND PAULA MCDOWELL, OD
KALAMAZOO, MI; BIG RAPIDS, MI

Being an optometrist has been a rewarding job. However, when I (Dr. Roberts) graduated from school 15 years ago, I was not sure if patients would accept me for being different. I was from a small rural town where diversity was scarce and discussions of diversity and inclusion were not mainstream in culture—let alone in the optometry curriculum. At the time, I was closeted (meaning I hadn’t told anyone about my sexuality) and scared to death that my future would crumble should people know the truth about who I am and who I love. At graduation, I was just coming to grips with who I truly was, but being a part of the lesbian, gay, bisexual, transgender or queer/questioning (LGBTQ+) community frightened me. I certainly did not feel safe enough to trust a medical professional with knowing my hidden truth.

Background

Now I can look back at how far I have come: I am out, married to the love of my life, have an adopted son and a great job within the Department of Veteran Affairs. I have also been appointed the LGBTQ+ Veteran care coordinator due to my advocacy for LGBTQ+ veterans for our facility and smaller out-patient clinics. Never in a million years did I feel that I would be this embraced. Hopefully, this article will allow you as a provider to feel more comfortable with LGBTQ+ patients in your office and to enhance their experience as patients and human beings.

I will never forget having that first, honest discussion with friends, then family, then finally the medical community (in that order). Unfortunately, due to past experiences, this is the case for most people in the LGBTQ+ community.¹ Most, at some point, have felt the stigma of being different in society, experienced discrimination and have psychological insult from

being denied civil and human rights. Further, many have lacked family and personal acceptance of their true self.³

We have come so far in a short period of time with the legalization of gay marriage, but, like human rights movements of the past, there is still progress that needs to be made to reduce disparities and achieve full equality. The largest thing to know is that being LGBTQ+ is not a disease. However, it was only in 1987 that “homosexuality” was removed from the *Diagnostic and Statistical Manual of Mental Disorders*.¹

In reality, the LGBTQ+ community “consists of a cross-cultural, broad range of community members that includes all races, ethnic and religious backgrounds, as well as a range of socioeconomic status.”¹ Therefore, it is so important to become aware of unconscious biases as clinicians to provide the best possible care to patients. As the most recent optometric oath states, “I will provide professional care for the diverse populations

About the authors

Dr. Roberts practices at the VA Battle Creek Medical Center, where he is the team lead of the Low Vision Clinic and the LGBTQ+ Veteran Care Coordinator. He also practices at the Unified Clinics at Western Michigan University in Kalamazoo, MI, where he is also an adjunct professor, a fellow of the American Academy of Optometry and chair of the Michigan Optometric Association’s Continuing Education Committee. He has no financial disclosures.

Dr. McDowell is chief of pediatrics, pediatric residency supervisor and professor at Michigan College of Optometry at Ferris State University in Big Rapids, MI. She is a fellow of the American Academy of Optometry, an investigator for the Pediatric Eye Disease Investigator Group and chair of the Michigan Optometric Association’s Children’s Vision Care Committee. She has no financial disclosures.

who seek my services, with concern, with compassion and with due regard for their human rights and dignity.”² The most recent updates also state, “I will work to expand access to quality care and improve health equity for all communities.”²

The three main ways that a provider can help improve the patient experience are to understand and use appropriate terminology, understand barriers to care for this population and use gender-inclusive practices within the office. In this article, Dr. McDowell and I will discuss how to increase your awareness and best enact these changes.

Using Appropriate Terms

Understanding terminology can help build rapport with patients. This can be difficult, as terminology surrounding LGBTQ+ individuals and identity, in particular, is constantly evolving. However, both the optometrist and staff need to know what is derogatory and what is not; when in doubt, following the patient’s lead is often safe.¹

Previous literature frequently cites out-of-date, derogatory or inaccurate terminology, but the good news is that there is an abundance of recent literature surrounding this topic. The following is a very brief list of some terminology that is prominent within the LGBTQ+ community that all clinicians should be aware of:¹

- **Ally:** a heterosexual and cisgender person who supports equal civil rights, gender equality and LGBTQ+ social movements, challenging homophobia, biphobia and transphobia.

- **Bisexual:** Individuals that are attracted to both males and females.

- **Cisgender:** Denoting or relating to a person whose sense of gender identity corresponds with their assigned sex at birth.

- **Coming out:** Sharing gender or sexual identity publicly.

- **FTM (female to male):** Assigned female sex at birth but identifies as male, sometimes referred to as a transgender male.

- **Gender:** A person’s internal sense of being male, female or somewhere in between, often self-identified by age six or earlier.

- **Gender non-conforming (GNC) or non-binary (NB):** Gender behaviors that do not strictly align with feminine or masculine binaries.

- **Intersex:** Individuals born with anatomical sexual characteristics that are not typical of male or female binary notions.

- **MTF (male to female):** Assigned male sex at birth but identifies as female, sometimes referred to as a transgender female.

- **Queer:** A general term that refers to lesbian, gay, bisexual, transgender and queer individuals (sometimes considered derogatory but often thought to have been reclaimed by those in the LGBTQ+ community).

- **Questioning:** Individuals uncertain of their gender identity and/or sexual orientation.

- **Sex assigned at birth:** Sex assigned based on infant’s external genitalia, chromosomal make-up and/or hormone prevalence.

- **Sexual identity:** An individual’s description of their own sexuality.

- **Sexual orientation:** An individual’s sexual identity concerning their gender attraction.

- **Transgender:** Individuals whose gender identity is different than their sex assigned at birth.

- **Transition:** An individual’s psychological, medical or social process of transitioning from one gender to another. This is individualized and may include one, some, all or none of these transitions.

Barriers to Care

Optometrists are often on the front-line of healthcare. By being more culturally competent with the LGBTQ+ population, we can improve health outcomes by eliminating disparities this population often faces. The following includes a list of challenges in this population, with each of these statistics higher and more prominent in racial minority groups:³

- LGBTQ+ youth are more likely to be homeless and are two to three times more likely to commit suicide.

- Lesbians and bisexual females are more likely to be overweight or obese.

- Gay men are at a higher risk of HIV and other sexually transmitted infections (STIs), especially among communities of color.

- Transgender individuals have a high prevalence of HIV/STIs, victimization, mental health conditions, higher risk of suicide and are less likely to have health insurance than heterosexual or cisgender members of the LGBTQ+ community.



Intake forms with marital status might include “significant other” or “partner” to show inclusiveness. For children, options for legal guardian(s) or caregiver(s) are more inclusive than a specific space for a mother and father.



Photo: Getty Images



Within your practice, consider including literature or symbols that are pertinent to the LGBTQ+ community in the waiting room. The Pride Progress Flag's design is inclusive of marginalized racial communities as well as the transgender community.

• Elderly LGBTQ+ individuals face additional barriers to health because of isolation and lack of social services and culturally competent providers.

• LGBTQ+ populations have the highest rates of tobacco, alcohol and other drug use.

While none of the above are inherent to being an LGBTQ+ individual, the frequent abuse and risk of discrimination of “coming out” contributes to the astounding rates of depression and suicide. As providers, we can ask if the patient has access to appropriate mental health services, and be aware of local support groups and inclusive primary care providers.

An Inclusive Practice

In practice, patient paperwork and forms need to reflect an inclusive environment, since paperwork is one of the first things that a patient sees upon entering the office. For all patients, providing space for legal name and nickname or preferred name is common, and still appropriate for the LGBTQ+ population. Sex should be listed as male, female or other. A more complete option is to have both birth sex and self-identified gender identity, with options for pronouns.

Intake forms with marital status might include terminology such as “significant other” or “partner” (instead of husband/wife) to show a practice’s inclusiveness. For chil-

dren, options for legal guardian(s) or caregiver(s) are more inclusive than a specific space for a mother and father.

One of the smallest steps to improve inclusivity, while yet making a large impact, is the use of pronouns that match the patient’s identity. To most heterosexual cisgender individuals, this may seem like an unnecessary step. However, to the transgender and GNC/NB community, using appropriate pronouns validates who they are.

When a person is misgendered, it adds to the challenges and burdens that they already face. Worst of all, it brings up feelings of dysphoria, anxiety, stigmatization, lowered self-esteem and embarrassment. Simply using gender-affirming pronouns lowers rates of suicide and is an easy way to have a hugely positive impact on your patients’ life.⁴

In sharing pronouns, it is also becoming common practice in group introductions to include pronouns. This shows anyone in the group that may be GNC that they will

not be the only ones to reveal their pronouns. This creates a supportive environment for employees that will also extend to improved patient care. To show patients this inclusivity, include pronouns on both websites and business cards. There are also stickers and pins readily available to attach to a clinic badge or white coat to keep your pronouns visible and remind your patient that you have a gender-inclusive practice.

One frequent question we get is, “How do we use pronouns in the exam room?” Your pronoun can be added as part of your introduction. An example to the patient could be, “Hello, I’m Dr. Matthew Roberts, your optometrist, and my pronouns are he/him/his,” or, “Hello, I’m Dr. Paula McDowell, and my pronouns are she/her/hers.” As the leader in the clinic, it is our job to start the meeting properly, even in one-on-one interviews.

If there is someone that identifies as GNC, this shows that person they are in a safe environment. Also, if a patient has marked that they are GNC on their form, as their optometrist it is acceptable and encouraged to ask directly, “What are your pronouns?” Of course, it is always appropriate to use a patient’s preferred name or nickname in a face-to-face setting as well.

Photo: Getty Images



Being more culturally competent with the LGBTQ+ population can improve health outcomes by eliminating disparities this population often faces.



One of the smallest steps to improve inclusivity while yet making a large impact is the use of pronouns; for example, in staff badges. Have stickers and pins readily available to attach to a clinic badge or white coat to keep your pronouns visible and remind patients that you have a gender-inclusive practice.

There are some challenges with preferred names in that the patient's current name may not match with legal paperwork or their previous name recorded in the office. An inclusive practice will use the patient's nickname or preferred name and be sure not to use a name linked to an identity that the patient no longer identifies with.

To use the old, or dead, name is an offensive practice called "dead-naming," which should be avoided whenever possible. However, while a nickname should be easy to record in the chart and use in patient conversations, the legal paperwork may still have to use the previous name for insurance submissions. It is useful to inform patients of this discrepancy so that they are aware that paperwork from the insurance company may use the old name, and make sure that documentation is clear in the chart for staff as well.

Within the practice, include literature or symbols that are pertinent to the LGBTQ+ community in the waiting room. Common symbols include the equal sign from the Human Rights Campaign, or the rainbow flag, which has been redesigned itself to be more inclusive as the Progress Flag.

The smallest symbol will be noticed by patients without needing to have a large-sized display. Also, ensure that there is racial diversity within displays and include both transgender and same-sex couples.¹

Interactions

Although an optometrist may be aware of their own biases, it is important to educate your staff about appropriate interactions and language. As they often interact with patients more frequently than the doctor, what your staff says and does places a large impact on the practice. Encourage them to practice in becoming comfortable discussing gender identity, and include periodic trainings, tutorials or role-play to help increase comfort.²

Other strategies may not be as obvious to implement but can still enhance inclusivity. First and foremost, be aware. If there is derogatory language occurring in the practice (by either staff or patients), do not escalate, but educate. Correcting attitudes takes time and it can be difficult being aware of what one's biases are.

Second, be an ally to your staff and your patients. By taking into consideration the steps listed here, an optometrist can help build a better commu-

nity and improve health outcomes.

Third, ask questions to those within the LGBTQ+ community to become more aware of their needs. Those within the community do not take offense to someone trying to better understand.

Fourth, make a list of internal biases you may have. This is the best way to try to work through them to ensure equal care is given to each patient, no matter the background.⁵

Finally, get involved in your community. If the community you serve has a Pride event, support it by getting a booth, for example. This helps the practice show its stance as an ally for the community. The vision information that you can provide is invaluable and knowing that there is a safe eye care practice for LGBTQ+ individuals to visit when needed is one way to reduce barriers to care.⁴

Takeaways

The diversity within the LGBTQ+ community is part of what makes it so unique. Being more aware of internal implicit biases makes a better clinician. Even as an individual within the LGBTQ+ community, I (Dr. Roberts) have become aware of my own biases, but continuing to educate and now providing education to others has made me a better clinician and a better father. As the two of us have seen optometry become more diverse, all of us need to meet that challenge with open arms. ■

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HOW TO DEFUSE A DIFFICULT PATIENT

Whatever the trigger, take a deep breath and adopt an empathetic approach to calm the situation.

BY JANE COLE
CONTRIBUTING EDITOR

A few years ago, optometrist Ian Whipple of Ogden, UT, examined a patient with the most advanced keratoconus he had ever seen. Dr. Whipple managed to quickly convince the patient that specialty contact lenses would be the best solution after sharing that many of his other advanced keratoconus patients experienced improved quality of life with specialty lenses.

The process went smoothly until a staff member tried to authorize the patient's insurance coverage and it was denied. Hearing the bad news, the patient marched over to Dr. Whipple's billing manager and launched into a tirade.

"The patient wasn't ready to pay for the lenses out of pocket, so he took his frustration out on my staff," Dr. Whipple recounts.

Whether you've been in practice for one year or 40, every optometrist will face a difficult patient at some point in their career. In fact, it's estimated that 15% of patient encounters are on the more challenging side.¹

In today's world, where feelings of isolation are common due to the pandemic and opinions differ strongly on how COVID-19 protocols should be

handled, emotions may be more heightened, which can lead to an environment that's ripe for difficult patient encounters, says Patricia Poma, OD, of Bloomfield, MI.

"Difficult patients are a part of doing business," adds Highland, CA, optometrist Pamela Miller. "You need to recognize the fact that people can be difficult, and you don't know what's going on in a patient's life."

The Cost-Triggered Patient

When a patient is disgruntled, education and communication are essential, Dr. Poma says. For example, if a patient is upset because the office billed their exam as a medical visit instead of billing their vision plan, it's not appropriate to say, "Your insurance deductible wasn't met, and that's how the doctor decided to bill your exam, so therefore you owe us money," she adds.

Instead, she suggests the conversation should take an informative angle and sound something like this, "The doctor noticed that you have some



Photo: Ian Whipple, OD

At Dr. Whipple's practice, a staff member discusses costs with each patient before their eye exam.

spots near your macula and therefore spent a little more time examining your eyes. To make sure your condition won't progress, further testing was done with the latest technology the field offers, which we use to provide the best outcomes for our patients. Unfortunately, this isn't covered by your vision insurance, but we will work with you to ensure optimal vision and create a plan for the resulting finances moving forward."

When Dr. Whipple's advanced keratoconus patient became furious after insurance wouldn't cover the cost of the specialty lenses, Dr. Whipple changed course and imagined what it would be like to be in the other man's shoes.

“It was an intense situation,” he notes. “The patient couldn’t see, and we had a solution for him, but insurance wouldn’t cover it. If I were him, I’d be frustrated too. When I recognized that, I could feel empathy.”

In this case, the empathetic approach worked. The patient returned a few days later and was fit in a specialty lens, which he paid for out of pocket. “He’s been on his best behavior ever since, and today, he’s the nicest guy and a great patient,” Dr. Whipple says. “And he’s since gotten insurance that covers the cost of his specialty lenses.”

Transparency is key in defusing angry patient encounters, Dr. Whipple suggests. At his practice, each patient is briefed by a staff member about pricing and insurance coverage before they ever step foot in the exam room.

The Denial Patient

Vincent Zingaro, OD, of Chester Springs, PA, recently diagnosed a patient with macular degeneration. The woman, however, kept insisting she just needed a new pair of glasses to improve her vision.

“I explained there wasn’t a change in her glasses prescription and that she needed treatment from a retina specialist for wet macular degeneration. She became angry and told me there wasn’t anything the specialist could do,” Dr. Zingaro recalls. “I explained the treatment options, and I was frustrated too since she didn’t accept my findings or take my advice.”

After a somewhat argumentative conversation, the patient demanded her prescription and left the office, declining Dr. Zingaro’s offer to schedule the referral appointment for her.

A few weeks later, the patient returned with a new pair of glasses that she had purchased at a different office. In the middle of the crowded reception area, the woman began yelling at Dr. Zingaro’s optician, complaining that she couldn’t see out of her new glasses.

Dr. Zingaro immediately escorted the woman away from his other patients and took her to an open exam room, where he calmly told her that the problem wasn’t with the glasses but instead with her retina, and that she needed to see a specialist.

“I made the mistake of dismissing the patient initially when she didn’t accept my diagnosis. I think it’s important for doctors to have empathy for the patient. We don’t always know what each patient is going through in their life, and it’s easy to want to rush through to the next patient when our schedules are busy. Stepping back and acknowledging the patient’s fears can go a long way in minimizing unpleasant patient interactions,” he says.

This time, the woman accepted her diagnosis from Dr. Zingaro, who scheduled the specialist appointment for her.

When dealing with a patient in denial, sometimes a doctor may have to think outside of the box. Dr. Whipple recently diagnosed a new patient with moderate glaucoma, and the woman

was not only upset about the news, but also wouldn’t accept it.

“The patient was familiar with the Harry Potter series, so I used the example of the character Voldemort, who is known in the books as, ‘He who must not be named,’” Dr. Whipple says. “I asked her, ‘How can we know what to fight if we can’t even name it?’ We need to talk about it and come

up with a treatment plan. I know it’s disappointing news, but what’s even worse is having a condition and not doing anything about it. Your glaucoma is only moderate now, but it could get worse if we don’t treat it.”

The Fretful Patient

It’s always important to be open and honest about the diagnosis and long-term impacts of a severe or threatening eye condition, even though it may be a difficult conversation to have with the patient, Dr. Poma says.

The staff and doctor need to be very confident and compassionate with patients who are worried, she adds. “The goal is to ensure that we are capable and caring. Eye contact is especially crucial, along with words of encouragement and a smile. I sometimes will make casual conversation with the patient while I’m working so that they’re distracted from what I’m doing.”

When breaking the news about a potentially troubling diagnosis, doctors should keep the initial information simple and avoid using technical, medical language that might be confusing, a study suggests.²

Optometrist Andrew Fischer of Jasper, IN, adopts the “KISS” mindset when he describes a new or changing diagnosis to a patient and keeps his explanation simple.

“Explaining a medical condition can be both intimidating and confusing to a patient,” Dr. Fischer says. “I clearly and briefly explain the diagnosis and whenever possible, use photos, imaging or other visuals to help the patient understand what exactly I’m seeing.”

Dr. Fischer also takes the time to describe the potential visual, systemic and lifestyle impacts the condition could have, and then he reviews the plan to mitigate any progression of the condition, all of which can help ease a worried patient’s concerns.

The Busy Patient

Dr. Fischer recently treated a two-year-old who had recurrent styes. At first, Dr. Fischer prescribed at-home treatments, but the issue persisted.

Photo: Ian Whipple, OD



Transparency among all the staff of a practice is key in reducing the chances of a difficult patient encounter.



A subsequent dose of oral antibiotics cleared the lid; however, a few months later, the mother brought the toddler back to the practice with a large chalazion. After discussing his findings with the mother and breaking the news that the child would need the chalazion surgically removed, Dr. Fischer referred the patient to the only pediatric specialist who accepted the family's insurance. The problem was that the specialist was located about 2.5 hours away.

A few weeks later, the patient's father showed up at Dr. Fischer's practice, irate and frustrated with the front desk staff. The father was yelling so loudly that Dr. Fischer could hear him from the other side of the office. Dr. Fischer, who was in the middle of an eye exam with a patient, excused himself to escort the father to an empty room where he could vent.

"He was very upset that his son's appointment was so far away that he had to take time off work," Dr. Fischer says. "When he'd said his piece, he did calm down enough for us to discuss why I referred his son."

Dr. Fisher explained to the father that other offices in their area that accept the family's insurance don't treat pediatric patients.

"I also made sure he understood that I appreciated the strain the appointment put on his work schedule. I really didn't do anything more than listen to him, but sometimes that's all it takes to resolve a difficult situation," Dr. Fischer

says. "I think it is important to remember to approach any situation where a patient is difficult or upset with empathy. Give the patient time to address their concerns, make it clear that you hear them and understand the situation and then do everything that is within reason to rectify the situation."

The Language Barrier Patient

Sometimes difficult patient encounters may be the result of limited English proficiency.

Dr. Fischer has a large population of Spanish-speaking patients in his community, which he says can create an opportunity for a difficult exam. "I know and understand a fair amount of Spanish—enough to get through an exam easily—until there is a medical condition to explain," he says. In these cases, he relies on five of his staff members who are fluent or nearly fluent in Spanish.

Additionally, if a deaf patient comes in for an office visit, he will contract with an American Sign Language interpreter. "Otherwise, in these cases, we will write back and forth on a pad of paper, which is slower but also works very well," he says.

In the case of a patient who has limited English proficiency, Dr. Whipple will ask the individual to bring someone they know who speaks English to interpret during the office visit. "If we're having a hard time understanding each other on the phone, we ask the patient to bring an interpreter."

When a translator accompanies a patient to the exam, Dr. Miller will pull her chair back and address both individuals, making a point not to focus all her attention on the translator, which could make the patient feel devalued.

While hiring a translator may be a costly prospect, remote interpreting services are available. When she finds herself in a pinch, Dr. Poma will sometimes resort to Google Translate.

COVID-19 Mandate Frustrations

We would be remiss to not take into account how COVID has heightened patient tensions. Depending on how the virus has affected your region, mask mandates may vary. Almost two years into the pandemic, mask wear and other COVID-related safety restrictions remain a flashpoint for some.

In fact, the American Psychiatric Association's recent *Stress in America* report found that eight out of 10 Americans said the pandemic has created significant stress in their life.³

So, how should an OD dial down the tension when a patient is fired up about masking up?

Dr. Zingaro's practice implemented a mask mandate, regardless of vaccination status, based on recommendations from his state's optometric association.

"On occasion, we get a patient who refuses to wear a mask, and we just tell them that we can't see them without one," Dr. Zingaro says. "They typically turn around and leave without saying anything. Luckily, this is rare and has only happened five or six times in the last 18 months or so. I think it's hard to find a healthcare facility at the moment that will allow you to go in unmasked. This will change eventually, but this is our current reality."

Drawing a line in the sand about mask wear is essential for practices, Dr. Zingaro suggests. "I feel if we let that slide, it could get ugly pretty quick," he adds.

During the onset and height of the pandemic, Dr. Fischer asked all his patients to wear a mask during the exam, and the policy had minimal pushback, he says.

Over the course of the pandemic, mask guidelines changed, and Dr. Fischer's office followed suit. Currently, vaccinated patients aren't required to wear a mask during their exam. However, when mask mandates were in full

TIPS TO TURN DOWN THE HEAT

When a patient loses their cool, it's critical for the doctor to keep theirs intact, Dr. Miller says. She offers several suggestions on how to turn a negative patient encounter around:

- Stand back, take a deep breath and don't downplay the patient's issue. "It's important to remember that not all people are as wonderful as you are," she says with a laugh.
- Employ a good bedside manner and empathy. Sometimes, the patient just needs to hear the words, "I understand," Dr. Miller explains.
- Repeat the patient's problem back to them. In addition to saying, "What can I do to take care of this for you?" she also suggests taking responsibility if a problem does arise. For example, if a patient is unhappy that their spectacle lens Rx isn't correct, Dr. Miller says to fall on your sword and not blame the lab. "It's best to say, 'I made a mistake. Let me see what I can do to fix it.'"
- Talk "with" the patient and not "at" the patient.
- Ask, "Did I answer all your questions?" at the end of the exam.



Clinics have adapted protocols to ensure safety during COVID.

effect, if a patient refused wear, Dr. Fischer asked them to reschedule to a later date, in hopes that the guidelines would eventually change.

During the early days of the pandemic, his practice also adjusted its schedule to include fewer patient appointments throughout the day. This new approach limited contact between patients, gave staff the opportunity to deep clean rooms between exams and provided patients ample space in the optical for frame selection, Dr. Fischer explains.

Dr. Poma has experienced both ends of the spectrum of COVID-19 protocols, and she's found that on many occasions, it's difficult to make either side happy.

"We decided to have a discussion among the doctors and made protocols and procedures based on OSHA, CDC and local health department recommendations," Dr. Poma says.

She and the other doctors at her practice even role-played different scenarios with staff based on potential issues that might arise among patients due to COVID and her practice's associated safety requirements.

"Whenever a patient comes in demanding service that is beyond our protocols, we calmly tell them that we aren't able to accommodate their request but that we would be very sad to lose their business," Dr. Poma says.

When appropriate, she will remind a patient that it's her job to follow CDC/

OSHA guidelines, even if they don't want to wear a mask.

On the other hand, she has also dealt with people who demand to be seen when there are no other patients in the office. There are those who have even requested that Dr. Poma and her staff be dressed in hazmat gear.

"We simply tell them that our protocols are well established, ensuring safety. We

inform them that we have spent over \$10,000 in air scrubbers, but if they aren't comfortable, we can see them once the COVID numbers decline in our state," she says.

To tamp down any disgruntled patient encounters due to your practice's COVID-19 guidelines, experts suggest it's best to spell out your requirements prior to the visit, which may be communicated during the initial scheduling call, and reinforce them with text or e-mail appointment reminders and signage throughout the office.⁴

When to Set Boundaries

Dr. Poma and her staff make an effort to help each patient unless the individual becomes irrational, belligerent or threatening. In these cases, the patient is told, "You're more than welcome to take your happiness elsewhere," she says. The patient is then sent a letter, stating their relationship with the practice has been terminated, and a short list of other eye care offices in the area.

"We also have a code word within our office that's a signal for others to call 911. We use a name of a frame line that we don't carry. It is a security blanket for 'just in case,'" she says.

To ensure office safety, Dr. Miller has mirrors throughout her clinic and doors are left ajar, even during the exam, so she can remove herself from a situation if one arises and so staff have easy access to her as needed.

While violent patient outbursts might

seem rare, workplace violence is most common in the medical setting, and it frequently involves a patient or family member threatening physicians or practice staff.⁵ In one such incident in 2013, a disgruntled former patient used a fake name to make an appointment and shot to death a Newport Beach, CA, doctor after the doctor entered the exam room.⁶

Practices need to set boundaries and shouldn't tolerate certain behaviors, Dr. Whipple explains. "I've had to let a handful of patients go through the years for inappropriate behavior, especially when employees felt uncomfortable, including one time when a patient took a photo of a tech when she wasn't looking. That's not okay. If a staff member tells me a patient is really difficult and isn't a right fit for our practice, I'll trust my staff's judgement and we'll remove the patient. You need to stand by your team," Dr. Whipple says.

Final Thoughts

When a difficult patient encounter arises, Dr. Poma suggests the best thing to do is to simply listen.

"Most people want to air their grievances and just be heard," she says. "Stay calm and don't interrupt. Many times, a patient is just upset about something in their lives, and they take their emotions out on staff or management. When the patient is finished expressing, I simply ask, 'What can I do to make you happy?' or, 'How would you like me to fix this problem?' Most of the time, they're speechless and realize they were overreacting." ■

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MAKING YOUR PRACTICE KID-FRIENDLY

How to simplify exams and make them fun while minimizing stress for you, the pediatric patients and their parents.



BY SARAH GALT, OD
FORT COLLINS, CO

Working with pediatric patients can be intimidating, but is the most fun and rewarding experience. It can be somewhat daunting from the get-go when a child and parent enter an optometrist’s office due to parents not knowing what to expect and not exactly looking forward to receiving potentially life-changing news about their child’s condition. When it comes to the kid patients, they can at times be undisciplined, may have trouble sitting still and have to be engaged from the moment they walk through the door.

For a pediatric exam, we ultimately need the same information that we collect during an adult exam; we just use creativity and varied methods to obtain that same base data set. Simplifying the initial approach down to the basics of an eye exam can make a pediatric work-up protocol significantly more approachable for both doctors and staff.

In this article—the first of a four-part series on pediatric care—we will talk about specific ways to add fun and lightness to a sometimes intimidating experience for the patient and their parent, and discuss the best ways to perform an exam on the youngest of patients.

Exam Early

Over the last few years, I have seen a significant increase in the number of patients referred for formal evaluation from both doctors’ offices and school districts. This is largely because of an increase in availability and accuracy



An optometrist is making this eye exam fun for a young patient.

of photo-screener technology, and also possibly because of an increase in technology use in classrooms.

In the absence of a photo-screener alert from a pediatrician or school, children may benefit from having a baseline dilated eye exam by age three. This ensures that as they are exposed to visual language, they can interpret their visual world as accurately as possible and we can treat amblyopia if amblyopic factors are found.

This is also an important age for dilated fundus evaluation for potentially life-threatening diseases such as retinoblastoma. In your local community, communicating with pediatricians, alerting daycares and schools and

About the author

Dr. Galt practices pediatric optometry at The Eye Center of Northern Colorado. She fell in love with caring for the pediatric patient population while at the University of Houston College of Optometry and specialized through the University of Alabama at Birmingham School of Optometry Pediatrics Residency program. She has no financial disclosures.



Having colorful, interactive items and toys in your waiting room will keep pediatric patients engaged and relaxed as they wait for their appointment.

talking with peers can increase the number of children who receive eye care.

Interactive Items

Waiting rooms are our patient's initial impression of what will be happening to them, if their parent hasn't primed them with a description of their eye exam.

Right now, our office does not have toys out, as these are high-touch items that encourage movement and that we cannot effectively disinfect at this time. In an ideal world, and maybe again in the future, pediatric patients are greeted by colorful, interactive toys to help them stay relaxed and enjoy their experience.

How to Perform an Exam

The challenge of a pediatric exam comes from obtaining necessary data in a way that minimizes frustration of the patient and the staff member. Doctors and staff must be ready to see pediatric patients, both in terms of equipment and mindset. All you technically need is a retinoscope and a BIO, but additional tools and forethought can provide cooperation and comfort of your patient and their parent significantly.

Some offices I travel to are not equipped with a full array of peds tools. In those cases, we have a "peds bucket," which typically includes stickers, a spinning light, adhesive patches, stereo booklet and glasses, loose prisms and a talking Elmo doll. Any of these items or substitutes can be found easily and kept around the office to set you up for success in maintaining pediatric patients' attention.

Pre-testing: Stickers, spinning light toys and small toys can transform the success of your data acquisition with pediatric patients. A child is far more likely to follow a fun light when you ask them, "What colors do you see?" or to fixate on a sticker when you can say, "Does this look like a happy elephant?" than to follow our typical adult script. Having toys and stickers allows you to connect with the patient and can decrease the harshness of being at the doctor's office.

Acuity: We aim to test visual acuity with as advanced a technique as the patient is capable of; that does not mean the patient has to be able to read the chart. The hierarchy ranges from Snellen with our verbal patients who know letters, to Lea symbol charts and matching, to central, steady and maintained; to blink to light and an optokinetic nystagmus drum. We operate with a majority of our pre- or non-verbal patients getting an allocation of central steady and maintained or central steady and fixated visual acuities. Teller acuities, used in research and academic settings, aren't as functional for your high-volume clinic setting.

Dilation: I cannot pretend to be the expert in this topic, as I rarely dilate a patient on my own. In most circumstances, my wonderful technicians dilate my patients to reduce the possibility of a breakdown when I re-enter the room for retinoscopy. When my technicians are kind enough to play the "bad guy" and administer drops, they generally agree that speed is on their side. They do a great job of reading the room and determining the patient's level of anxiety surrounding the drop administration process.

In the case of a very alert child who may have sensory sensitivities, further explanation may be helpful. In other



A young patient during a pediatric eye exam.



A parent keeps a young patient still by feeding them a bottle during an eye exam.

cases, asking the patient if they want cherry or apple flavored eye drops—and administering quickly—may be the most effective, rather than drawing out the process with an explanation.

In all circumstances, we respect the patient’s bodily autonomy, but there are times that a big hug by the parent to prevent scratching and kicking makes our drop delivery more successful.

Once dilated, the provider performs retinoscopy and posterior segment exam (BIO) on all patients, and slit lamp exam is typically performed for patients four years old and above (we can manage slit lamp on infants if the patient’s caregiver is willing and we deem it important).

Retinoscopy: In our office we use loose lens retinoscopy with sphere and cylinder lens combinations for neutralization. During retinoscopy, I tend to sing a song with or to the patient to maintain their gaze. My counterpart is less prone to singing, so he will make “mouse noises” behind the retinoscope or have a technician hold up a spinning light or Elmo doll beside his head to maintain fixation long enough to find an accurate neutralization of refractive error.

You will inevitably find yourself performing retinoscopy on a screaming, inconsolable toddler at some point, but having these tools and an ability to not take yourself too seriously to sing nursery rhymes can reduce that likelihood significantly.

I do not prescribe a final glasses prescription without retinoscopy obtained after a dilating agent. When new

patient parents come into our office not wanting their children dilated, our technicians are well-versed in respectful ways to discuss why we encourage it. When necessary, I will enter the conversation and emphasize that we cannot:

- (1) accurately assess refractive error, and therefore how it affects binocular vision;
- (2) fully evaluate posterior segment health, without dilating agents.

We do respect when parents feel dilation is not the best option for their child after they have heard all of the relevant reasons for our suggesting it. For these patients, I have frequent follow-ups and make every effort to obtain a non-dilated view of the optic nerve at their initial visit. I would rather be managing patients in my office than have them walk away and possibly not be cared for at all. Parents typically respond well to this, and when I reach a level of concern about prescribing that I bring up dilation again, it is better received. I recommend dilating your pediatric patients whenever possible.

Effective Communication

The challenge of a pediatric exam comes from obtaining the above data in a non-traditional way. The same goes for communication with our pediatric patients during their exams and after when discussing the outcomes and the future of their children’s ophthalmic care. During any examination, technicians, doctors, patients and parents benefit from extensive description of what is going to happen, what is happening and what results we get from each exam element.

We find metaphors very helpful when communicating with both the patient and parent. I follow my colleague’s lead, as he has his metaphors very finely tuned, so a few that I cannot take credit for are below:

KEEPING KIDS ENGAGED

Cooperation by the patient and trust by the parent are improved when you keep discussion open throughout.

Below are a few “scripts” that I find give patients and parents an idea of the next steps without alienating myself or my process. This includes giving optometry instruments fun names which can keep kids engaged and asking them questions about different objects in the room. These can be adjusted to your patient’s age, as nine-year-olds may be offended if you ask them to sing their ABCs.

- “I am going to use this spoon (cover paddle) and I will cover up each eye; you just get to sit and chat with me about the silly sticker on my mask—who is that? What about that airplane across the room—how many windows does it have?”
- “You have already done so much hard work! We only have three steps left and then you’re all done. We will use our wiggle flashlight (retinoscope), my crazy hat (BIO) and the bicycle (slit lamp, which has handlebars).”
- “Can you tell me what secret color is at the top of my spinning light?”
- “Is your mom making a silly face behind me?”



A pediatric patient has a toy to keep her engaged during her exam.

Amblyopia:
 “Right now, Johnny’s right eye has Blu-ray quality vision. Because of his difference in prescription in the left eye, that eye has VHS quality vision, but we have a lot of tools to help us upgrade so that both eyes see especially well.”

Contact lenses:
 “Glasses are like a T-shirt; contacts are like a tuxedo.”

You have to take extra special care and a little more time at the beginning and end of the day to clean and take care of your contact lenses.”

Compliance: “The first few days you may not like these glasses; you may think that we didn’t get things right this time! But you gave me really good attention and I feel good about the prescription. Sometimes I like to call them ‘breakfast glasses’ because if we have them on for breakfast, we are more likely to wear them all day. It’s okay if you need to build-up wear over the week, too.”

Follow-up: “You’ve got special eyeballs, they’re very interesting. Because of your special eyeballs, we are going to be good friends.” I then set the expectation for how often I plan to see the patient. For example, I may say every three to four months, only dilating annually unless needed otherwise.

Keeping open communication by talking throughout the exam, even if it is a one-sided conversation, can calm your nerves as well as the patient’s. If you are able to connect with your patient, the exam will be smoother and parents will often feel much more confident in your exam results.

I also like to inform parents and patients that dilation may last longer in children than they have experienced from their adult exams. If the patient has noted that near has blur, I reassure them with, “I know your hands look a little funny, the phone might, too. I promise that’s not forever, that will just be for today. You may enjoy far away activities more than up close activities today, and the nice people who check you out will have some groovy sunglasses for you.”

Our office sees patients of all ages, but I like to think that the front desk does enjoy greeting our pediatric patients. Big smiles (behind masks) from them upon arrival and departure are the icing on the cake to patient and parent experiences in our office. ■



A NEW WAY TO EXPERIENCE REVIEW OF OPTOMETRY

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TACKLING THE “MYOPIA OR GLAUCOMA?” QUESTION

As the prevalence of both increase, ODs will be on the front lines, relying on a growing set of tools to aid proper diagnosis and management.



Differentiating between high myopia and glaucoma is a clinical conundrum many of us face daily in our clinical practice. The clinical correlation between myopia and glaucoma has been demonstrated in previous studies and continues to be researched; still, many challenges and limitations exist in current testing protocols that may threaten your ability to confidently differentiate between the two diseases.

In this article, we will dive into the pathophysiology of myopia as a risk factor for glaucoma and share techniques and clinical pearls to help you overcome some of these difficulties and accurately diagnose and manage patients.

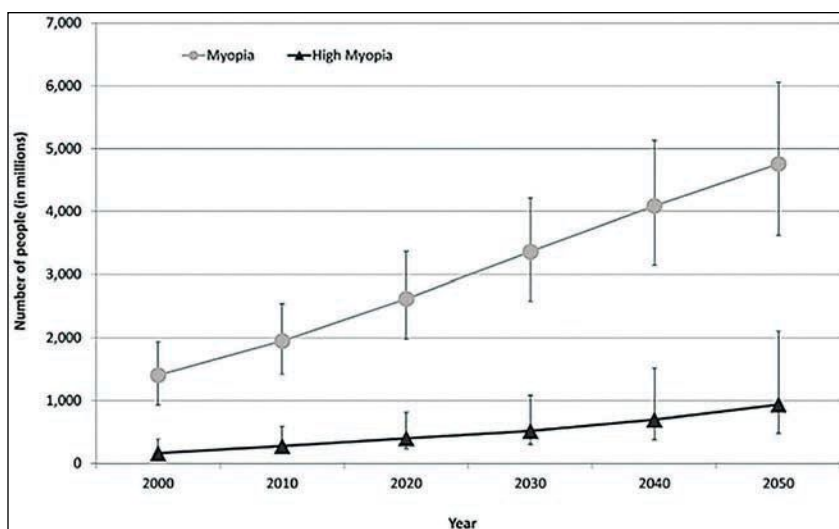


Fig. 1. This graph shows the current prevalence of myopia and estimates of significant increases anticipated by 2050.¹

Connecting the Dots

Myopia is the most common ocular disorder worldwide, a statistic unlikely to change in the foreseeable future. In 2000, it was estimated that 1.4 billion people worldwide were myopic (22.9%); of those, 163 million had high myopia (2.7%). Current estimations predict the worldwide prevalence of

myopia and high myopia in 2050 to be 49.8% and 9.8%, respectively.¹ A recent study also showed an increase in myopia in school-aged children due to the COVID-19 pandemic.²

Previous epidemiological studies across multiple ethnic groups have shown an increased prevalence of glaucoma in myopic patients, includ-

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ing the Blue Mountain Eye study, Barbados Eye Study, Beaver Dam Eye Study, Singapore Malay Eye Study, Beijing Eye Study and Latino Eye Study. Another recent meta-analysis by determined that for each 1.0D increase of myopia, glaucoma risk increased by 20%, shown to accelerate around -6.0D of myopia and further at -8.0D, demonstrating a correlation between degenerative myopia and increased glaucoma risk.³

It is currently unknown how myopia increases the risk of glaucoma, but there are several hypotheses. One is that the tilting of the optic nerve often seen in myopia may lead to a direct insult or a shearing effect to the ganglion cell axons. Another hypothesis is that the effects of intraocular pressure (IOP) can be more pronounced in myopes due to thinning of the retinal nerve fiber layer (RNFL), lamina cribrosa and sclera.⁴

In glaucoma, the primary site for axonal injury is the lamina cribrosa. As mentioned previously, the tilting of the optic nerve can have a direct effect on the retinal ganglion cell axons. This may be due to the increased stretching of the lamina cribrosa, particularly on the temporal side, and increased scleral bend due to the tilting of the optic nerve commonly seen in myopia.

The increase in axial length (AL) in myopia also causes a stretching and thinning of the lamina cribrosa. The thinning not only makes the retinal ganglion cell axons more susceptible to increased IOP, but it also alters the translaminar pressure gradient. The translaminar pressure gradient is the difference between the outward pressure on the optic nerve by IOP and inward pressure from the cerebrospinal fluid. In some studies, the translaminar pressure gradient has a better correlation with the degree of glaucomatous optic neuropathy.⁵ The lamina cribrosa is composed of a collagen matrix similar to that of the cornea.

The Ocular Response Analyzer (ORA) is a relatively new device that measures the biomechanical properties of the cornea. It uses a bidirectional

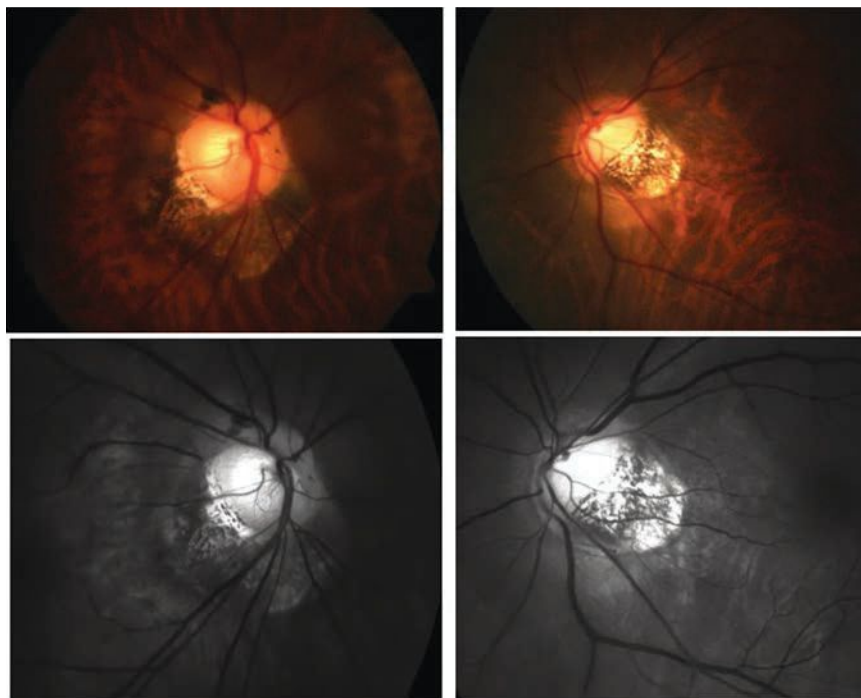


Fig. 2. Traditional fundus photography shows anomalous optic nerve insertion, tilting and torsion and posterior staphyloma in a highly myopic patient (top). Below is the same image of the optic nerves using red-free fundus photography to visualize the extent of thinning more easily (bottom).

applanation process to assess the viscoelastic properties of the cornea. Although it's not fully understood, some studies link the viscoelastic properties of the cornea to those of the lamina cribrosa.⁶ Corneal hysteresis (CH) is a measurement of the cornea's ability to dampen the effects of eye pressure and has been shown to be an independent risk factor for glaucoma progression.⁷ Several studies have shown that myopic eyes tend to have a lower CH, suggesting that those eyes are more prone to stretching and axonal injury in comparison to emmetropic and hyperopic eyes.⁸ Using CH can help you determine the risk of glaucoma or progression. A patient with a lower CH (<8mm Hg) is more at risk than a patient with higher CH (>12mm Hg).⁹

Another useful measurement of the ORA is the corneal-compensated IOP (IOPcc). IOP obtained by the traditional Goldmann applanation technique can be inaccurate since corneal properties tend to differ in myopic patients either via the natural differences in collagen composition and/or arrangement in the corneal stroma. This measure compensates for the corneal properties and may offer a more accurate measure of the IOP. Although research is still active, using the ORA to obtain corneal hysteresis values and IOPcc may be a useful tool to determine IOP and gauge the ability of the eye to resist its increase.

Traditional methods of diagnosing glaucoma include direct observation of the optic nerve to determine

TABLE 1. CORNEAL HYSTERESIS NORMS

Low CH	<8mm Hg
Medium CH	8-12mm Hg
High CH	>12mm Hg

This table shows the normative values for corneal hysteresis. To assess risk in glaucoma, the lower the CH, the greater the risk for glaucoma or glaucoma progression.⁹

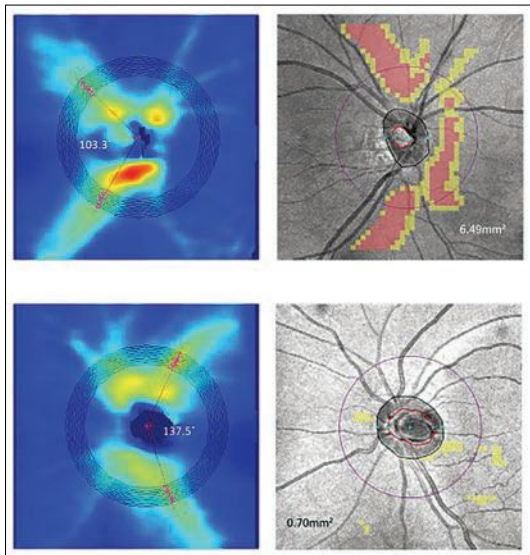


Fig. 3. Above are the RNFL thickness maps (left panel) and RNFL thickness deviation maps (right panel) of two myopic eyes with AL of (top) 27.26mm (spherical error: -6.75D) and (bottom) 26.61mm (spherical error: -2.00D). The RNFL distribution angles were 103.38 (top) and 137.58 (bottom) showing the increased temporalization of the RNFL bundles.¹¹

rim thinning, measuring IOP with Goldmann tonometry, using optical coherence tomography (OCT) to measure the thickness of the RNFL and performing a visual field test to determine any functional vision loss as a result of glaucoma. However, these traditional measures may be difficult to use due to anatomical changes in highly myopic eyes that make it challenging to determine if a glaucomatous process is occurring.

Optic Nerve

To diagnose glaucoma, clinicians assess the optic nerve with a fundus exam to determine if there is neuroretinal rim thinning, particularly in the superior-temporal and inferior-temporal quadrants that are most vulnerable to glaucomatous damage.¹⁰ In degenerative myopia, tilting of the optic nerve and posterior staphylomas make this assessment challenging and, in some cases, impossible.

How would you describe the optic nerve head appearance in *Figure 2*? This is a difficult question to answer, and many optometrists may describe or document this patient’s optic nerve

in different ways. To help determine the extent of rim thinning, red-free fundus photos should be captured which facilitate the visualization and delineation of the neuroretinal rim and optic cup. Other technologies such as OCT can be used to quantify the thickness of the RNFL.

OCT

Since entering optometric practice in the late 1990s, this imaging modality has become a versatile tool used to examine the clinical manifestations of a variety of diseases—glaucoma included. When spectral-domain OCT became commercially available in 2007, it revolutionized the ability to diagnose glaucoma.

OCT takes structural measurements of the RNFL thickness and can detect change over time. Depending on the device, the OCT will take a 4.5x4.5mm circular scan around the optic nerve. It then measures where the Bruch’s membrane opening is to determine the edge of the optic nerve and measures the thickness of the rim tissue by taking the shortest distance

to the edge of the internal limiting membrane.

In degenerative myopic patients, tilting of the optic nerve, posterior staphylomas and RNFL thinning in myopia generally result in abnormal OCT scans or incorrect segmentation. Other changes seen in myopic patients on OCT is the temporalization of the RNFL bundles. Studies have shown that as the degree of myopia is increased (both increases in AL and spherical equivalent), the greater the temporalization of the RNFL bundles (*Figure 3*).¹¹ Abnormal OCT scans are sometimes flagged as red and may hint that there might be a glaucomatous process occurring.

Myopia is a common cause of “red disease,” which indicates a false positive of glaucoma (*Figure 4*).¹² Clinicians may see this and initiate glaucoma treatment; however, it’s important to recognize that the abnormal thinning is secondary to the myopic changes and not a true glaucomatous process.

Within the OCT programming, each scan is compared to a normative or reference database created based on studies performed by each company. This helps clinicians determine whether the measured RNFL thickness is statistically normal or abnormal. The inclusion and exclu-

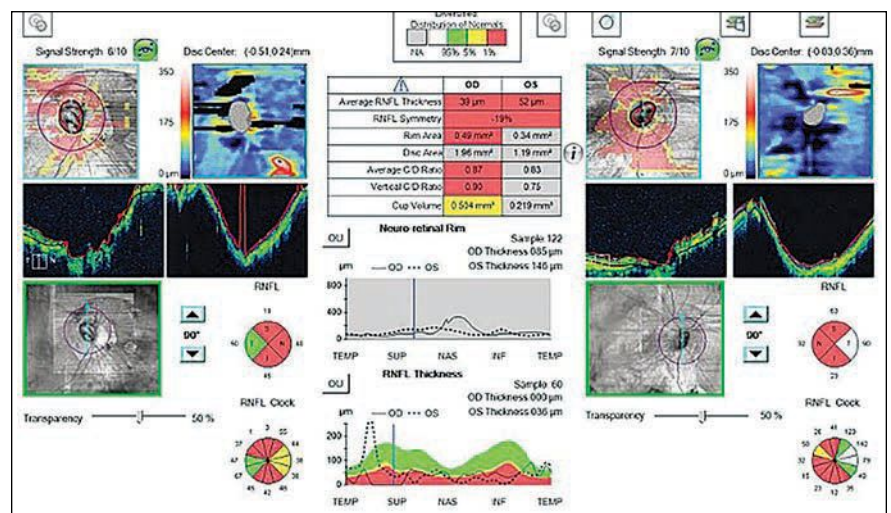


Fig. 4. This abnormal OCT shows poor segmentation in both the heat maps and tomograms in a high myope. The statistical analysis shows “red,” meaning abnormal thinning; however, this isn’t due to glaucoma but rather is from poor segmentation caused by high myopia.

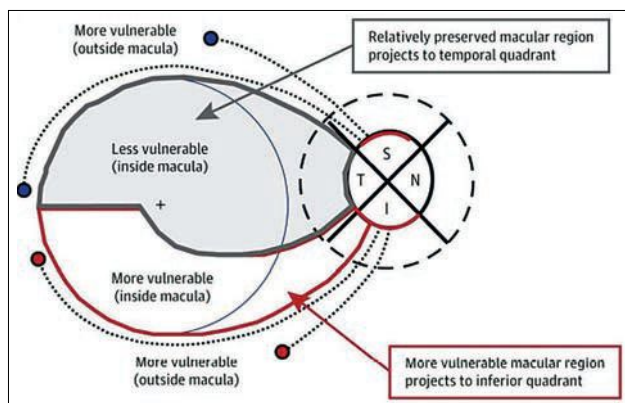


Fig. 5. This illustration demonstrates the inferior vulnerability zone, which consists of macular fibers that are at risk for damage due to glaucoma. The superior vulnerability zone does not consist of macular fibers.¹⁴

sion criteria for each company varies based on studies they have performed. For example, Zeiss's Cirrus OCT normative databases included patients between -12D to +8D, those who had vision better than 20/40, and did not have disc hemorrhages, RNFL defects or abnormal visual field. Heidelberg's Spectralis OCT normative database included patients between -7D to +5D, patients who had vision better than 20/30 and those that had normal appearing optic discs with no visual field defects.¹³ Most of the representation within these ranges is located at the mean, and actual representation of patients at the extremes is limited. The actual representation of myopic patients in the OCT normative databases is quite trivial, which reduces the strength of the analysis and heightens the difficulty of glaucoma diagnosis in this cohort.

The analysis of the inner retinal thickness in the macula is complementary to the nerve fiber layer scan and offers useful information in glaucoma detection. In some cases of glaucoma where early damage occurs in the macular region first, taking only RNFL measurements would fail to detect the disease. This is highlighted by the work of Don Hood. The most vulnerable locations to be damaged by glaucoma are the temporal half of the inferior and superior quadrants of the optic nerve, which Hood named

the superior and inferior vulnerability zones. Due to the macula being inferiorly displaced in most patients, the superior vulnerability zone does not consist of macular fibers. However, the inferior vulnerability zone consists of macular fibers (Figure 5).¹⁴ Obtaining macular OCT scan in all glaucoma patients is essential, and particularly in

the case of glaucoma patients with high myopia, macular measurements of the ganglion cell complex may have a significantly better detection power than RNFL thickness due to anomalous nerve tilting or staphylomas.

In one previous study, macular measurements using OCT had greater diagnostic power than RNFL measurements in high myopia.¹⁵ Both glaucomatous and highly myopic eyes can show areas of RNFL thinning. However, certain types of focal loss in the ganglion cell complex can correlate to glaucomatous damage. In

clinical practice, when no other macular pathologies are present, using the ganglion cell complex is quite useful in the long-term management of these patients. However, the definition of degenerative myopia tells us that people with a high amount of nearsightedness can also show degenerative changes in the retina and macula. In these patients, it's critical to look carefully for macular staphylomas, macular schisis, macular holes, vitreomacular traction, epiretinal membrane, lacquer cracks and choroidal neovascular membranes, which will help in choosing the best imaging techniques and informing a proper diagnosis.

OCT-A

Although its value in glaucoma care is still under investigation, previous research shows that parameters in OCT angiography (OCT-A) can detect glaucomatous damage. This type of imaging obtains measurements of the retinal and choroidal vasculature by taking sequential B-scans of the same location of the retina. Mobile blood cells create changes in reflectance, while stationary tissue does not. The OCT-A device then creates a map of the blood vessels to illustrate all the microvascular layers.

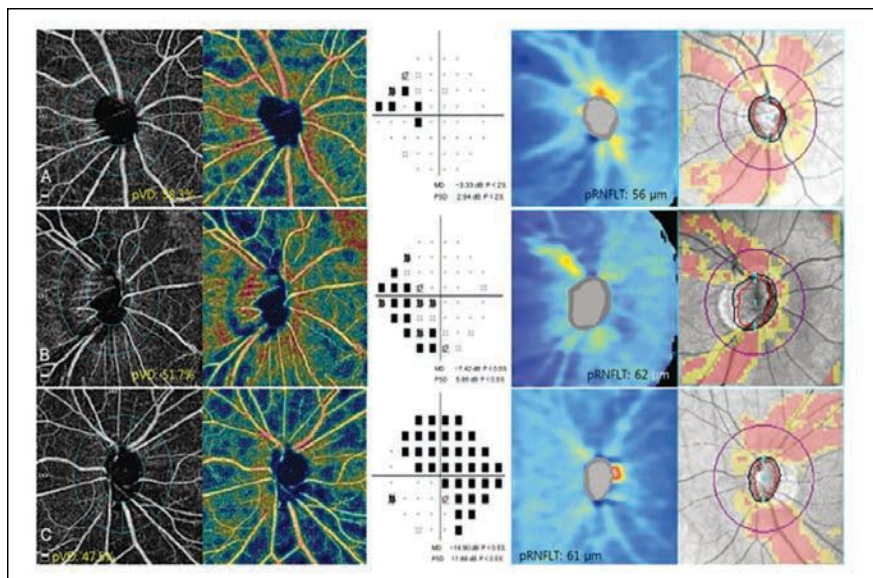


Fig. 6. This image shows the OCT-A scans of peripapillary vessel density, visual field scans and OCT RNFL scans of three different patients. The peripapillary vessel density loss correlated more to the visual field defect than to the OCT RNFL scan.¹⁴

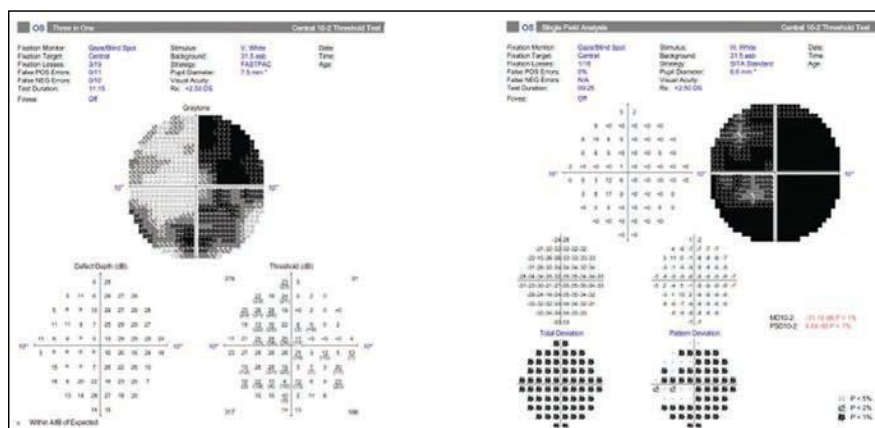


Fig. 7. A 10-2 visual field with a size III target showing a generalized depression (right). Beside it is a 10-2 of the same patient with a size V target showing a better visualization of the pattern of visual field loss (left). The bigger stimulus size may allow for easier determination of progression.

Other parameters that may be detected in glaucoma patients include peripapillary vessel density and superficial vascular complex defects. Studies have shown defects on OCT-A correlate to both the visual field and OCT RNFL. There is varying evidence on whether RNFL thinning precedes a decrease in vessel density or vice versa in glaucoma. In certain cases, the OCT RNFL is not as predictable in conditions like myelinated nerve fiber layer, epiretinal membranes and myopic discs. One study found that the vessel density parameter showed a better correlation to visual field defects in glaucoma patients with high myopia than the OCT RNFL.¹⁶

Although there are numerous studies that show the usefulness of detecting glaucoma using OCT-A, they do have several limitations, one being the lack of a normative database and progression analysis. Without a progression analysis tool, clinicians must decide on their own whether actual progression is present. With more studies and creation of a normative database and progression analysis, OCT-A may be an important tool to be used, particularly in myopic patients with glaucoma in the future.

Visual Fields

A key assessment in the diagnosis and management of glaucoma is visual

fields, as they provide a functional measurement of vision. The visual field is often compared to the structural OCT measurement to determine if there is a functional defect that correlates to RNFL thinning typical in glaucoma. However, in pathological myopia, optic nerve thinning, tilting and torsion can create visual field defects similar to those seen in glaucoma. In the Zhongshan Ophthalmic Center-Brien Holden Vision Institute (ZOC-BHVI) High Myopia Registry Study, 16.1% of the visual fields of myopic patients showed arcuate-like defects that mirrored those seen in glaucoma, and 3.4% of those showed advanced arcuate defects seen in more advanced glaucoma cases.

There are other potential sources of error when performing the visual field test on myopic patients. Trial lenses are used to correct for the refractive error, causing significant minification of the stimulus. As a result, patients may not be able to see certain stimuli, which may lead to a false estimation of their functional vision. Performing the test while the patient is corrected using contact lenses might be useful to obtain a more accurate measure of a patient’s visual field.

Most visual fields use a size III target, which is a 4mm² stimulus on a 30cm bowl. In advanced cases of glaucoma or highly myopic patients where vision might be poorer

than 20/100 Snellen acuity, a size V stimulus (64mm² stimulus on a 30cm bowl) may be beneficial to gauge progression more easily. In some cases of myopia and glaucoma, using a size III stimulus would show a generalized depression of the entire visual field. Using a size V stimulus helps to determine patterns more easily and detect small changes in disease progression. Although these fields tend to be helpful in advanced cases, there is no progression analysis. Clinicians must determine progression by using the raw data to evaluate changes in threshold, particularly looking for decreases in the quadrant-specific values.

Axial Length

Although these measurements are not typically used in glaucoma patients, the parameter might be a better indicator for glaucoma risk than refractive error alone. Given that we know that degenerative myopic eyes are more prone to stretching, taking AL measurements periodically on patients might be useful in the management of their glaucoma.

As myopic eyes elongate, changes tend to occur around the lamina, as it is the weakest point of the sclera. A study including patients from Tokyo High Myopia Clinic found that glaucomatous optic neuropathy was correlated to AL measurements, and that the prevalence of glaucoma increased from 12.2% in eyes with AL of >28mm to 42.1% in eyes with AL of >30mm.¹⁷ For highly myopic patients, taking an AL measurement at the first exam as a baseline and continuing to observe for change over time can be diagnostic. The future of myopia control shows us the importance of taking AL measurements to monitor changes in the anatomy and decide on the most effective treatment to slow progression.

Clinical Pearls

When diagnosing glaucoma or determining if there is progression in your highly myopic patients, use the fol-

lowing tips to help guide your clinical decision making:

1. Demographics

- Consider patient's age, family history and amount of myopia.
- AL measurements may offer correlation to the degree of laminar vulnerability.
- Review additional factors including max IOP, central corneal thickness and corneal hysteresis to help differentiate those at higher risk for glaucoma or progression.

2. Clinical Data

- Dilated fundus examination is essential to stereoscopically assess the papillary optic nerve rim tissue.
- Documentation of the peripapillary tissue for peripapillary atrophy, disc hemorrhages and the amount of disc tilting should be noted.
- Fundus photography is a good way to assess structural changes, especially if OCT scans are unreliable.
- Note the limitations of RNFL OCT scans on highly myopic eyes. RNFL scans may be difficult to obtain and interpret. Be mindful of red disease, as these patients are often excluded from normative databases.
- Ganglion cell measurements can be helpful and offer additional information; however, the presence of myopic macular pathology may complicate usefulness.

- Visual fields are often very helpful in determining progression in this population. Consider having patients contact lens-corrected to reduce spectacle minification and consider larger stimulus size.

3. Clinical Decision Making

- Glaucoma is a progressive condition, so use the above strategies to aid in detection of true glaucomatous progression.
- Repeat testing often to determine baselines, as higher testing variability is common among these patients.
- Understanding the higher degree of glaucoma risk in myopic patients based on epidemiological studies will optimize your clinical judgment in this cohort.

Conclusion

The current United States population is aging. In the US Census 2017 report, it was estimated that in 2030, the older population will outnumber the pediatric population for the first time in history.¹⁸ As the elderly population increases, so will the prevalence of glaucoma. It was estimated in 2020 that about 76 million people worldwide were diagnosed with glaucoma, and by 2040, predictions show that number will increase to about 111.8 million people across the globe.¹⁹

The prevalence of myopia is also on the rise. Combined this trend with the increase in glaucoma and it's clear that optometrists are going to find themselves on the front lines of glaucoma diagnosis and differentiation in myopic patients.

Although diagnosing and managing these patients can be difficult, understanding the strengths and

limitations of our current battery of tests will increase the ability to accurately distinguish the two conditions. Additionally, new technologies will allow optometrists to tackle this challenge head-on. ■

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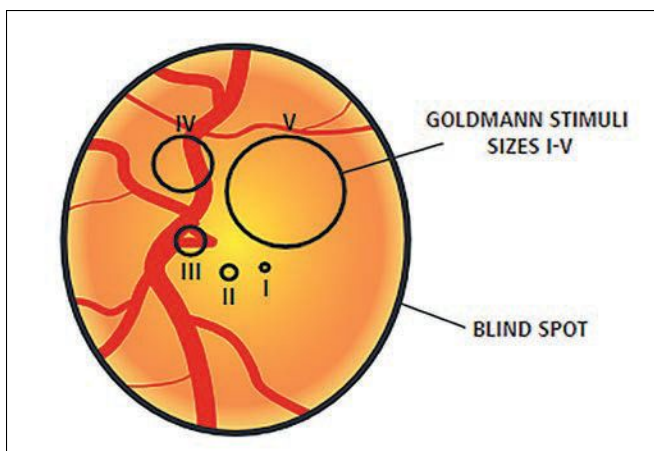


Fig. 8. This diagram shows a representation of the difference in size of the stimulus size III target and size V target.

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10 QUESTIONS ON DIGITAL DEVICES AND EYE HEALTH—ANSWERED!

With screen time rising in children and adults, ODs must understand the potential impact.



BY LISA OSTRIN, OD, PhD
HOUSTON

With significant increases in daily screen time, the impact of such exposure on eye health, and from blue light exposure in particular, has gained increased interest in recent years. Numerous questions surround the potential implications of digital device use on eye health. In this article, the effects of digital device use specific to the eye will be discussed, as well as the role of the optometrist in educating patients on the risks of digital device exposure and mitigation strategies.

How Much Screen Time Are We Getting?

Digital devices are increasingly used by children and adults for education, gaming, social interaction and other daily activities, such as shopping. It was estimated that adults 18 years and older spent an average of 12

hours and 21 minutes per day using screens in the first quarter of 2020 (*Figure 1*).¹ Children ages 10 to 18 years spent 12 hours per day on average using electronic devices during the 2021 school year.² In the United States, 44% of children use mobile devices before the age of one, and by age four, 75% have their own mobile device.³

What is Blue Light?

Before discussing blue light in the context of digital devices, let's discuss light as electromagnetic radiation (*Figure 2*). Light that is perceived by the human eye is termed "visible light," which ranges from approximately 400nm to 700nm. Wavelengths from 400nm to 500nm are generally perceived as "blue," medium wavelengths from 500nm to 600nm are perceived as "green" and longer wavelengths from 600nm to 700nm are perceived as "red." Short-wavelength blue light has higher energy than long-wavelength red light.

Ultraviolet (UV) light includes wavelengths that are shorter than visible light, ranging from approximately 10nm to 400nm, and infrared light includes wavelengths that are longer than visible light, from approximately 700nm to 1mm. The majority of UV light that reaches the eye is absorbed by the cornea, which absorbs UV-C, and the crystalline lens, which absorbs UV-A, -B and -C, and therefore does not reach the retina.

An additional protection from light damage is the macular pigment, consisting of zeaxanthin and lutein, which absorbs approximately 40% of high-energy blue light with an absorption spectrum peaking at 460nm.⁴

The spectral output (*i.e.*, wavelength composition) is comprised of various natural and artificial sources of light (*Figure 3*). The highest intensity light that humans are exposed to is sunlight, which can be as high as 150,000 lux on a bright sunny day. Indoor room illuminance generally ranges from 30 to 600 lux, and illuminance from

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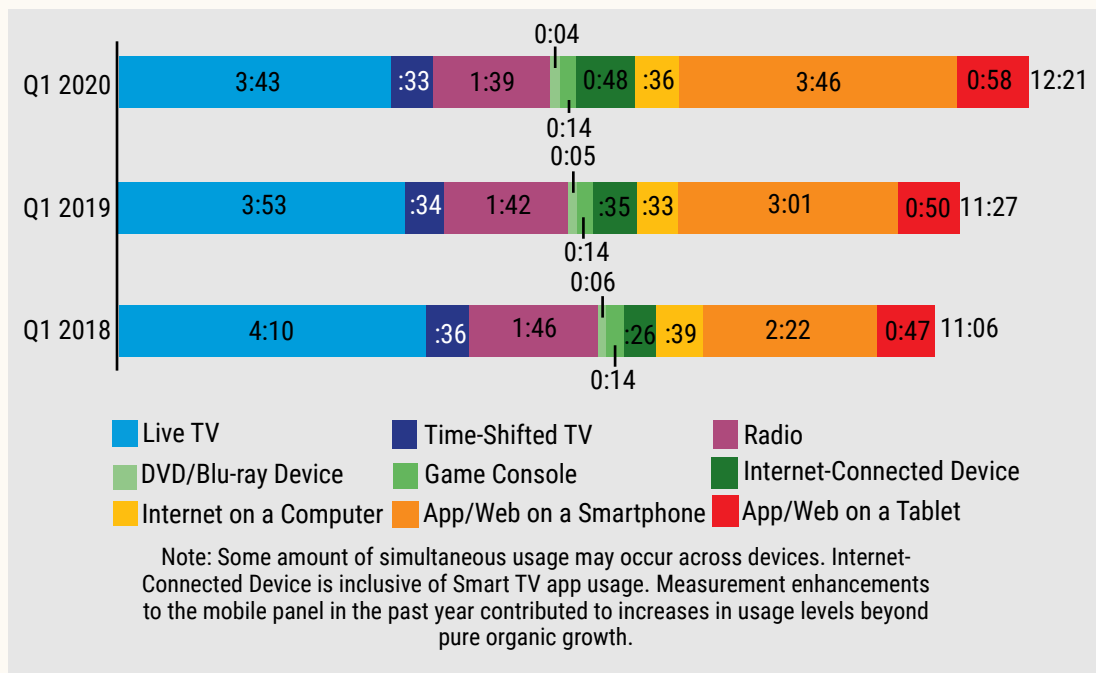


Fig. 1. Average daily time spent on screens for adults 18 years and older.¹

electronic devices is in the range of 40 to 300 lux.^{5,6}

Sunlight is made up of all wavelengths of the electromagnetic spectrum and represents the greatest source of light that humans are exposed to, including blue light, red light and all wavelengths in between. Fluorescent lights provide broadband illumination, with peaks across the entire visible spectrum. Incandescent lights lean toward longer wavelengths, appearing more orange-red, and traditional white-light LEDs (the most

common type of LED) peak in the short wavelength region, thereby emitting a higher proportion of blue light. Electronic devices, including televisions, computer monitors, tablets and smartphones, are typically backlit by LEDs and therefore emit blue light.

Why Do We Need Blue Light?

Light is the most important cue for entraining circadian rhythm. These rhythms represent the fluctuations in physiological processes over the course of approximately 24 hours. They are

controlled both by light exposure and endogenous molecular clocks.

Light information is conveyed from the eye to the suprachiasmatic nucleus by the intrinsically photosensitive retinal ganglion cells (ipRGCs), which are light-sensitive ganglion cells in the inner retina that contain the photopigment melanopsin.⁷ Melanopsin is most sensitive to short-wavelength blue light of approximately 480nm. The

ipRGCs also convey light information from the rod/cone pathways.

Light exposure, and particularly melanopsin-activating blue light exposure, signals to the body that it is daytime. In the dark, ipRGC signaling decreases and melatonin is secreted. Melatonin, the sleep hormone, undergoes a sharp rise in response to dim light approximately one to three hours before bedtime, known as dim light melatonin onset. Exposure to regular light/dark patterns, *i.e.*, light during the day and darkness at night,

Release Date: January 15, 2022

Expiration Date: January 15, 2025

Estimated Time to Complete Activity: 2 hours

Jointly provided by Postgraduate Institute for Medicine (PIM) and Review Education Group

Educational Objectives: After completing this activity, the participant should be better able to:

- Discuss understand blue light exposure.
- Recognize the potential risks associated with blue light exposure.
- Describe the effect blue light has on circadian rhythms and sleep status.
- Educate patients on the impact blue light can have on eye health.

Target Audience: This activity is intended for optometrists engaged in managing patients who present with blue light-related ocular problems.

Accreditation Statement: In support of improving patient care, this activity



has been planned and implemented by the Postgraduate Institute for Medicine and Review Education Group. Postgraduate Institute for Medicine is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE) and the American Nurses Credentialing Center (ANCC) to provide continuing education for the healthcare team. Postgraduate Institute for Medicine is accredited by COPE to provide continuing education to optometrists.

Reviewed by: Salus University, Elkins Park, PA 

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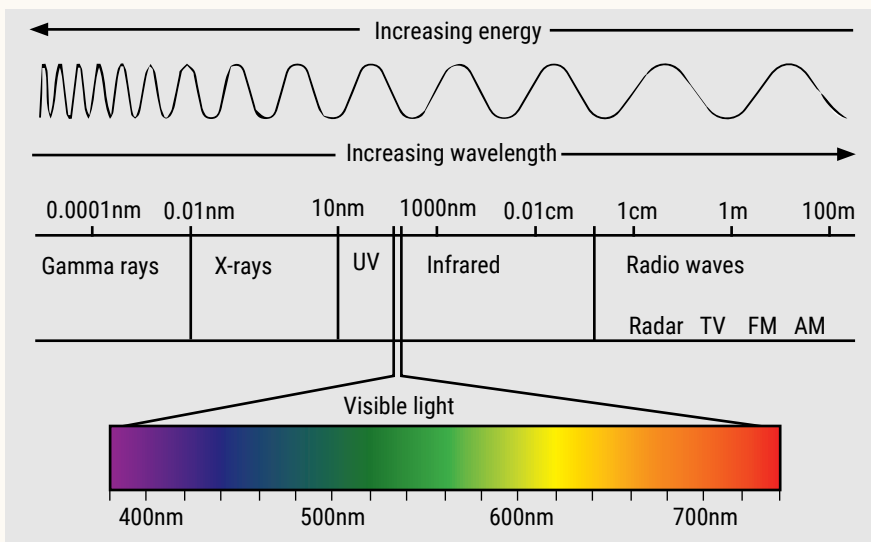


Fig. 2. The electromagnetic spectrum. Adapted from Cyberphysics.

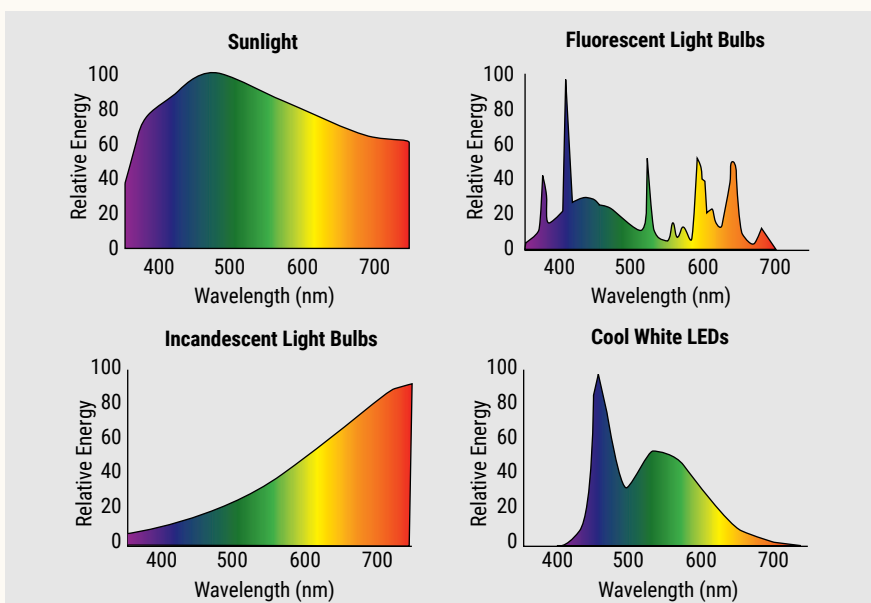


Fig. 3. Spectral composition of sunlight, fluorescent light bulbs, incandescent light bulbs and cool white LEDs.

is critical for overall health and performance. A growing body of evidence shows that the timing, intensity, spectral composition and duration of light exposure all contribute to circadian health.^{8,9}

What Are the Potential Effects of Blue Light On the Eye?

Much of the concern regarding blue light stems from early studies showing that light can damage the retinas of rats and rhesus monkeys.¹⁰⁻¹² One found that prolonged exposure to fluorescent light (wavelengths of 490nm

to 580nm) caused phototoxic damage in albino rats.¹⁰ Another found that a laser of 441nm directed at the retinas of anesthetized monkeys at 33 J/cm² resulted in clumping and phagocytosis of melanin that could be observed histologically as focal lesions.¹² After converting these laboratory thresholds into solar energy values, it was concluded that “sungazing at bright midnoon for 100 seconds can produce a threshold lesion.”¹²

Several studies have investigated the effects of blue light on the human retina. One showed that isolated hu-

man retinal pigment epithelial (RPE) cells were injured with exposure to blue light of 400nm, while exposure to 420nm and 435nm did not cause cellular damage.¹³ Another found that short wavelengths (390nm to 450nm) led to lipofuscin photoreactivity in cultured human RPE cells.¹⁴ Blue light-induced damage and death of isolated RPE cells is caused by mitochondria-derived reactive oxygen species.¹⁵ However, blue light exposure in these laboratory studies was of high intensity and long duration, presented directly to retinal cells and without the filtering properties of the ocular media that is present in a human eye.

Findings such as these, and those in animals, have led to the concept of “blue light hazard,” raising concern that prolonged exposure to blue light-emitting devices can damage the retina and cause age-related macular degeneration (AMD) (Figure 4).

Numerous studies have investigated whether sunlight increases the risk of AMD but have found inconsistent results.¹⁶⁻²⁰ In a study of watermen aged 65 and older, those with advanced AMD had significantly higher exposure to blue or visible light in the previous 20 years. However, there was no association between mild to moderate AMD and blue or visible light.

The Beaver Dam Eye Study reported an association between extended exposure to summer sun and the 10-year incidence of early AMD and macular pigment.¹⁶ On the other hand, a 2018 meta-analysis of 14 studies concluded that sunlight exposure may not be associated with increased risk of AMD.²¹ The absence of a clear association between sunlight exposure and AMD means that light emitted from digital devices, at exponentially lower levels, may present no risk of AMD.

What Are Blue-Blocking Lenses?

These are ophthalmic lenses that filter light within the 400nm to 500nm range. Traditionally, spectacle lenses, contact lenses and intraocular lenses are designed to block UV light. The integration of a yellow chromophore

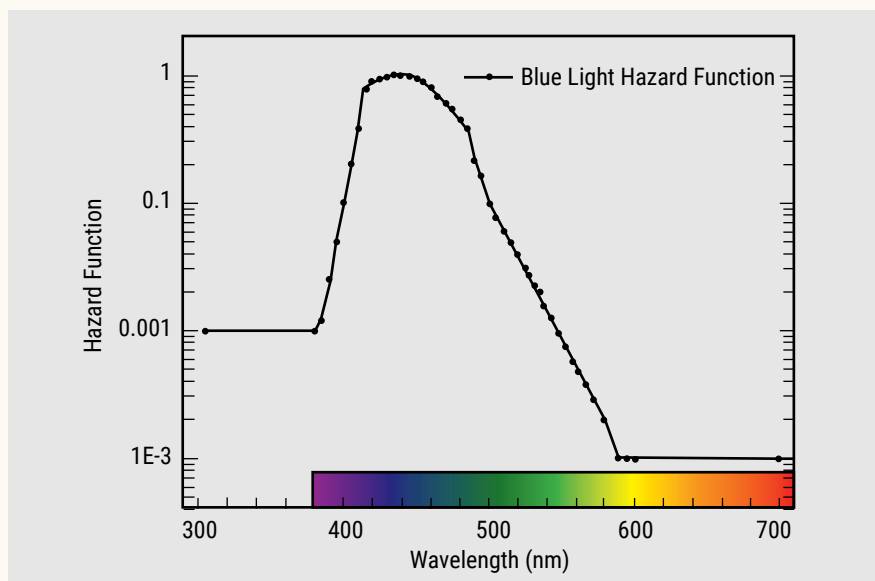


Fig. 4. Blue light hazard function.⁵⁶

blocks wavelengths in the blue portion of the visible spectrum, and additional coatings on the anterior and/or posterior surface of the lens can selectively filter wavelengths in the blue-violet light spectrum (415nm to 455nm). Blue-blocking lenses are widely marketed to relieve “hazardous blue light” exposure and digital eye strain.

Blue-blocking lenses are variable in the proportion of blue light that is filtered, ranging from 10% to 100%. In one study, researchers measured the transmittance of seven commercially available blue-blocking lenses.²² They found that while all of the lenses blocked 100% of the UV light less than 400nm, transmittance in the blue range varied widely (*Figure 5*). On average, blue-blocking lenses filter 5% to 40% of the blue wavelengths. To reach greater filtering, the lenses will generally be tinted yellow or amber.

Can Blue Light From Digital Devices Lead to Retinal Damage?

International standards for blue light exposure were developed based on early studies.²³ One investigated the level of blue light emitted from digital devices with respect to international standards and the blue light hazard.²⁴ The authors tested numerous computer monitors, laptops, tablets and smartphones and calculated that all

devices were within 0.03% to 0.38% of the blue light exposure limit threshold, concluding that these devices do not represent a hazard to the human retina, even during prolonged viewing. In other words, it is extremely unlikely that any patient is exposed to blue light outside of the safe range, regardless of their screen time.

What is the Link Between Digital Device Use and Eye Strain?

Digital eye strain, also known as computer vision syndrome, refers to a group of eye- and vision-related symptoms that result from extended use of screens, including computers, tablets, e-readers and smartphones.²⁵ Digital eye strain has become increasingly prevalent, with studies reporting that up to 40% of office workers and 80% of children experience symptoms, some of which may significantly impact productivity.²⁶⁻²⁸

Digital eye strain includes two broad categories of symptoms: those linked to binocular or accommodative stress and those linked to dry eye. The most common symptoms beside eye strain include headache, blurred vision, dry eye and pain in the neck and shoulders. Dry eye can affect both adults and children and may cause a decreased blink rate or incomplete blinks with digital device use.²⁹⁻³⁸

Many manufacturers market blue-blocking lenses to reduce symptoms of digital eye strain. However, there is little evidence to support the claim that blue light in particular is the cause of digital eye strain. Additionally, there are no physiological mechanisms that link blue light exposure to symptoms of digital eye strain.

One study measured critical fusion frequency following a two-hour computer task with and without blue-blocking lenses.²⁹ Critical fusion frequency is a metric representing fatigue and mental workload.³⁰ Findings showed that wearing a filter that blocked approximately 60% of blue light resulted in the greatest change in critical fusion frequency, which the authors interpreted as less fatigue, compared with wearing a filter that blocked 24% or 3% of blue light. However, when analyzing the proportion of subjects in each group showing a post-task symptomatic improvement for each question, a significant improvement with the blue-filtering lens was only found for one question, “My eyes feel itchy.”

A more recent study examined symptoms of digital eye strain when participants wore a lens that blocked 99% of blue light compared with an equivalent neutral density filter.³⁹ Findings showed that the blue-blocking filter was no more effective at reducing symptoms of digital eye strain than the neutral density filter.

Two other double-blind studies on symptoms of digital eye strain also showed no improvement with the blue-blocking lenses, and a recent review concluded that there were no significant differences in relation to the proportion of subjects showing an improvement in symptoms of eye strain or eye fatigue between blue-blocking and control spectacle lenses.^{29,31-33,40}

How Does Digital Device Use Impact Sleep?

Nighttime use of electronic devices, including televisions, computers and handheld devices, is highly prevalent, with 90% of Americans reporting

electronic device use in the hour before bedtime.⁴¹ Evening exposure to short-wavelength light prior to bedtime may disrupt sleep through ipRGC-induced melatonin suppression, contributing to the high frequency of reported cases of sleep dysfunction, which affects up to 40% of the population.⁴²⁻⁴⁵ Computers, cell phones and video games at night are associated with more difficulty falling asleep and less restful sleep.⁴¹ Evening smartphone use, with and without a blue-blocking filter, showed attenuated nighttime melatonin in comparison with reading a printed book, albeit less so when the filter was used.⁴⁶

An obvious solution to combat light-induced melatonin suppression is to cease electronic device use and dim indoor artificial lights a few hours before bedtime. However, given challenging academic obligations and demanding workloads, this is often an unrealistic expectation. An alternative is the use of blue-blocking lenses before bedtime.

A recent study showed that wearing blue-blocking glasses before bedtime, even while continuing to work on digital devices, increased nighttime melatonin by 58%, increased sleep duration by 24 minutes and improved subjective sleep quality.⁴⁷ Note that the lenses used in that study blocked nearly 100% of wavelengths less than 500nm and were worn only at bedtime, not throughout the day. Another study demonstrated subjective improvements in both sleep quality and mood, as well as a decrease in LED-induced nighttime melatonin suppression, in participants wearing blue-blocking glasses at nighttime for two weeks.^{48,49}

What is the Connection Between Digital Device Use and Myopia?

A common concern for parents is whether digital devices contribute to myopia. The prevalence of myopia is increasing faster than genetics can account for, and it is well accepted that there are environmental and behavioral contributions to myopia. Not only is the prevalence of myopia increasing, but the age of onset is also younger, progression is accelerated and high myopia

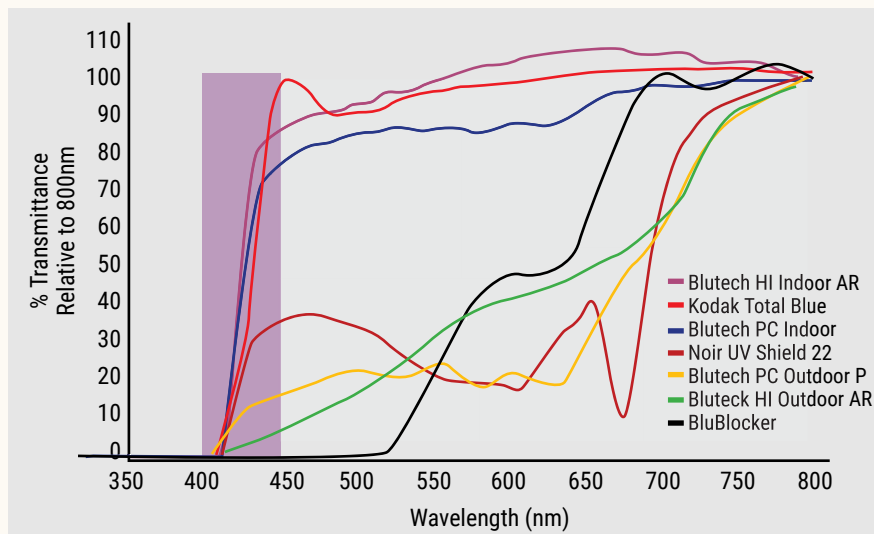


Fig. 5. Transmission spectrum of seven commercially available blue-blocking lenses.²²

is increasing.⁵⁰ These observations raise the question of whether screen time contributes to myopia.

Two major risk factors associated with myopia are decreased time outdoors and increased near work. Screen time represents a form of near work. Children use digital devices for long durations, often uninterrupted, and at a close distance. Studies show that children typically view handheld devices from distances of approximately 10cm to 30cm (Figure 6).⁵¹ Additionally, it is likely that if children spend increased time on digital devices, they are spending less time outdoors.

Studies examining the association between screen time and myopia are conflicting. Some reveal a link between screen time and myopia, reporting more screen time is associated with a higher prevalence of myopia, increased myopic refraction and longer axial length.⁵² However, others have found no link between the two.^{53,54}

A systematic review published in 2020 included five studies and found no association between prevalent or incident myopia and digital screen time.⁵⁵ Another systematic review and meta-analysis published in 2021 (33 articles and 11 articles, respectively) reported a weighted odds ratio of 1.26 from cross-sectional and prospective studies. The authors of the review article concluded that there is insufficient and conflicting

literature on the association between digital device use and myopia.

Investigating the relationship between device use and myopia is challenging for many reasons. It is difficult to investigate device use as an independent factor, separate from near work. Additionally, device use is generally estimated from parent questionnaires, which are inherently confounded by recall errors and biases. Many studies have included Asian populations and may not be generalizable. Importantly, associations between screen time and myopia reported in observational studies do not infer causal relationships.

What is the Optometrist's Role?

Many patients are concerned about “blue light hazard,” in part due to extensive marketing of blue-blocking lenses. It is the optometrist’s obligation to educate their patients and present evidence-based clinical recommendations. Patients should be informed that there are no physiological mechanisms linking blue light to digital eye strain, that blue-blocking lenses show no benefit to eye comfort in controlled clinical trials and that there is no evidence supporting a link between digital device use and retinal damage. Additionally, patients should be notified that studies investigating links between screen time and myopia are conflicting and inconclusive.



Fig. 6. Screen exposure may have a negative effect on ocular surface health.

Optometrists should educate parents that nighttime screen time and artificial light can lead to sleep disruptions. They can also convey general recommendations for screen use in children by referring parents to guidelines set by the American Academy of Pediatrics and World Health Organization.

How can the OD help relieve digital eye strain? Note that it is a diagnosis of exclusion. Refractive status must be comprehensively examined, considering objective and subjective as well as non-cycloplegic and cycloplegic measures. A careful assessment of binocular vision should be performed, as binocular vision conditions can often present with the same symptoms as digital eye strain. A patient's individual viewing needs should be discussed, which will vary based on academic or work demands and leisure screen time. Patients who are presbyopic or near-sighted may benefit from computer glasses to reduce accommodative demand at their habitual computer-viewing distance.

Physical attributes, such as body height and arm length, should be considered. For both children and adults, workstations should be set up with ideal ergonomics that take into account viewing distance, angle and height. Glare, brightness, contrast and font size are also important factors for comfort during extended screen time. Dry eye symptoms related to digital devices can be addressed by teaching the patient to blink during screen time, using lubricating drops and employing other

traditional treatments for dry eye. A common clinical recommendation is the 20-20-20 rule. For every 20 minutes of near work, look at objects further than 20 feet away for at least 20 seconds. This general rule-of-thumb may help remind patients to blink and intermittently relax their eyes.

Based on studies demonstrating the attenuating effects of blue light on melatonin, screen time and artificial light exposure should be decreased one to two hours before bedtime.^{46,47} This can also be accomplished through the use of amber-tinted lenses before bedtime. Lenses with the ability to block close to 100% of shorter wavelengths are the most effective. Other options include using apps and installing home lighting that both aim to reduce blue light. ■

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OPTOMETRIC STUDY CENTER QUIZ

To obtain continuing education credit through the Optometric Study Center, complete the test form on the following page and return it with the \$35 fee to: Jobson Healthcare Information, LLC, Attn.: CE Processing, 395 Hudson Street, 3rd Floor New York, New York 10014. To be eligible, please return the card within three years of publication. You can also access the test form and submit your answers and payment via credit card online at revieweducationgroup.com. You must achieve a score of 70 or higher to receive credit. Allow four weeks for processing. For each Optometric Study Center course you pass, you earn 2 hours of credit. Please check with your state licensing board to see if this approval counts toward your CE requirement for relicensure.

1. Which range of electromagnetic radiation represents the visible spectrum?
 - a. 100nm-400nm.
 - b. 400nm-700nm.
 - c. 700nm-900nm.
 - d. 900nm-2mm.
2. Which effect does ipRGC stimulation from blue light have on melatonin secretion and sleep?
 - a. ipRGC stimulation promotes melatonin secretion and increases sleepiness.
 - b. ipRGC stimulation promotes melatonin secretion and decreases sleepiness.
 - c. ipRGC stimulation suppresses melatonin secretion and increases sleepiness.
 - d. ipRGC stimulation suppresses melatonin secretion and decreases sleepiness.
3. Which is the greatest source of blue light exposure?
 - a. The sun.
 - b. LEDs.
 - c. Fluorescent light bulbs.
 - d. Incandescent light bulbs.
4. Recent reports show that adults spend how much time per day viewing digital devices?
 - a. 2-4 hours.
 - b. 6-8 hours.
 - c. 10-12 hours.
 - d. 14-16 hours.
5. Compared with red light, blue light has which?
 - a. Shorter wavelength and higher energy.
 - b. Shorter wavelength and lower energy.
 - c. Longer wavelength and higher energy.
 - d. Longer wavelength and lower energy.
6. Which of the following ocular structures does not help to filter out UV and/or blue light?
 - a. Cornea.
 - b. Lens.
 - c. Vitreous.
 - d. Macular pigment.
7. Which of the following best describes the spectral output of cool white LEDs?
 - a. Constant energy across the entire visible spectrum.
 - b. Individual peaks with equal energy across the entire visible spectrum.
 - c. Greater output in the red region of the visible spectrum.
 - d. Greater output in the blue region of the visible spectrum.
8. Daytime blue light exposure is important for which of the following?
 - a. Alertness.
 - b. Improving mood.
 - c. Regulating circadian rhythm.
 - d. All of the above.
9. Digital eye strain refers to which of the following?
 - a. Macular damage from digital devices.
 - b. A group of eye- and vision-related symptoms that result from extended use of screens.
 - c. Decrease in ocular motility with extended use of screens.
 - d. Perception of phosphenes when viewing devices.
10. Retinal damage from blue light has been demonstrated in which?
 - a. Isolated human RPE cells.
 - b. Children who display extensive digital device use.
 - c. Adults with computer-related occupations.
 - d. Teens who have transitioned to virtual learning during COVID-19.
11. Wearing 100% blue-blocking glasses before bedtime has been shown to do what?
 - a. Decrease sleep duration.
 - b. Decrease sleep quality.
 - c. Increase nighttime melatonin.
 - d. Decrease nighttime melatonin.
12. Which of the following is important for the optometrist to assess in patients suspected of having digital eye strain?
 - a. Workstation ergonomics.
 - b. Comprehensive refraction.
 - c. Binocular vision assessment.
 - d. All of the above.
13. In the United States, which percentage of children use mobile devices before the age of one?
 - a. 21%.
 - b. 44%.
 - c. 75%.
 - d. 50%.
14. Studies investigating links between digital device use and refractive error in children show that screen time does what?
 - a. Significantly increases the risk of myopia.
 - b. Significantly decreases the risk of myopia.
 - c. Has inconclusive effects on the risk of myopia.
 - d. Significantly increases the risk of hyperopia.
15. Which of the following is not a symptom of digital eye strain?
 - a. AMD.
 - b. Dry eye.
 - c. Asthenopia.
 - d. Blurred vision.
16. All of the following are considered evidence-based treatment options for digital eye strain except for which?
 - a. Lubricating eye drops.
 - b. Viewing breaks.
 - c. Blue-blocking lenses.
 - d. Plus-powered computer glasses for presbyopes.
17. The illuminance of sunlight can range up to 150,000 lux. Illuminance from digital devices is in the range of which of the following?
 - a. 1-30 lux.
 - b. 40-300 lux.
 - c. 1,000-3,000 lux.
 - d. Greater than 3,000 lux.
18. Critical flicker fusion frequency is often assessed as a measure of which?
 - a. Eye fatigue.
 - b. Dry eye.
 - c. Contrast sensitivity.
 - d. Macular damage.
19. To improve sleep quality, blue light should be eliminated from screens at which point?
 - a. At all times.
 - b. In the morning after waking.
 - c. At midday.
 - d. At night before bedtime.
20. The 20-20-20 rule refers to which of the following?
 - a. Reading at a 20cm viewing distance for 20 minutes.
 - b. Performing 20 eye exercises of viewing from 20 feet to 20cm.
 - c. Sleeping for 20 minutes for every 20 minutes of digital device use.
 - d. Viewing 20 feet away for 20 seconds every 20 minutes of digital device use.

Examination Answer Sheet

10 Questions on Digital Devices and Eye Health—Answered!

Valid for credit through January 15, 2025

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Answers to CE exam:

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D
9. A B C D
10. A B C D
11. A B C D
12. A B C D
13. A B C D
14. A B C D
15. A B C D
16. A B C D
17. A B C D
18. A B C D
19. A B C D
20. A B C D

Post-activity evaluation questions:

Rate how well the activity supported your achievement of these learning objectives. 1=Poor, 2=Fair, 3=Neutral, 4=Good, 5=Excellent

21. Discuss understand blue light exposure. ① ② ③ ④ ⑤
22. Recognize the potential risks associated with blue light exposure. ① ② ③ ④ ⑤
23. Describe the effect blue light has on circadian rhythms and sleep status. ① ② ③ ④ ⑤
24. Educate patients on the impact blue light can have on eye health. ① ② ③ ④ ⑤
25. Based upon your participation in this activity, do you intend to change your practice behavior? (Choose only one of the following options.)
 A I do plan to implement changes in my practice based on the information presented.
 B My current practice has been reinforced by the information presented.
 C I need more information before I will change my practice.
26. Thinking about how your participation in this activity will influence your patient care, how many of your patients are likely to benefit? (please use a number):
27. If you plan to change your practice behavior, what type of changes do you plan to implement? (Check all that apply.)
 A Apply latest guidelines D Change in current practice for referral G More active monitoring and counseling
 B Change in diagnostic methods E Change in vision correction offerings H Other, please specify: _____
 C Choice of management approach F Change in differential diagnosis
28. How confident are you that you will be able to make your intended changes?
 A Very confident B Somewhat confident C Unsure D Not confident
29. Which of the following do you anticipate will be the primary barrier to implementing these changes?
 A Formulary restrictions D Insurance/financial issues G Patient adherence/compliance
 B Time constraints E Lack of interprofessional team support H Other, please specify: _____
 C System constraints F Treatment related adverse events
30. Additional comments on this course: _____

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31. The content was evidence-based. ① ② ③ ④ ⑤
32. The content was balanced and free of bias. ① ② ③ ④ ⑤
33. The presentation was clear and effective. ① ② ③ ④ ⑤

By submitting this answer sheet, I certify that I have read the lesson in its entirety and completed the self-assessment exam personally based on the material presented. I have not obtained the answers to this exam by any fraudulent or improper means.

Signature _____ Date _____ Lesson 122302 RO-OSC-0122



EDITED BY JOSEPH P. SHOVLIN, OD

KCN Again?

Keratoconus development post-corneal transplantation may be harder to explain, but timely detection and treatment is the best course of action for successful visual outcomes.

Q I have a patient who had a successful graft nearly 20 years ago and now appears to have keratoconus in the graft again. The graft is thin, small and very steep. What factors pose a risk for recurrence?

A Anat Galor, MD, MSPH, of the Bascom Palmer Eye Institute, recently saw a similar case that she hopes will help steer other optometrists in the right direction when caring for these types of patients.

Case Details

A 70-year-old white male presented to the clinic with decreased vision that began while being fit for a hard contact lens in the right eye. His past medical history was significant for keratoconus in both eyes, and he had undergone a

corneal transplant in 1983 in the right eye.

On presentation 36 years after the original transplant, best-corrected visual acuity with contact lenses was 20/30 in the right eye and 20/20 in the left eye.

Over the next few months, increased corneal haze and progressive ectasia were noted in areas of the inferior temporal graft-host junction, and a decision was made to proceed with repeat penetrating keratoplasty, cataract extraction and intraocular implantation (*Figure 1*).

During the surgery, the area of ectasia was removed using an 8.00mm trephine and an 8.25mm donor cornea was sewn into place (*Figure 2*). In 2021, two years after surgery, the patient's

best-corrected visual acuity was 20/20 with a contact lens. No recurrent ectasia was noted. However, in looking back at the case, what are the risk factors leading up to the occurrence of recurrent ectasia in a graft?

Risk Factors

The short answer is that risk factors for recurrent ectasia after penetrating keratoplasty are unknown, says Dr. Galor. However, she notes that this finding typically occurs along the inferior graft-host junction, suggesting that progressive ectasia occurs within the residual host tissue. This may explain why ectasia is more commonly described in cases of small grafts, as more host tissue remains in the periphery, she adds.

If caught early, riboflavin-assisted crosslinking can be considered in the area of ectasia, with care to avoid the limbus, according to Dr. Galor. However, when significant as in this case, she suggests repeat corneal transplantation can be performed, making an effort to include as much of the ectatic area as is feasible in the trephination. ■

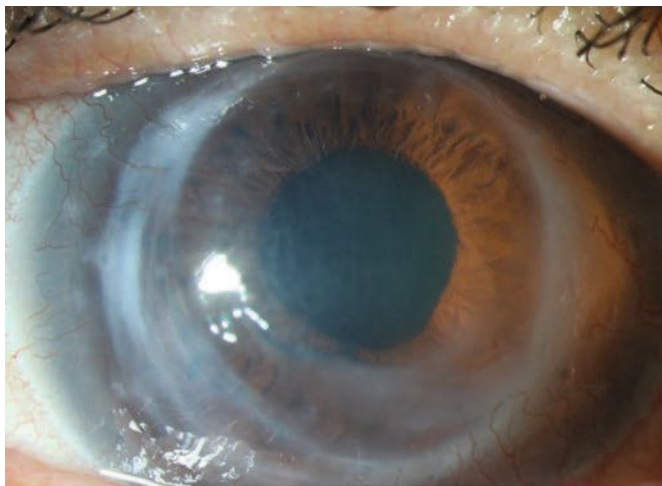


Fig. 1. Corneal ectasia in a graft performed 36 years prior for keratoconus.

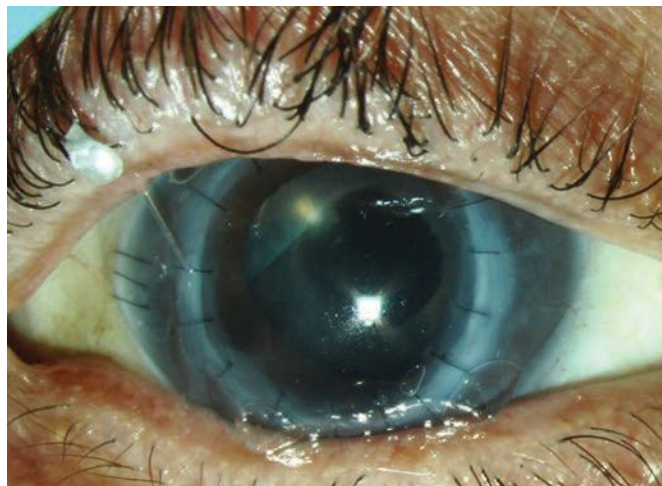


Fig. 2. Repeat corneal transplantation and cataract extraction performed with area of ectasia removed.

About Dr. Shovlin

Dr. Shovlin, a senior optometrist at Northeastern Eye Institute in Scranton, PA, is a fellow and past president of the American Academy of Optometry and a clinical editor of *Review of Optometry* and *Review of Cornea & Contact Lenses*. He consults for Kala, Aerie, AbbVie, Novartis, Hubble and Bausch + Lomb and is on the medical advisory panel for Lentechs.

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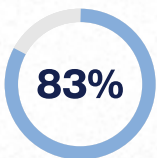
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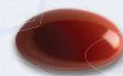
Of participants experienced **improved vision** in low-light conditions²



Of those with **early AMD symptoms** experienced increased contrast sensitivity after 24 months³

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Not the Usual Suspect

Unilateral proptosis, pain and decreased vision led to an uncommon diagnosis.

A 65-year-old man presented with unilateral blurred vision, headaches and periorbital swelling. He reported that the fullness and swelling around the right eye had been present for over a year but that the floaters, tearing and blurred vision in the same eye were recent developments. His mild headaches localized over the right temporal and periorbital regions. His medical history was unremarkable, and he endorsed daily multivitamins with no other medications.

On examination, his vision corrected to 20/40 OD and 20/30 OS. His intraocular pressures were 23mm Hg OD and 18mm Hg OS. Pupillary examination revealed pupils equal in size but an afferent pupillary defect (APD) OD. He correctly identified 11 out of 14 color plates in each eye but noted a 50% subjective brightness desaturation in the right eye compared with the left with a transilluminator. Right eye extraocular motilities revealed abduction (12^{Δ} esotropia on right gaze), adduction (8^{Δ} exotropia on left gaze) and supraduction deficits (3^{Δ} hypotropia on right upgaze) (*Figure 1*). Exophthalmometry revealed 7mm of proptosis OD, with notable fullness of the tissue surrounding the eye (*Figure 2*). Aside from mild nuclear sclerosis in both eyes, the slit lamp and fundus exams were unremarkable. Notably, there was no chemosis or injection of the conjunctivae.

Differentials

At this point, the exam was concerning for an orbital process on the right

side. Unilateral proptosis can be caused by several conditions. First, consider infectious and inflammatory causes. Orbital cellulitis is a painful infection of the content posterior to the orbital septum. It is most commonly associated with paranasal sinus infections. Orbital cellulitis may also be caused by trauma with or without retained foreign body, periocular surgery, preseptal cellulitis, dacryocystitis, dental infection or hematogenous spread.¹ Prompt recognition and treatment is critical to prevent further spread of infection, which could ultimately lead to permanent vision loss or life-threatening complications.

Unilateral proptosis may also result from orbital inflammatory syndromes such as idiopathic orbital inflammation (IOI). Typically, IOI is a painful, rapidly progressive condition that can be misdiagnosed as orbital cellulitis due to the overlap in clinical characteristics. Both disorders can present with significant conjunctival injection, pain, proptosis, vision loss and diplopia. A diagnosis of IOI is typically made only after an infectious entity and other inflammatory systemic conditions are ruled out.²

Thyroid eye disease (TED) should also be considered in patients who present with proptosis. Typically, TED presents with bilateral proptosis, diplopia, conjunctival injection and

eyelid retraction. It may, however, present asymmetrically and appear as a unilateral process at the onset. If no prior history of thyroid dysfunction is known and the examination is suspicious for TED, patients should undergo a basic thyroid function panel. If negative, the provider should consider ordering thyroid auto-antibody titers. Our patient did not present with a history or clinical findings that would indicate an inflammatory orbital disorder or TED, so it was prudent to consider alternatives.

The next differential on our list was an orbital mass. These vary greatly in presentation, size and prognosis. Vascular lesions of the orbit such as lymphangiomas and cavernous venous malformations are benign but may still cause progressive proptosis, reduced vision and diplopia if they increase in size. Lymphoproliferative lesions are the most common orbital masses in older adults and include both lymphoid hyperplasia and lymphoma.³ Many cases of orbital lymphoma go undiagnosed for a period due to their slow growth. When these tumors do enlarge, they tend to conform around the globe and muscles, resulting in a less obvious mass effect. Orbital lymphoma generally lacks significant inflammation unless it is a more aggressive subtype, which can pose a diagnostic challenge.



Fig. 1. Extraocular motilities in all gazes. Note periorbital fullness of the right side in primary gaze. There were adduction, abduction and supraduction limitations OD. Left eye motilities were full.

About
Dr. Bozung

Dr. Bozung works in the Ophthalmic Emergency Department of the Bascom Palmer Eye Institute (BPEI) in Miami and serves as the clinical site director of the Optometric Student Externship Program as well as the associate director of the Optometric Residence Program at BPEI. She has no financial interests to disclose.



Fig. 2. The “worm’s eye view” offers a better angle to evaluate the globes’ positions relative to one another, which can be helpful in unilateral globe displacement. Proptosis OD is evident relative to OS.

Next Steps

Based on the patient’s age and presenting features of unilateral proptosis, an APD, limited extraocular motilities and a lack of inflammation, the most likely diagnosis was an orbital neoplasm. MRI of the brain and orbit with and without contrast revealed an expansile mass arising from the right greater wing of the sphenoid bone that extended superiorly into the floor of both the anterior and middle cranial fossae. The lesion also expanded into the right lateral orbit. The intraorbital extension resulted in right-sided proptosis and crowding of the mid and apical orbit (*Figure 3*).

The lesion’s radiographic features, location and clinical history were most consistent with an intraosseous meningioma. The patient was referred to neurosurgery within two weeks, and a combined case was coordinated with an oculoplastics surgeon. The tumor was resected in full via a cranio-orbital approach, and pathology confirmed it to be WHO grade I meningioma.

At his two-month post-surgical follow-up, the patient reported significant improvement in his vision and headaches. He complained of facial numbness, diplopia and jaw pain with mastication but noted these symptoms were continually improving.

A Rare Subtype

Meningiomas are tumors that originate from the meninges surrounding the brain and spinal cord. They are the most common intracranial tumor and may be found incidentally on imaging.⁴ They grow slowly, so the onset of symptoms is often insidious. Though

most meningiomas are benign, they can lead to headaches, seizures and focal neurologic deficits depending on their location and growth. Grade I are the most common (81.1%) and have the best

prognosis. Grade II are less common, and grade III are the rarest (1.7%).⁵ As the grade increases, so does the likelihood of recurrence and complications.

Primary intraosseous meningiomas comprise 1% to 2% of all meningiomas.⁶ They form within the bones of the skull and are thought to arise from arachnoid cells trapped within the bone. Similar to other intracranial meningiomas, symptoms can vary and are mostly related to the tumor’s location. Calvarium lesions typically do not present with symptoms but may be noted as a hard scalp mass. Intraosseous meningiomas of the skull base, like in this patient, are more likely to lead to cranial neuropathies, vision changes or hearing loss due to their proximity to the brainstem and cavernous sinus.⁶

Total surgical resection of the intraosseous meningioma with wide margins is the treatment of choice when possible. Some tumors, particularly those involving the skull base, may not be amenable to total resection due to their location. Instead, these tumors may be partially removed to decompress neural structures. Though there is not significant data on outcomes with adjuvant therapies, some suggest radiotherapy to treat residual or recurrent tumors.⁷

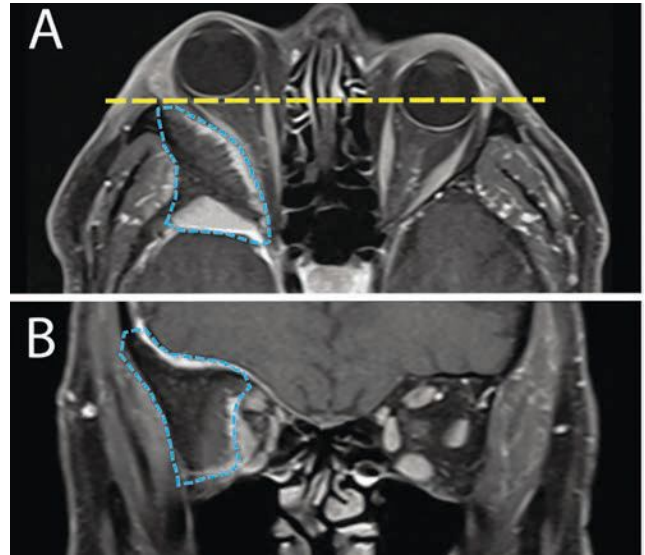


Fig. 3. A: Axial MRI orbit study reveals a large intraosseous lesion of the greater wing of the sphenoid bone (blue line). The mass resulted in right globe proptosis (yellow line). **B:** Coronal MRI view reveals the extensive bony lesion (blue line) causing significant orbital volume loss and medialization of all orbital content.

Regardless of the treatment strategy, long-term radiologic follow-up is critical to monitor for recurrence or growth.⁸

Takeaways

This case highlights the importance of a thorough clinical examination when sorting out a patient’s symptoms. Given this patient’s relatively symmetric visual acuity and color vision, it is tempting to dismiss the chief complaint of blurred vision. However, the pupil exam and a subjective brightness assessment reinforced the importance of this symptom. The patient also did not notice diplopia until testing was completed in the exam lane with prism bars. A careful assessment of motilities and proptosis prompted neuroimaging, ultimately leading to a rare diagnosis and successful management. ■

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BY BISANT A. LABIB, OD

THE ESSENTIALS

In the NO

Find out how nitric oxide plays a role in the treatment of POAG by boosting the efficacy of prostaglandin analogs.

With primary open-angle glaucoma (POAG) being one of the leading causes of blindness worldwide, there is continual effort to explore and develop new modalities to treat this condition.¹ Although the pathophysiology of glaucoma is a multifactorial and complex mechanism leading to retinal ganglion cell (RGC) damage, managing intraocular pressure (IOP) is the only modifiable risk factor at this time.¹⁻³ This is made possible through topical or surgical processes that enhance aqueous outflow and thus lower IOP. First-line topical therapies include prostaglandin (PG) analogs, due to their efficacy and ease of administration.

More recently, the supplementation of nitric oxide (NO) has made PGs even more efficacious, introducing a new avenue for the potential treatment of glaucoma.⁴ In conjunction with PGs, which target uveoscleral aqueous outflow, NO is implicated in structures that are responsible for aqueous outflow using the predominant conventional pathway.^{1,2} NO augments the IOP-lowering effect and has neuroprotective and ocular perfusion properties.¹⁻⁵

Background

NO is a signaling molecule found throughout the body and in multiple organs. It is lipophilic, allowing it to readily cross the cell membrane and reach numerous targets. As such, NO is responsible for various physiological processes, including smooth muscle

relaxation, vasodilation, blood pressure regulation and vascular homeostasis. Endogenous NO is produced from the enzyme nitric oxide synthase (NOS) and is available in three distinct isoforms, each with different functions that affect the corresponding ocular structures.²

The first and most important isoform is endothelial NOS (eNOS), which was first studied in the cardiovascular system as a vascular regulator. Within the eye, eNOS is an important molecule involved in the conventional aqueous outflow pathway and its primary structures, the trabecular meshwork (TM) and Schlemm's canal. Expression of eNOS in these locations aids in increasing outflow facility and thus lowers IOP. Moreover, studies have shown that gene polymorphisms of eNOS are associated with an increased risk of POAG development.²

The second isoform is neuronal NOS (nNOS). This form is expressed anteriorly in the ciliary body, particularly the non-pigmented epithelium, and posteriorly in the optic nerve head and retina. Within the retina, it is expressed by the amacrine cells, photoreceptors and

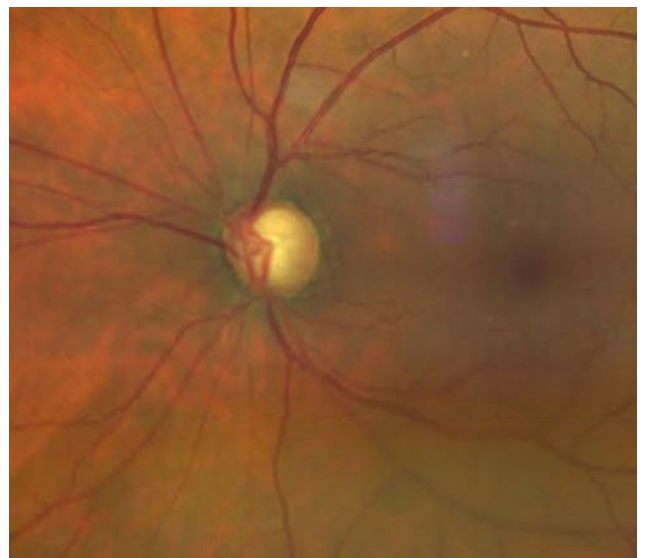
RGCs. It has been postulated that the nNOS variant is responsible for controlling ocular blood flow as well as acting as a messenger between cells within the inner neural retina, such as RGCs.²

Finally, inducible NOS (iNOS) is available only in pathological conditions such as inflammation and ischemia. Increased levels of iNOS have been found in POAG patients with visual field loss. This isoform may also play a role in mediating pressure-induced NO release.²

Benefits

NO offers patients several clinical perks, including the following:

IOP regulation. When IOP is elevated in healthy eyes, the subsequent narrowing of Schlemm's canal and stress on the system causes a cellular response where NO is released in higher quantities. This response leads to an increase in canal permeability and a decrease in TM contractility, allowing for the normalization of IOP.² The effect on the TM also impacts



NO is a viable treatment option for eyes with POAG.

About
Dr. Labib

Dr. Labib graduated from Pennsylvania College of Optometry, where she now works as an associate professor. She completed her residency in primary care/ocular disease and is a fellow of the American Academy of Optometry and a diplomate in the Comprehensive Eye Care section. She has no financial interests to disclose.

diurnal IOP fluctuations, which are dampened with a healthy TM.¹ In patients with ocular hypertension or POAG, this response to IOP and stress is absent, highlighting the role of NO inhibition in glaucomatous pathology.²

Ocular perfusion. In addition to the effect on aqueous outflow dynamics, NO has been implicated in optic nerve head perfusion. NOS inhibition has been found to impair blood flow to the optic nerve in POAG patients compared with healthy controls.² This mechanism of glaucomatous damage due to vascular dysregulation is well-established and can be, in part, explained by NO. The molecule is a vasoactive factor that is produced by the vascular endothelium and is important for maintaining basal flow within the retina and optic nerve head. In cases of elevated IOP, NO aids in autoregulation, which may explain its role in the development or exacerbation of POAG.²

Neuroprotection. NO has been shown to exhibit both neurotoxic and neuroprotective properties. While

elevated levels have been implicated in diseases such as Alzheimer's and even in RGC degeneration, activation of NO has also been shown as an inhibitor of apoptotic cell death. In animal models, NO donor compounds have elicited potential neuroprotective properties.² The ocular perfusion properties of NOS promote vasodilation and vascular permeability, contributing to possible neuroprotection.⁵

Treatment

Currently, the only FDA-approved topical agent for the treatment of glaucoma that makes use of NO is Vyzulta (latanoprostene bunod 0.024%, Bausch + Lomb). The drug is a NO-donating derivative of latanoprost. Clinical trials demonstrated clear superiority of this agent compared with PGs alone, as well as with other topical treatments. This should come as no surprise, as the combination of ingredients acts on both routes of aqueous outflow.⁴ Furthermore, studies have demonstrated that even high dietary nitrate intake was associated with up to a 21% reduced risk of

incident POAG. This includes NO sources from dark, leafy green vegetables (lettuce, kale, broccoli, spinach), celery, potatoes and onions.^{3,6}

Takeaways

Appropriately managing patients with POAG is imperative to preserving visual function. With IOP remaining the only modifiable risk factor, it is important to familiarize yourself with newly available options, research and factors in determining treatment efficacy. ■

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Know When to Fold 'em

Do the findings here provide a definitive diagnosis, or merely a clue to the full story?

A 55-year-old Black female presented with a chief complaint of blurry vision at near. Her systemic history was positive for hypertension, for which she was properly medicated and compliant. She denied allergies of any kind.

Diagnostic Data

Her best uncorrected entering visual acuities were 20/20 OD and 20/20 OS

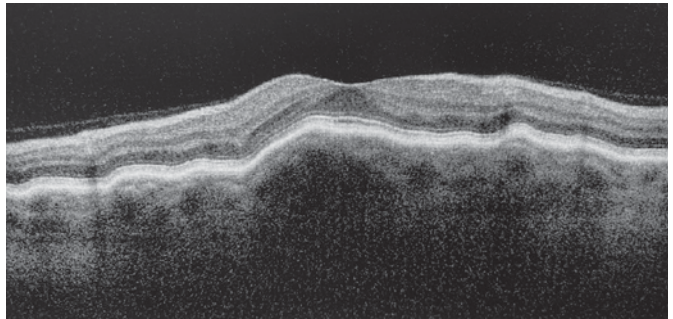
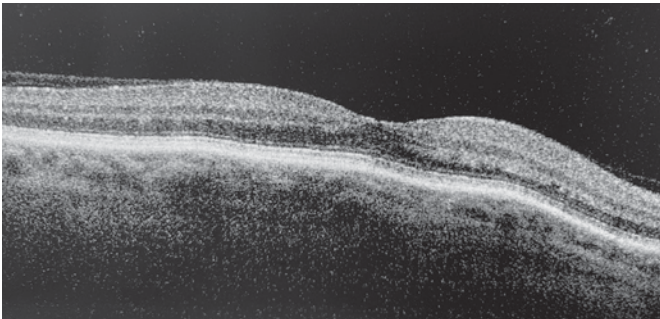
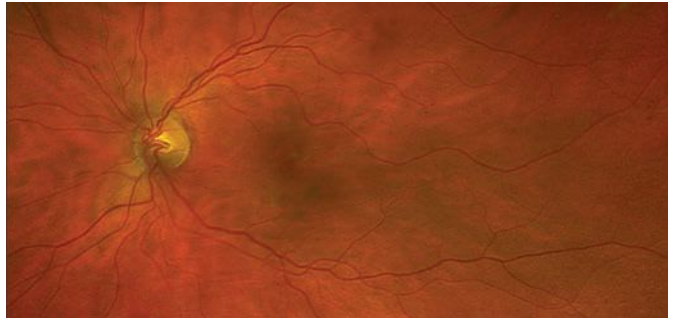
at distance, and 20/30 at near through her over-the-counter +1.50D reading glasses. Her external examination was normal, and there was no evidence of afferent pupillary defect. Biomicroscopic examination of the anterior segments was normal and Goldmann intraocular pressures were measured at 17mm Hg OU. The pertinent posterior segment findings are demonstrated in the photographs.

Additional studies included fundus photodocumentation, B-scan ultrasonography and optical coherence tomography (OCT) with a retinology referral and considerations for neuroimaging. Photos and OCT scans are shown below.

Your Diagnosis

What would be your diagnosis in this case? What is the patient's likely prognosis? Are there additional tests you would order? To find out, please read the online version of this article at www.reviewofoptometry.com. ■

Dr. Gurwood thanks Michael Rebar, OD, for contributing this case.



What do these findings suggest about the patient? How would you approach management?

About Dr. Gurwood Dr. Gurwood is a professor of clinical sciences at The Eye Institute of the Pennsylvania College of Optometry at Salus University. He is a co-chief of Primary Care Suite 3. He is attending medical staff in the department of ophthalmology at Albert Einstein Medical Center, Philadelphia. He has no financial interests to disclose.

NEXT MONTH IN THE MAG

In February, we present our annual issue on diagnostic skills and techniques. Articles will include:

- Peripheral Retinal Assessment: Tips for Success
- Roundtable on Changing Standards in Diagnostic Methodology
- Diagnostic Testing in Dry Eye: Old and New Ideas
- A Refresher on Gonio Lens Use
- The Essentials of Triaging for Potential ER Referral

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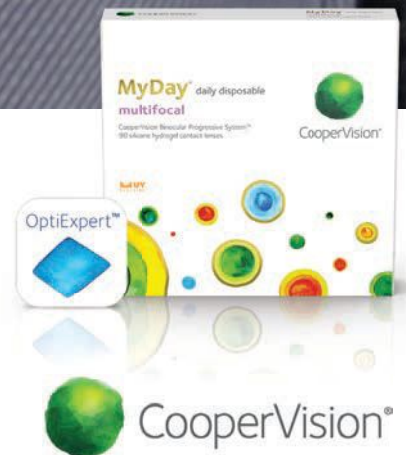


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