Amniotic membrane helps ocular surface disease

Quality-of-life metrics improve glaucoma staging page 22

BLUE LIGHT: Why it matters page 28

Amniotic membrane helps

Cryopreserved and dehydrated membranes are an important strategy to promote healing, and complications such as scarring and haze.1 Healing, tissue damage, and vision-threatening ocular surface disease, including dry eye disease, are gradually released through the day for initial and all-day comfort.2,3 Moisturizing agents are gradually released throughout the day for initial and all-day comfort.2,3

Prescribe DAILIES® AquaComfort Plus® Toric contact lenses for your astigmatic patients.

By Walter O. Whitley, OD, FAAO, MBA

Effective control of inflammation is to chronic pain and irritation as well as delayed endothelial damage (DED). Uncontrolled inflammation leads to dry eye disease, including dry eye disease. Effective control of inflammation is the hallmark symptom of all treatments. Effective control of inflammation is the hallmark symptom of all treatments.


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Amniotic membrane helps ocular surface disease

Cryopreserved and dehydrated membranes offer more therapeutic options

By Walter O. Whitley, OD, FAAO, MBA

Inflammation is the hallmark symptom of all ocular surface disease, including dry eye disease (DED). Uncontrolled inflammation leads to chronic pain and irritation as well as delayed healing, tissue damage, and vision-threatening complications such as scarring and haze. Effective control of inflammation is an important strategy to promote healing, and it is fundamental to my treatment paradigm of dry eye disease.

I have a thriving DED practice within a cornea practice, and every day I see at least one patient seeking dry eye relief despite compliant use of various palliative measures. Like many other eyecare practitioners, I have embraced the use of amniotic membrane (AM) tissue to control inflammation and rehabilitate the ocular surface for select DED patients as well as those patients who have keratitis, conjunctivitis, and blepharitis.

FIGURE 1

Cryopreserved amniotic membrane (CAM) was utilized to rehabilitate and restore the ocular surface of a patient who had a long history of keratitis and unsuccessful use of multiple therapies. The photos show the patient's right eye with A and without B sodium fluorescein (NaFl) stain one week after CAM removal.

Images courtesy Walter O. Whitley, OD, FAAO, MBA

Keep an eye on link between glaucoma and blood pressure

By Benjamin P. Casella, OD, FAAO

While not a systemic disease itself, glaucoma is widely understood to have systemic risk factors. Much of the relationship between glaucoma and the human system has to do with the vasculature of the optic nerve itself. The 1 million or so ganglion cells that converge to make up the optic nerve are similar to other cells in that they must do two things to survive: eat and breathe. While that is an oversimplification of the two processes, it is essentially accurate. The cells of the optic nerve depend on the circulatory system for respiration and supply of glucose to make adenosine triphosphate (ATP) and have energy. So, by definition, anything that nega-

Educate, DON’T SELL TO PATIENTS

By Scott Sikes, OD

ODs must sell from the exam chair. Everyone has heard it, a lot of us have tried it, but how well does it actually work? Do we as ODs have time to go through all lens options, discuss what makes a particular progressive lens better or worse, and delve into different anti-reflective options? Don’t even get me started on the multiple levels of blue light protection. It’s overwhelming, time consuming, and cumbersome.

So, what’s the solution? Recently, I have tried to educate patients in my discussions rather than mention specific brands, designs, or features.

Amniotic graft on page 18

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EDUCATE, DON’T SELL TO PATIENTS

By Scott Sikes, OD

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So, what’s the solution? Recently, I have tried to educate patients in my discussions rather than mention specific brands, designs, or features.
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For many states, including my own state of Georgia, it is that magical time of year: the legislative session. For many doctors of optometry, their respective state legislatures function as a subtle whisper far distant from the more tangibly perceptive aspects of their lives.

However, for a few men and women out there with the nerves (and stomachs) to handle the day-to-day of it, each year’s session is a daily up-to-the-minute saga of offense, defense, or both, contingent upon what is going on under the dome.

4 ways to stay in the know
While I no longer sit on my state optometry association’s board of directors, I still like to keep a foot in the door during the session.

Here are four ways I do that:

1. I reach out to my representatives by phone or email before the legislative session or during its infancy. Even if this is someone who overtly does not respect my profession, I think it’s good form. And who knows? I may win him or her over one day before hell freezes.

2. Daily during the legislative session, I visit the official website of the Georgia General Assembly and look at what new bills have been dropped into the hopper. I also perform an advanced search of all current bills using keywords such as “optometry,” “eye,” and “insurance.” It takes about two minutes a day—not a large or time-consuming task to undertake.

3. I bother my state association’s executive director and lobbyists with sporadic text messages inquiring about whispers in the hallways which may have been overheard but not yet put into written form.

4. I attend my state association’s “day at the capitol.” Ours was supposed to be January 31 this year, but a little event called the Super Bowl was being held a few blocks away at that time. So, we rescheduled for March. For me, there exists an infectious vitality under the dome which always invigorates me (at least enough for the drive home). It’s also great to see some of my buddies whom I don’t often get to see.

Legislative session offers opportunity to join in

As long as optometry is a legislated profession, you are involved

You are already involved

Through these various means, I stay relatively involved. However, I’m not going to stand up and charge you with the task of becoming involved if you’re not already. Instead I’m going to remind you that, like it or not, as long as optometry is a legislated profession (and even thereafter), you are involved. I’ll leave it at that.

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Dr. Chris Lievens shares why blue light is important. See page 28.
New blogs written by and for eye care professionals are featured each week on Optometry Times. Check out some of the latest content below and head over to OptometryTimes.com/topic/blog for more articles.

Understand the science and art of managing chronic conditions

ODs play a key role in diagnosing and managing ocular chronic conditions. Mile Brejic, OD, FAAO, and David Kading, OD, FAAO, FCLOSA, explain why an understanding of these responsibilities can help provide better patient care.

OptometryTimes.com/BlogChronicConditions

Dive into the widening landscape of refractive surgery

Tracy Schroeder Swartz, OD, MS, FAAO, explains why ODs should consider more than just LASIK as the best option for their next patient asking about refractive surgery.

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**The Difference is Marco.**
Know how to care for pediatric patients diagnosed with Down syndrome

ODs play a key role in providing treatment, management for this population

By Alex Delaney-Gesing

**Associate Editor**

Optometrists are an important part of the care team for individuals with Down syndrome, says Marianne Boltz, OD, FAAO, of Hershey, PA, at the American Academy of Optometry’s 2018 annual meeting in San Antonio.

More than half—60 percent—of all children diagnosed with Down syndrome have vision problems, a 2011 clinical report by the American Academy of Pediatrics found.

Down syndrome diagnosis is visually confirmed by karyotype. While the individual phenotype is variable, most children develop similar features.

Common ocular findings in children with Down syndrome include:
- 50 percent with significant refractive error
- 15 percent with cataracts
- Up to 47 percent with strabismus, pseudostrabismus/epicanthus
- 33 percent with nystagmus
- Up to 75 percent with nasolacrimal duct obstruction
- 35 to 78 percent with brushfield spots
To a lesser extent, other conditions that can become apparent as a child enters early adulthood include:
- Ptosis
- Corneal ectasias
- Amblyopia
- Keratoconus

Even after a thorough eye exam, children with Down syndrome showing high levels of function or IQ, 20/20 vision, and no refractive error, still showed a reduced visual acuity.

After conducting research, Dr. Boltz determined that reduced visual acuity in the Down syndrome population is expected.

Regardless of expectations, ODs should conduct a proper exam and rule out conditions like hyperopia and refractive error.

**Prescribing for children**

High refractive error, most commonly high astigmatism and hyperopia, has been found in children with Down syndrome. ODs prescribe for these patients as they would for any other pediatric population, Dr. Boltz says.

“We want to prevent the development of amblyopia,” she says.

ODs should prescribe for young patients with Down syndrome, particularly toddlers and preschoolers, in the following cases:
- >1.50 D anisometropia of hyperopia or astigmatism
- >2.50 D cylinder in both eyes
- >4.50 D hyperopia in both eyes

**Behavior and glasses**

Along with refractive error, consider behavioral components when fitting pediatric patients with Down syndrome.

Getting children to wear and continue wearing glasses can be a challenge, Dr. Boltz says. But education and ensuring parents are on board can help prevent resistance.

As a result of pediatric Down syndrome patients having a high refractive error, regular nosepads typically don’t fit these patients’ nasal bridges well, according to Dr. Boltz.

Here are other conditions often found in the Down syndrome pediatric population.

**Accommodative insufficiency**

Typically related to generalized hypotonia, accommodative insufficiency is a common occurrence in Down syndrome patients due to their lower muscle tone.

If this reduced accommodation isn’t addressed, it can be an additional barrier to children’s learning and literacy that ODs need to keep in mind, Dr. Boltz says.

Giving a young patient bifocal reading glasses may also benefit if the child does a lot of reading, Dr. Boltz says.

The biggest key to watch for is if the child has a lower response to accommodation, which would result in a higher plus result, according to Dr. Boltz. This would lead to an under-accommodation response and indicate the child needs reading glasses and bifocals.

**Accommodative esotropia**

Uncorrected hyperopia results in accommodation in children with Down syndrome between 1.5 and 3 years of age. It is often associated with significant hyperopia.

**Epicanthus**

By itself, epicanthus is not a major concern, Dr. Boltz says. The condition is often misdiagnosed as true strabismus by pediatricians or family physicians.

“With an extra epicanthus, just a slight gaze to the right or to the left can make the eye look like it’s crossing in,” Dr. Boltz says.

**Cataracts**

Usually congenital, cerulean cataracts is prevalent among the Down syndrome population. Dots appearing a cerulean blue or light blue color are typically bilateral and asymmetric, according to Dr. Boltz.

The condition does not often obstruct visual acuity as a whole, although it can maintain status or progress slowly.

**Brushfield spots**

These round focal areas appear on the anterior surface of the iris as white or light brown/gray.

They are likelier to develop in Down syndrome children with lightly pigmented—blue, green and hazel—irises or who are of European descent.

Keep in mind, Dr. Boltz says, these spots are not only seen in the Down syndrome population. However, they are more commonly found among these individuals than other conditions.

**Strabismus**

The most common form of strabismus is esotropia, which includes congenital or infantile esotropia (ET).

Treatment for the disorder include recommending glasses—Rx low-plus lenses—and surgery, which would be required to correct infantile ET. Having a relationship with a pediatric ophthalmologist or oculoplastic specialist will help.

**Other common conditions**

Aside from strabismus, additional conditions prevalent in the young Down syndrome popu-
lation include:

- Accommodative esotropia
- Amblyopia
- Nasolacrimal duct (NLD) obstruction
- Keratoconus

**Techniques**
As for any child, NLD probing and irrigation should be the first method used by ODs. A silicone (Crawford) tube is used. If the technique fails to keep symptoms at bay long enough, additional procedures will have to be considered, Dr. Boltz says.

All children touch their eyes frequently. For those diagnosed with Down syndrome, Dr. Boltz says, ODs need to be careful when conducting NLD probing and irrigation.

The technique may be bypassed altogether, and a balloon catheter dilation could be used. This would reduce any risk for a child to dislodge it or have it misplaced, Dr. Boltz says.

Any irritation—dryness, redness—of those lids and eyes will have children with Down syndrome wanting to rub, likely a little more forcefully than they should, says Dr. Boltz.

“(ODs) may want to treat this sooner in these situations, and aggressively,” Dr. Boltz says.

**Macula thickness**
A 2015 study researched the macular structural characteristics in children with Down syndrome in comparison to children not diagnosed.

The study found that, on average, the central subfield thickness (CST) in the Down syndrome group of children was larger than the CST in the second group. Results concluded the presence of abnormal macular development in Down syndrome.

**Recommended exams**
Pediatric tests are considered ideal when working with both children and adults diagnosed with Down syndrome or similar developmental delays.

However, binocular vision testing such as the Hirschberg test can also determine the presence of a more specific condition (strabismus) and its projected direction, frequency, and magnitude.

Another binocular vision test—Krimsky Prism Test—is also used to estimate the magnitude of strabismus. The process includes placing a correcting prism over a fixating eye until the reflex is the deviating eye is symmetric.

**When to schedule exams**
A child’s first eye exam is recommended at six months, Dr. Boltz says.

If results at the six-month exam appear normal, ODs will want to follow up with a child on an annual basis to evaluate for signs of amblyopia, refractive error, or other indicators specific to the patient’s condition.

Yearly evaluations can be followed until age 5. If results appear normal after that, exams can be extended to every two years through adulthood.

**REFERENCES**

Use technology advancements to modernize your practice

As this year seems to be moving as fast as the last, I find myself thinking of the book I read in 1999 called Business @ the Speed of Thought by Bill Gates.

The book seemed like a fast-forward into the future, and that was two decades ago. On a related note, I ponder how far we have come in optometry and how far we still have to go.

Evolving patient care
Managing our patients can be made easier with the advancement of technology as well as with the creation of more accessibility for our patients.

David Dulaney, MD, and Ronald Barnet, MD, were pioneers in the development of an integrated comanagement model.

When I did my residency in 1994, these surgeons were already discussing electronic medical records (EMR), a year shy of starting LASIK, performing small incision cataract surgeries, and looking for the next advancement. These futuristic endeavors opened my eyes to technology's hold on our profession.

Today, I continue to incorporate technology to manage my patients and to demonstrate the modernization of our practice. The current approach that I share with Jay Schwartz, DO, is to add pieces little by little that can then be integrated with the creation of more accessibility for our patients.

A great example is by starting with the Phoroptor. Yes, the same phoroptor we have been spinning for 80 years.

Phoroptor
The digital phoroptor I use is Phoroptor Variable Resolution X-ray from Reichert. This device has a hidden secret that we are looking to take advantage of this year.

Phoroptor Variable Resolution X-ray interacts with pre-screening equipment, such as my autorefractor/keratometer, auto lensmeter and liquid crystal display (LCD)-based acuity screens. Moreover, the device features Bluetooth capability, making it adaptable to other pre-test equipment with Bluetooth.

The device’s controller and display easily fit on the counter in my lane. This allows me the ability to face my patient as I simultaneously look at the controls and ClearChart 4P Polarized Digital Acuity System that I comfortably control with a touch of the variable resolution X-ray screen—and no more reaching up to turn the dials.

And when I—or my patient—is under the weather, I can be at a distance that gives us both some room.

This phoroptor also features large buttons that are visible in lit or dim lanes and—more importantly—allow a presbyope to clearly see what he is doing without his progressive lenses.

In addition to interacting with pre-screening devices, the refraction system integrates with multiple electronic health records (EHR) software and DigitalOptometrics Tele-Optometry software.

Software integration
Tele-Optometry is eyecare software that permits patients to undergo a comprehensive eye health exam remotely. Live remote video conferencing brings together the patient, eyecare professional, and remote use of devices, such as Phoroptor Variable Resolution X-ray digital refraction system and others.

For example, because our office is the official eye center for local sport teams, my staff and I cannot be everywhere all the time. With a clinic in walking distance of the local NBA and MLB teams, we could perform exams or screen injuries in real time without being at the arena.

Unlike other forms of remote refractions conducted via a computer—where the OD is not in control—we are fully engaged with the patient.

Overall, this technology allows us, as eyecare providers, to increase efficiency and grow our businesses via the ability to “see” patients while not in the lane. Furthermore, integrating with your EHR system reduces the time of transcribing and removes areas of potential error.

If you have multiple offices or live in a remote location, you can see patients physically in your first office and see other patients remotely in your other offices, or comanage those surgical patients who are too far to drive into your location.

ODs can now be in three places at the same time. By using technology, they can have flexibility in their schedules, work from home some days, and see patients virtually.

Advancing expectations
Patients expect a level of technology when they come to optometry offices. The fact that ODs can now change the acuity line in a push of a button and perform a refraction, or other binocular testing, outside the physical lane is a jaw dropper—even for those of us in the industry.

Thanks to technology, we can offer patients comprehensive eye health examinations remotely. Telemedicine has arrived, and, as in refractive surgery management, we should always be looking for the best for our patients.

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Troubleshoot contact lens discomfort and prevent complications

Keep an open mind to potential underlying ocular surface disease contributors

In the last contact lens department (see “Look for small signs to prevent contact lens complications,” December 2018), I reviewed complications specific to contact lenses. Another aspect to consider is the underlying conditions that are amplified by the patient’s contact lens wear. Many ocular conditions can occur with or without hyperemia.

“Red eye” is a nonspecific term used to describe an eye that appears red due to illness, injury, or another condition in which the vessels enlarge as a defense mechanism.

When an OD sees a contact lens patient with a red eye, the first thought might be of contact lens-related concerns. But we must keep an open mind to other etiologies, such as these underlying—seemingly unrelated—causes, or even posterior segment problems.

Keep your staff informed to help you triage, especially when you are out of office.

Patients should always be instructed to remove contact lenses when any degree of redness, discharge, or discomfort is present. Let’s start with dry eye disease.

Typically, when ODs see a low tear meniscus height or obtain a short phenol red thread test or Schirmer’s test, they assume there is sluggish aqueous function.

An OD can utilize lissamine green to identify staining on the upper lid, indicating lid wiper epitheliopathy. This indicates low tear volume and friction against the ocular surface.

Excessive staining on the lower lid margin is assessed as the line of Marx and can represent keratinization and meibomian gland disease.8

To note, it is important to use enough lissamine green dye and to tap it along the lower lid margin before asking the patient to blink. If do not see a fine line at the mucocutaneous junction, you need additional dye.

Contact lens wearers are more prone to have meibomian gland dysfunction (MGD),9-12 and symptomatic contact lens wearers often show signs of MGD.13 It is critical that ODs carefully screen for this to promote long-term comfortable lens wear.12

It is also crucial to assess meibomian function by multiple means. Carefully examine the lid margin to look for stagnant meibomian glands, thickening, and scalloping of the lid margin. Express the glands diagnostically to determine the flow and turbidity of the excretion, then use fluorescein to time tear film evaporation.

The challenge is that this will change once the contact lens is applied, and using standard fluorescein over the contact lens is not reasonable. This is unfortunate, considering the evaporation with the contact lenses on the eyes is what likely influences the patient’s comfort and ability to wear lenses long term.

In this case, noninvasive keratograph tear break-up time (NKBUT) proves very useful. I use the Oculus Keratograph 5M to perform interferometry testing over the contact lens, showing me a rainbow prism in the tear film when adequate oil is present.

Ensure your staff is asking pertinent questions such as wear time and comfort at removal. Ask staff to notify you when the patient has to blink multiple times to read the acuity chart.

In addition, inflammation is a key component of dry eye. Inflammatory proteins (including interleukin [IL-6, IL-8,] and tumor necrosis factor [TNF-α]) are upregulated with contact lens wear.9

Inflammation creates a cascade of events leading to greater potential damage to the lacrimal and meibomian glands, thus creating a greater deficit in tear volume.

Discuss dry eye treatments early with contact lens patients. It is easier to implement at this stage, preventing progression and need for multiple treatments.

However, ODs may hesitate to have this conversation because the contact lens wearer does not experience symptoms at this stage and may not be receptive to the warning. Regardless, it is an OD’s obligation to screen, identify these early challenges, and educate patients on treatment options.

The most effective way to succeed in convincing patients to begin treatment is sharing images and measurements of the patient’s ocular surface.

Contact lens wearers are some of the best candidates for lifitigrast (Xidra, Shire) or cyclosporine (Restasis, Allergan; Cequa, Sun) treatment. This patient base often has commercial insurance to help with drug coverage. These serve as simple treatments for underlying inflammation and to prevent progression of the ocular surface concerns.

A 2016 study showed that after initiating cyclosporine therapy, the average wear time of symptomatic wearers (wearing lenses less than eight hours per day) increased by 2.1 ± 1.4 hours at two months and 4.6 ±1.4 hours at six months.14

ODs should also discuss hydration, a diet rich in omega-3 foods, and supplements. For patients who want longer wear time, or who have loss or changes in their meibomian structure, I recommend thermal pulsation (LipiFlow, Johnson & Johnson Vision) or intense pulsed light (IPL) treatment (M22, Lumenis).

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Dry eye disease

Dry eye disease has been documented as four times more prevalent in patients who wear contact lenses, with two-thirds of contact lens wearers being female.2

In fact, 50 to 90 percent of contact lens wearers report having symptoms of dry eye.14 The average onset of dry eye symptoms is nearly 10 years sooner in contact lens wearers at age 27 compared to age 36 in non-lens wearers.2

Of course, dry eye is an encompassing term. Whether the patient has a lack of water oil, the loss is magnified when the tear film is split in two by the contact lens, resulting in a significantly reduced tear breakup time (TBUT) and tear volume.3

In fact, 59 percent of contact lens wearers were tested to be hyperosmolar in a 2017 study.7

In the last contact lens department (see “Look for small signs to prevent contact lens complications,” December 2018), I reviewed complications specific to contact lenses. Another aspect to consider is the underlying conditions that are amplified by the patient’s contact lens wear. Many ocular conditions can occur with or without hyperemia.

Typically, when ODs see a low tear meniscus height or obtain a short phenol red thread test or Schirmer’s test, they assume there is sluggish aqueous function.

An OD can utilize lissamine green to identify staining on the upper lid, indicating lid wiper epitheliopathy. This indicates low tear volume and friction against the ocular surface.

Excessive staining on the lower lid margin is assessed as the line of Marx and can represent keratinization and meibomian gland disease.8

To note, it is important to use enough lissamine green dye and to tap it along the lower lid margin before asking the patient to blink. If do not see a fine line at the mucocutaneous junction, you need additional dye.

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ODs should also discuss hydration, a diet rich in omega-3 foods, and supplements. For patients who want longer wear time, or who have loss or changes in their meibomian structure, I recommend thermal pulsation (LipiFlow, Johnson & Johnson Vision) or intense pulsed light (IPL) treatment (M22, Lumenis).
These patients are sometimes more amenable to an in-office treatment as opposed to significant at-home maintenance. A single LipiFlow treatment was found to increase wear time of contact lens patients by an average of four hours per day at Month One.13

Advanced warm compress masks, such as Tranquileyes (Eye Eco), and a new mechanical treatment called NuLids (NuSight Medical), are among a few of the at-home options that can help maintain oil flow after an in-office treatment.

**Blink function**

MGD may be more prevalent in contact lens wearers due to the relativity of the blink to meibomian glands function and possibility that contact lens wear negatively affects blink function.

The contact lens can act as a shield that desensitizes the cornea. The corneal nerves are involved in the feedback loop that stimulates blink action. As partial blinks leave a portion of the globe exposed, it can cause evaporative stress, leading to more inflammation. Moreover, meibomian glands are not stimulated to release oil unless the lids close completely. Proper lid closure is also important for ocular hygiene, as it plays a role in tear drainage and lid maintenance.

I have conducted an in-office assessment of lipid layer thickness and rate of partial blinks on patients during contact lens wear versus without lenses. Unanimously, the lipid layer thickness was reduced, and the rate of partial blinks was increased in patients without lenses.

**Blepharitis**

It is easy to see—if you’re looking—when there is lash debris, wet clumping, or collogarettes. But go further to carefully assess the lid margin for migrating makeup or scar. These can have an even greater influence because of their ability to significantly contaminate the tear film and cause a toxic pool the eye is bathed in.

Such buildups can accumulate in the lacrimal system and conjunctiva over time.14 This can lead to contact lens buildup, intolerance, corneal staining, and photophobia.

Showing patients their tear film debris video is one of the most valuable education tools I have to convert them from wearing reusable lenses to daily disposables, and to motivate behavioral change when it comes to makeup habits. I use my Keratograph’s tear film dynamic function with special lighting to highlight debris movement.

**Lid cleansers**

Some lid cleansers available include foam soaps (Eye Eco, Ocusoft), gel soaps and saturated pads (Oasis), hypochlorous acids, and even special oils (Purifeyed).

**Contact lens wearers are more prone to have meibomian gland dysfunction**

A hygiene recommendation is a good preventative measure for all contact lens wearers. It may even be advisable for ODs to raise their contact lens exam price by the wholesale cost of one bottle of foam cleanser (~$6.50) and include it as a value add to a patient’s yearly contact lens exam to create healthy habits.

**Allergy**

Too often the allergy component may be overlooked in contact lens patients without itch. Fewer cases of giant papillary conjunctivitis (GPC) are seen today than in the days of longer wear modalities.15

However, I still recommend upper lid eversion to confirm the status of the palpebral conjunctiva. Both upper and lower palpebral conjunctiva is best assessed with fluorescein use.

I always grab an image of this at every contact lens exam and correlate it to the success of the contact lens wear over time.

If there are significant papillae and the presence of a stringy crystalline mucous or a junky tear film, I will initiate treatment with or without the complaint of itch. This opens conversation for daily disposables, flushing the eye before and after contact lens wear, allergy drops, or allergy testing within my office (AllerFocus).

For patients with intense reactions, I prescribe sublingual immunosuppressive therapy to avoid the drying effect of oral antihistamines.

The more ODs screen for these underlying concerns, the better long-term care and outcomes they can provide patients.

**REFERENCES**


tively affects the vascular system has the potential to negatively affect the optic nerves.

**Risk factors**
Diabetes mellitus, for example, has long been proposed as a risk factor of the development of open-angle glaucoma. The evidence for this may be more compelling than ever before.2-4

With that said, the relationship between blood pressure and glaucoma has been studied for quite some time.5

Specifically, low blood pressure has been implicated as having a role in the development of open-angle glaucoma, especially in so-called normal tension glaucoma.6,7

With the recent publication of new blood pressure guidelines8 set forth by the American College of Cardiology and the American Heart Association, it is timely to analyze the relationship between blood pressure and glaucoma and examine the role of optometrists.

**Supporting research**
In a 2018 study published in the American Journal of Hypertension, the presence of glaucoma was determined to have a nonlinear relationship with systemic blood pressure.9

The relationship between the two followed a U-shaped curve, according to the study’s investigators.

from the 2005 to 2008 National Health and Nutrition Examination Surveys (NHANES), all age 40 or older.

The overall prevalence of glaucoma in the study sample was 1.2 percent. Systolic and diastolic blood pressure, separately, were metrics to determine the relationship between these two chronic diseases.

For participants who were not taking antihypertensive medications, the incidence of glaucoma went up with both high systolic blood pressure (greater than or equal to 161 mm Hg) and low systolic blood pressure (less than or equal to 110 mm Hg). Similarly, the incidence of glaucoma

**Low blood pressure has been implicated as having a role in the development of open-angle glaucoma, especially in so-called normal tension glaucoma**

Anything that negatively affects the vascular system has the potential to negatively affect the optic nerves

This means that the incidence of glaucoma increased in those participants with low and high blood pressure.

The study included 4,137 participants went up with respect to high and low diastolic blood pressure (greater than or equal to 91 mmHg or less than or equal to 60 mmHg, respectively).

The prevalence of glaucoma among study participants was lowest in those with systolic blood pressure between 11 mm Hg and 120 mm Hg and diastolic blood pressure between 81 mm Hg and 90 mm Hg.

This study suggests a sort of “Goldilocks scenario” of blood pressure is preferred with respect to glaucoma, wherein an optimum range exists.

Blood pressure that is too low—naturally or from the overtreatment of hypertension—may lead to decreased ocular perfusion pressure and result in ischemia to the optic nerve.10

This factor may be especially significant within the arena of normal tension glaucoma.11

On the other hand, systemic hypertension, while perhaps not damaging in the short term, often leads to arteriosclerosis, which may decrease perfusion to the optic nerve.12

**Controversial link**
The relationship between systemic hypertension and glaucoma has traditionally been one of controversy.

In fact, the 2008 Barbados Eye Studies showed that systemic hypertension may have an association with a decreased risk for glaucoma.13

However, newer research published in 2014 suggests the contrary, with systemic hypertension implicated as having a role in the development of ocular hypertension.14

**Putting into practice**
So, with contemporary science suggest-
XIiDRA HAS BEEN STUDIED IN A LARGE DRY EYE DISEASE CLINICAL TRIAL PROGRAM

MORE THAN 2,500 PATIENTS ACROSS 5 CLINICAL TRIALS

STUDY 1
Studied 3 concentrations (0.1%, 1.0%, 5.0%)
230 PATIENTS 12 WEEKS

STUDY 2
Phase 3
588 PATIENTS 12 WEEKS

STUDY 3
Phase 3
718 PATIENTS 12 WEEKS

STUDY 4
Phase 3
711 PATIENTS 12 WEEKS

SONATA
Phase 3
331 PATIENTS 1 YEAR

Indication
Xiidra® (lifitegrast ophthalmic solution) 5% is indicated for the treatment of signs and symptoms of dry eye disease (DED).

Important Safety Information
Xiidra is contraindicated in patients with known hypersensitivity to lifitegrast or to any of the other ingredients.

In clinical trials, the most common adverse reactions reported in 5-25% of patients were instillation site irritation, dysesthesia and reduced visual acuity. Other adverse reactions reported in 1% to 5% of the patients were blurred vision, conjunctival hyperemia, eye irritation, headache, increased lacrimation, eye discharge, eye discomfort, eye pruritus and sinusitis.

To avoid the potential for eye injury or contamination of the solution, patients should not touch the tip of the single-use container to their eye or to any surface.

Contact lenses should be removed prior to the administration of Xiidra and may be reinserted 15 minutes following administration.

Safety and efficacy in pediatric patients below the age of 17 years have not been established.

Xiidra is the first and only eye drop FDA-approved to treat both the signs and symptoms of Dry Eye Disease. It has been studied in more patients than any other pivotal clinical trial program for a prescription Dry Eye Disease treatment to date. Learn more about why you and your patients should give Xiidra a try.

Check out Xiidra-ECP.com

For additional safety information, see accompanying Brief Summary of Safety Information on the adjacent page and Full Prescribing Information on Xiidra-ECP.com.

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**BRIEF SUMMARY:**
Consult the Full Prescribing Information for complete product information.

**INDICATIONS AND USAGE**
Xiidra® (lifitegrast ophthalmic solution) 5% is indicated for the treatment of the signs and symptoms of dry eye disease (DED).

**DOSAGE AND ADMINISTRATION**
Instil one drop of Xiidra twice daily (approximately 12 hours apart) into each eye using a single-use container. Discard the single-use container immediately after using in each eye. Contact lenses should be removed prior to the administration of Xiidra and may be reinserted 15 minutes following administration.

**CONTRAINDICATIONS**
Xiidra is contraindicated in patients with known hypersensitivity to lifitegrast or to any of the other ingredients in the formulation.

**ADVERSE REACTIONS**

**Clinical Trials Experience**
Because clinical studies are conducted under widely varying conditions, adverse reaction rates observed in clinical studies of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. In five clinical studies of dry eye disease conducted with lifitegrast ophthalmic solution, 1401 patients received at least 1 dose of lifitegrast (1287 of which received lifitegrast 5%). The majority of patients (84%) had ≤ 3 months of treatment exposure. 170 patients were exposed to lifitegrast for approximately 12 months. The majority of the treated patients were female (77%). The most common adverse reactions reported in 5-25% of patients were instillation site irritation, dysgeusia and reduced visual acuity. Other adverse reactions reported in 1% to 5% of the patients were blurred vision, conjunctival hyperemia, eye irritation, headache, increased lacrimation, eye discharge, eye discomfort, eye pruritus and sinusitis.

**Postmarketing Experience**
The following adverse reactions have been identified during postapproval use of Xiidra. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure. Rare cases of hypersensitivity, including anaphylactic reaction, bronchospasm, respiratory distress, pharyngeal edema, swollen tongue, and urticaria have been reported. Eye swelling and rash have been reported.

**USE IN SPECIFIC POPULATIONS**

**Pregnancy**
There are no available data on Xiidra use in pregnant women to inform any drug associated risks. Intravenous (IV) administration of lifitegrast to pregnant rats, from pre-mating through gestation day 17, did not produce teratogenicity at clinically relevant systemic exposures. Intravenous administration of lifitegrast to pregnant rabbits during organogenesis produced an increased incidence of omphalocele at the lowest dose tested, 3 mg/kg/day (400-fold the human plasma exposure at the recommended human ophthalmic dose (RHOD), based on the area under the curve [AUC] level). Since human systemic exposure to lifitegrast following ocular administration of Xiidra at the RHOD is low, the applicability of animal findings to the risk of Xiidra use in humans during pregnancy is unclear.

**Animal Data**
Lifitegrast administered daily by intravenous (IV) injection to rats, from pre-mating through gestation day 17, caused an increase in mean preimplantation loss and an increased incidence of several minor skeletal anomalies at 30 mg/kg /day, representing 5,400-fold the human plasma exposure at the RHOD of Xiidra, based on AUC. No teratogenicity was observed in the rat at 10 mg /kg /day (460-fold the human plasma exposure at the RHOD, based on AUC). In the rabbit, an increased incidence of omphalocele was observed at the lowest dose tested, 3 mg /kg /day (400-fold the human plasma exposure at the RHOD, based on AUC), when administered by IV injection daily from gestation days 7 through 19. A fetal No Observed Adverse Effect Level (NOAEL) was not identified in the rabbit.

**Lactation**
There are no data on the presence of lifitegrast in human milk, the effects on the breastfed infant, or the effects on milk production. However, systemic exposure to lifitegrast from ocular administration is low. The developmental and health benefits of breastfeeding should be considered, along with the mother’s clinical need for Xiidra and any potential adverse effects on the breastfed child from Xiidra.

**Pediatric Use**
Safety and efficacy in pediatric patients below the age of 17 years have not been established.

**Geriatric Use**
No overall differences in safety or effectiveness have been observed between elderly and younger adult patients.

**NONCLINICAL TOXICOLOGY**

**Carcinogenesis, Mutagenesis, Impairment of Fertility**

**Carcinogenesis:** Animal studies have not been conducted to determine the carcinogenic potential of lifitegrast.

**Mutagenesis:** Lifitegrast was not mutagenic in the in vitro Ames assay. Lifitegrast was not clastogenic in the in vivo mouse micronucleus assay. In an in vitro chromosomal aberration assay using mammalian cells (Chinese hamster ovary cells), lifitegrast was positive at the highest concentration tested, without metabolic activation. **Impairment of fertility:** Lifitegrast administered at intravenous (IV) doses of up to 30 mg/kg/day (5400-fold the human plasma exposure at the recommended human ophthalmic dose (RHOD) of lifitegrast ophthalmic solution, 5%) had no effect on fertility and reproductive performance in male and female treated rats.
Glaucma & blood pressure

Continued from page 12

Effect profiles. Keeping check on metrics such as systemic blood pressure helps optometrists treating glaucoma patients in monitoring patient safety in addition to keeping an eye on potential lurking variables.

REFERENCES
New diabetes agents can improve, save patients’ lives

Several diabetes medications are now available for reducing blood glucose levels, with more on the horizon. Such drugs work by a variety of pharmacologic mechanisms. Clinical practice guidelines generally call for using the most effective agents with the greatest historical safety profiles at the lowest cost.

Reducing elevated blood glucose levels has a significant impact on the incidence and severity of diabetic retinopathy. Even more importantly, which medicines patients are prescribed can have a profound impact on the risk of them suffering major adverse cardiovascular events (MACE)—myocardial infarction (MI), cerebrovascular accident (CVA), death from MI or CVA, coronary artery bypass grafting (CABG), or hospitalization for congestive heart failure (CHF).

Our goal as eye care providers is to reduce the risk of significant vision loss caused by diabetes. But we must also keep an eye on preventing MACE. After all, with prevention and treatment options available, most patients will not go blind from diabetes.

However, most patients will suffer cardiovascular disease, which remains the largest cause of mortality in patients who have diabetes. Put more plainly, mortality trumps good vision.

**Effective medications**

Analysis of these cardiovascular outcomes has shined new light on what is meant by using the most “effective” diabetes medications.

This has been gauged primarily by a drug’s potency for absolute reductions in glycated hemoglobin (HbA1c) as well as patient tolerance of side effects and drug costs (what agent gives us the biggest and safest “bang for the buck”).

Metformin has long been considered the drug of choice in type 2 diabetes management because it is inexpensive, relatively effective at lowering mean blood glucose, and its use appeared to decrease bad cardiovascular outcomes when compared to patients on either insulin or sulfonylurea medicines in clinical trials.

Both glucagon-like peptide receptor-1 analogs (GLP-1 RA)—liraglutide (Victoza, Novo Nordisk), semaglutide (Ozempic, Novo Nordisk), exenatide (Bydureon, AstraZeneca) and dulaglutide (Trulicity, Eli Lilly)—and sodium-glucose co-transporter type 2 (SGLT2) inhibitors—canagliflozin (Invokana, Eli Lilly), dapagliflozin (Farxiga, AstraZeneca), and empagliflozin (Jardiance, Boehringer Ingelheim)—have been shown to significantly reduce MACE when compared to “usual care” with metformin plus add-on therapy as needed.

Relative risk reductions for various CVD outcomes have been to 15 percent for the GLP-1 agents and 40 to 50 percent for the SGLT2 drugs.

SGLT2 drugs appear to reduce the risk of hospitalization for CHF about 40 percent and preserve/improve kidney function in patients with and without early diabetic kidney disease.

**Cost barriers**

Unfortunately, these new drugs’ high prices have limited their use by prescribing physicians.

But because macrovascular complications of diabetes are far costlier to the U.S. economy than microvascular complications, the case for early use of these more expensive agents may gain strength.

The average cost of a CABG was roughly $151,000 in 2016, a figure that potentially dwarfs the $3,500 to $4,000 annual cost of these newer drugs for high-risk patients.

**Patient analysis**

Interestingly, the Comparative Effectiveness of Cardiovascular Outcomes in New Users of SGLT-2 Inhibitors (CVD-REAL) study showed that even patients with no prior history of CVA events had an almost 50 percent reduction in heart failure and death with use of any SGLT2 inhibitor.

Evidence from a 2018 analysis also suggests that sulfonylurea agents as a class may be associated with a greater risk of CV events and mortality, including as add-on therapy to metformin.

More than 140,000 U.S. veterans over 14 years of follow-up experienced nearly a 40 percent increase in mortality with sulfonylureas (SFU) compared to add-on pioglitazone (Actos, Takeda). The most striking association comes from a meta-analysis comparing patients on GLP-1 analogs or SGLT2 inhibitors to patients using primarily second-generation SFU drugs like glipizide (Glucotrol, Pfizer) or glyburide (Diabeta, Sanofi).

Patients in the latter group had more than a 40-fold increased risk of cardiovascular death or heart attack in the analysis of more than 1.5 million patients (82 randomized trials and 26 observational studies followed for a mean of six years).

**Guidelines in practice**

These findings have prompted me to routinely recommend that patients on SFUs—especially glyburide or glipizide—ask their diabetes physicians about substituting GLP-1 (injectable) or SGLT2 (oral) therapy for the SFU, particularly if they have known atherosclerotic disease (either class of agent) or CHF (SGLT2 drugs).
The American Academy of Optometry and the World Council of Optometry are joining together to offer a global platform where practitioners, students, researchers and educators can share expertise and engage in the development of optometry’s future. All in one of the top tourist destinations in the world – Orlando, Florida.

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Registration opens May 6, 2019
Amniotic membrane grafts help ocular surface disease

Using amniotic membrane

A decade of experience and impressive outcomes with AM tissue supports my ongoing reliance on this therapeutic intervention, and a growing body of evidence validates my anecdotal observations.

As a proponent and successful user of AM tissue, I sometimes facilitate workshops on this topic. My key message at these events is that there are various types of AM tissue for ophthalmic use, and eye-care providers should try them all. By doing so, clinicians can see for themselves which products provide better clinical results and which fit in best with their overall practice dynamics.

For optometrists who suspect that implanting AM grafts is beyond their level of expertise, nothing could be further from the truth. Implanting an AM tissue graft is as clear cut as applying a contact lens or inserting a punctal plug. When offering patients the option of AM tissue grafts, it can be reassuring to convey that the insertion process is simple.

That being said, it is equally important to manage patient expectations. Let patients know that dry eye is a chronic condition and that while the AM tissue is not a cure-all, it will play a key role among the multiple methods that can be used to manage their conditions.

Cryopreserved vs dehydrated

Cryopreserved AM and dehydrated AM are the two types of AM tissue grafts available for ophthalmic use. Prokera (Bio-Tissue) is the only cryopreserved ophthalmic AM tissue available, whereas several different dehydrated AM tissue grafts are available, including AmbioDisk (Katen) and BioDOptix (Integra LifeSciences). AM extract autologous serum eye drops are also an option (Regener-Eyes, Regenerative Network International; Genesis; Ocular Science), but they differ from pre-shaped, ready-to-place AM tissue grafts.

The primary difference between the two AM tissue categories is how they are preserved. Cryopreserved AM (CAM)—Prokera—must be kept frozen, then brought to room temperature before application. Conversely, heat or chemical processes are used to preserve dehydrated AM (DAM), which is stored at room temperature and must be rehydrated for clinical use.

Prokera is a self-retaining biologic corneal bandage that is fastened to an ophthalmic conformer ring that keeps the graft in place. I rinse the graft with sterile saline solution to prevent potential stinging from the preservation media and apply topical anesthetic.

Then, I hold the upper eyelid, ask the patient to look down, and insert Prokera into the superior fornix.

Next, I pull the lower eyelid down, slide Prokera under the lower eyelid, and check centration under the slit lamp.

Tape tarsorrhaphy is optional, but it’s a step that I always include because it helps keep the lid closed, keeps the device in place, and enhances comfort by preventing the patient from blinking.

The membrane dissolves as healing occurs. In my clinical experience, more inflammation there is, the faster the membrane will dissolve and release its biological factors.

I usually follow up with patients in one week, but the membrane may dissolve in

Figure 2A-C. A. A 72-year-old man with postoperative corneal edema five years after complicated cataract surgery. The patient suffers from chronic foreign body sensation and hyperlacrimation. B. Epithelial disruption in a linear-shaped band at 8 o’clock revealed with fluorescein. C. Significant improvement in symptoms and clinical appearance after two days of amniotic membrane therapy. Images courtesy Laurence Craig Thomas, OD
PRACTICAL CHAIRSIDE ADVICE

Ocular surface

Figure 3A-C. A. Non-resolving corneal abrasion of two-day duration. B. Amniotic membrane allograft in place under retaining soft contact lens. C. Defect closing after two days of amniotic membrane therapy. Images courtesy Laurence Craig Thomas, OD

- as few as two to three days.
- In cases where the graft is still in place at the one-week follow-up, removal is simple: I apply topical anesthetic, pull the lower eyelid down, lift the lower edge of Prokera using a cotton swab or forceps, ask the patient to look down, apply gentle pressure on the upper eyelid, and slide Prokera out.
- Placing dehydrated AM requires additional tools, such as a lid speculum, a Weck-Cel sponge, and a bandage contact lens.
- A bandage lens must be placed on top of the membrane to keep it fixated. Some dehydrated AMs are packaged along with a contact lens; these AMs cannot be used with any bandage lens, only the accompanying lens.
- With dehydrated AM graft, apply topical anesthetic, insert a speculum; debride the cornea if indicated; place the membrane basement side down with forceps; center Weck-Cel sponge; place a bandage contact lens on top of it, making sure both are centered; and finally remove the speculum, making sure to avoid disturbing placement of the membrane or contact lens.

The science
AM tissue is a disease-modifying therapy that aids corneal epithelialization, reduces inflammation and fibrosis, prevents structural damage, and boasts antimicrobial properties.²

- Many of the beneficial effects of AM are attributed to biomolecules, including fibronectin; hepatocyte growth factor (HGF); epidermal growth factor (EGF); basic fibroblast growth factor (bFGF); transforming growth factor (TGF); and collagen types I, III, IV, and V, which are a direct source of corneal regeneration.³,4

This cocktail of natural cytokines enhances tissue thickness, provides a scaffold for epithelialization, and enhances capillary formation—essentially stimulating growth to repair and restore soft tissue.³,4 What’s more, AM expresses HLA-G, which gives it the ability to graft damaged tissue without triggering an immune response, and naturally blocks the TGF-β receptor responsible for scar tissue development.⁵

While studies show that AM is imbued with these influential cellular power brokers, the anti-inflammatory and regenerative properties associated with these biologics are retained in different amounts or lost depending on the preservation process used.

For optometrists who suspect that implanting AM grafts is beyond their level of expertise, nothing could be further from the truth

- After 5.4 days of CAM treatment, patients demonstrated an improved ocular surface along with a notable reduction of the severity of their overall Dry Eye Workshop (DEWS) score.¹³ These findings are consistent with previous studies.¹⁵,¹⁶

AM in my practice
I typically use AM for moderate-to-severe DED patients. If they have been prescribed anti-inflammatory eye drops and oral omega-3 supplements, performed lid hygiene, and had their meibomian glands expressed, but I have not seen healing after one month or more, I will recommend AM.

I always start with CAM and move to DAM only in rare cases in which the patient is intolerant of the conformer ring with CAM. When a patient complains of irritation, it often dissipates within 24 hours.

See Amniotic membrane grafts on page 20

For optometrists who suspect that implanting AM grafts is beyond their level of expertise, nothing could be further from the truth

Relevant research
A 2018 retrospective study demonstrated that a single application of Prokera self-retained cryopreserved amniotic membrane (CAM) can accelerate the recovery of the corneal surface and help reduce signs and symptoms of DED for at least three months.¹³

This study, known as the Dry Eye and Amniotic Membrane (DREAM) study (not to be confused with the other well-known dry eye DREAM study), looked at 97 eyes of 84 patients who exhibited severe DED despite maximal medical treatments including topical artificial tears, cyclosporine-A, serum, antibiotics, and steroids. Study participants exhibited superficial punctate keratitis, filamentary keratitis, exposure keratitis, neurotrophic keratitis, and corneal epithelial defect.
Amniotic membrane grafts

Continued from page 19

cryopreserved preparations are more plentiful and active, and the consistency successful results seen in my practice suggest this is true. However, I also see remarkable results from DAM in select patients.

Keep in mind that when AM is used with recalcitrant DED patients who have advanced disease, at times patients will require several AM tissue grafts consecutively or over a period of months

Nerve regeneration

Patients who have neuropathic corneal pain are also ideal candidates for AM grafts.

Morkin and colleagues found that neuropathic corneal pain due to damaged trigeminal nerve terminals significantly improved by about 72 percent within an average of six days of CAM treatment.

Patients who found the graft uncomfortable and had it removed within four days still showed 63 percent improvement in pain scores even with the abbreviated placement. In this study, corneal nerve regeneration was shown via confocal microscopy.

John was the first to show that CAM’s increase in corneal nerve density and improved corneal sensitivity is correlated with corneal nerve regeneration. Before this study, no therapeutic modality had been shown to regenerate corneal nerves.

In the study, patients exhibited a significant increase in central corneal nerve density for up to three months as well as significant improvement in their DEWS score, pain score, tear film breakup time, fluorescein staining, and Standard Patient Evaluation of Eye Dryness (SPEED) score.

Researchers surmise that the lasting effect of a placement of CAM for DED may be attributed to corneal nerve regeneration given that corneal nerves play a vital role in epithelial regeneration and tear film stability through reflex tearing and blinking.

regeneration, and improve the signs and symptoms of DED, and my own anecdotal observations support this. DAM, too, is effective at improving the signs and symptoms of DED—in my hands and according to anecdotal reports.

Ultimately, eye care providers need to try cryopreserved and dehydrated AM, review the literature, and challenge themselves to decide how to incorporate these tools into their practices to offer additional treatment options to their patients.

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Dr. Whitley has relationships with Alcon (consultant and speaker), Allergan (advisory board member, researcher, and speaker) Bausch + Lomb (advisory board member, speaker), Bio-Tissue (speaker), Beaver-Visitec International (consultant), Johnson & Johnson Vision (speaker), Ocusoft (consultant), TearLab (advisory board member), ScienceBased Health (advisory board member, and Shire (advisory board member and speaker). whitleyeye.com
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Quality-of-life metrics improve glaucoma staging

Adding this data to clinical decision making may help patient treatment goals

The primary goals of glaucoma management include preservation of visual function and quality of life. To achieve these goals, accurate staging of each patient’s glaucoma is important so that treatment intensity can be appropriately titrated.

Considering these basic tenets, it is surprising that standard glaucoma staging systems have not incorporated vision-related quality of life (Vr-QOL) information into their models.

Looking at Vr-QOL

Studies have recognized that Vr-QOL is well correlated with presence and severity of glaucoma. Patients who present with advanced stages of glaucoma demonstrate a lower Vr-QOL versus those who present with early to mild stages of the disease.1,2 The Los Angeles Latino Eye Study reported that among its subjects with primary open-angle glaucoma, those with severe field loss had lower Vr-QOL scores vs. those with no or initial field loss.3

Although the questionnaires used in these studies differed, the evidence agrees that those with advanced stages of glaucoma have a lower Vr-QOL compared to those without glaucoma and those with earlier stages of the disease.1,6

Thus, it should be plausible to create a glaucoma staging system that incorporates Vr-QOL information.

Vr-QOL limitations

Vr-QOL scores, however, cannot be used in isolation to stage glaucoma because this type of data has limitations.

First, administering a Vr-QOL survey is cumbersome within a clinical setting where chair time is limited.

Additionally, Vr-QOL questionnaires are inherently variable because responses are subjective, and non-visual factors can significantly confound the results.

However, if Vr-QOL data could be accurately linked with information characterizing disease severity, it might be possible to develop an integrated glaucoma staging system in which visual function metrics could serve as adequate surrogates that reflect Vr-QOL. It was with this goal in mind that we recently conducted a clinical research study in our facility.

Approach and results

From participants in a research study at our institution, we identified 103 primary open-angle glaucoma subjects who had glaucomatous optic neuropathy with corresponding, repeatable visual field (VF) loss on 24-2 standard automated perimetry (SAP) in at least one eye.

Presence of VF loss was defined by standard cluster criteria and had to be reproducible on at least three VF tests. Each eye’s 24-2 visual field loss was classified/staged using comprehensive Hodapp-Parrish-Anderson criteria.

Vr-QOL was measured using the NEI-VFQ-25 quality-of-life questionnaire, and all subjects completed SAP within six months of completing that survey.

Because NEI-VFQ surveys are subject-based while VF classifications are conducted for each eye separately, we explored several different approaches for constructing a subject-based visual field loss staging system.

Ultimately, the method that best aligned with the Vr-QOL score involved a combined VF score derived from simple addition of each eye’s VF category (0 = none, 1 = mild, 2 = moderate, and 3 = advanced VF loss).

Specifically, this approach resulted in non-overlapping Vr-QOL scores among the mild, moderate, and advanced stages of disease when combined VF category scores equal to one or two were considered mild glaucoma, combined scores of three or four were considered moderate glaucoma, and scores of five or six were considered advanced glaucoma.

Because the clinical use of comprehensive Hodapp-Parrish-Anderson criteria is impractical for individual patients, we then investigated whether specific visual field parameters could serve as surrogates for Vr-QOL based stages within our system.

We found that while average binocular values for 24-2 mean deviation (MD), pattern stan-
dard deviation (PSD), and visual field index (VFI) each demonstrated significant differences among stages, the average 24-2 VFI value OU was the only parameter that was not only significantly different between each stage but also showed no overlap of Vr-QOL interquartile ranges between stages.

Specifically, mild glaucoma with its associated higher level of Vr-QOL was associated with average VFI >94 percent. In moderate glaucoma, Vr-QOL was significantly worse compared to the mild glaucoma stage, and average VFI for this group was between 85 to 94 percent Advanced glaucoma had the worst Vr-QOL, and the corresponding average VFI was <85 percent.

These results suggest that mean VFI score may have value as an effective, efficient surrogate to define glaucoma stages directly linked to Vr-QOL.

**Discussion**

While current management of glaucoma includes consideration of disease severity, the reduction of Vr-QOL related to any specific degree of vision loss can only be presumed.

Accordingly, if a staging system could be constructed that more directly linked different stages of disease to specific levels of Vr-QOL, this approach would be expected to permit clinicians to make more informed glaucoma management decisions about preserving Vr-QOL.

For practical clinical implementation, this system also must be uncomplicated and intuitive and exhibit well-delineated disease stages.

The staging system developed in our study meets many of these criteria, including well-defined disease stages, use of a parameter from an established parametric test used in glaucoma assessment (VFI), and the relative ease of use of this system in a clinical setting.

**Clinical example**

To demonstrate the potential value of our Vr-QOL based staging system, we offer the following clinical example.

Consider a glaucoma patient in clinic today whose OD’s VFI is 97 percent with an established rate of loss of 1 percent VFI per year and whose OS’s VFI is 95 percent with an established rate of VFI loss that is also 1 percent per year.

Thus, the average VFI today is 96 percent OU, which places him in the mild category of glaucoma severity and would correlate with a high-level Vr-QOL in this patient.

However, when considering the rate of VFI loss that is occurring over time in this patient, his average VFI two years from now would be expected to be 94 percent, which would correlate to a moderate stage of glaucoma with an associated reduction in Vr-QOL.

Accordingly, the rate of 1 percent VFI loss per year in each eye would be expected to result in a reduced quality of life for this patient in only two years if the rate of change were allowed to continue unchecked.

Alternatively, if this patient’s rate of change was only 0.1 percent in each eye per year, the patient would not reach the next disease stage for 20 years. By appreciating and understanding these relationships, the clinician can intervene in a more timely manner to directly preserve Vr-QOL.

**Conclusion**

In summary, there are clear advantages to integrating Vr-QOL information into glaucoma staging systems, though additional work is needed to improve and refine this approach. Particularly, we need to better understand exactly how glaucomatous vision loss impairs activities of daily living.

When this information can be more systematically incorporated into our clinical decision-making processes, ODs will be able to better achieve our primary goals in glaucoma management—preserving visual function and quality of life for each of our patients.

**REFERENCES**


Educate, don’t sell to patients

Continued from page 1

For example, a previous conversation might finish with, “You are nearsighted with astigmatism, and you need extra help to see up close, so I recommend Brand XYZ progressive and this specific anti-reflective coating with blue light filter and/or photochromic lens.”

Speaking a foreign language

Think about that from the patient’s perspective. In essence, the doctor just spoke a different language to you, and you are expected to make an informed decision based on one sentence of confusing proper nouns.

I remember a long time ago before current technology that I wanted to get a pager. I knew nothing about them and went into a Radio Shack store to ask questions and learn which one would best suit my needs. However, in this initial discussion I do not mention brand names names.

When I discuss a progressive lens with the patient, I tell him that many different styles and types of progressives or no-line bifocals are available. I say the newest technology minimizes blur and distortion of vision on the sides, minimizes side-to-side head movement, and provides a wider computer and reading area.

I mention progressives and no-line bifocals in the same breath to help minimize confusion; I find that more patients are familiar with the term “no-line bifocals.” Often, I need to explain the difference between progressives and photochromic lenses because many patients are confused by that terminology as well.

I also discuss the visual benefits of anti-reflective treatments for reducing eye strain and fatigue, decreasing glare and halos around lights (especially while driving at night), and providing scratch protection for his glasses. At this point I mention a one- or two-year warranty against scratches depending on what level of protection he chooses.

Finally, if the patient expressed interest in photochromic lenses or reports prolific computer use, I discuss the potential benefits of photochromic lenses and/or blue filter products. I group these together because most photochromic lenses have inherent blue-light protection.

For patients who use electronic devices more than a few hours per day, I recommend some form of blue light protection to help protect their eyes from eye strain and fatigue. Exposure to blue light can increase alertness and stimulate cognitive functions. Excessive blue light exposure especially right before sleep can disrupt sleep/wake cycles, so patients may not be getting full restful sleep, particularly if using electronic devices right before going to sleep.

Research has not definitively determined if prolonged exposure to blue light can affect the macula and potentially increase risk of age-related macular degeneration (AMD) in patients—some research shows blue light as a factor while other data shows no significant relationship; but I continue advise my patients of that potential as well.

This is also a good opportunity to educate patients on the importance of sun protection. Glasses wearers often do not have prescription sunglasses. In addition, many of my contact lens wearers do not have sunglasses to wear over their contact lenses.

Educate during the exam

In my experience, patients seem to be more receptive, understanding, and knowledgeable about the products they receive when ODs skip confusing terminology and simply describe the product and how it will benefit their ocular health and vision.

After I have these discussions with my patients, I hand them off to our optical staff and tell the staff what I have already discussed. This serves two key purposes:

- It informs the patient that the doctor and staff are on the same page
- It should minimize the amount of time and discussion between the patient and the optical staff. Not to say that there won’t be more or new questions that come up, but the majority of the big questions should have been already answered.

I know you are thinking, “Who has time to go through all of that at the end of the exam?” Probably no one, myself included.

I don’t set aside specific time at the end of the exam to review options. I learned that I can discuss topics during the exam itself and break the lengthy conversation into smaller, more manageable parts.
into smaller, more manageable parts. This makes the discussion more time efficient for me and easier for the patient to understand.

I will discuss lens type (progressive, single vision, digital) immediately after refraction as I set up for the next part of the exam.

While I’m performing the slit lamp exam or dilated fundus exam, I discuss anti-reflective treatments and blue filters as they pertain to the health of the eye. They are easily associated with exam findings like cataracts, AMD, digital device use, etc.

At the conclusion of the exam, I have time for general questions only. If the patient wants to discuss specific products or finances, I turn the patient over to the optical staff for additional conversation.

I have discovered that when patients return for their annual exams, they retained much of the knowledge that I offered the previous year. In fact, many patients specifically request features for their glasses without me having to discuss them. This allows me to educate them on advances in technology since their last exams as well as answer other questions.

I think ODs fall short in educating patients on advances in technology. Often, I see patients with no change in glasses prescription, but their glasses are two to three years old.

Think about that. How many people use technology on a daily basis that is multiple years old?

Consider cell phones. Manufacturers release new phones about once year with record-breaking sales, so clearly consumers don’t like old technology.

So, why do ODs look only at the prescription change without educating patients on advances in lens technology since their last glasses?

Wrapping up

In short, focus more on educating your patients and less on selling to them.

If you educate patients on why they need a certain product, they will better understand their own visual needs and how you, the doctor, can help meet those needs. They may also be more likely to support your practice.

REFERENCES


Dr. Sikes is a past president for the South Eastern District of the North Carolina State Optometric Society and has served as the Education Trustee for the North Carolina Optometric Society. He enjoys spending time with his family, woodworking, and playing soccer. He tries to get to the beach as much as possible. j.scottsikes@gmail.com

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InDispensable

Moncler Lunettes launches spring/summer 2019 collection

The new collection of Moncler Lunettes is split into three groups: sport, duvet, and timeless. Each pair of glasses is characterized by specific design details, such as the duvet effect seen in the rounded profiles, embossed logo, and bi-color temples. Another notable detail is the flat characteristic of some styles, evident in the frame’s contours. Frame shapes range from square to round and include metal styles. Brightly colored leather inserts; rubber details; and mirrored, polarized lenses bring enhancements to the collection.

**ML0078** features an accentuated dimensions and duvet effect. Flat nylon lenses and a keyhole bridge complete the frames. **ML5044** showcases a thin acetate frame front, duvet effect temple tips, and an exposed metal hinge for added detail. **ML5048** exhibits a combination of metal acetate frame fronts. Thin metal temples, adjustable nose pads, and duvet effect rubberized temple tips complete the style.
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MORE THAN A BLUR PROBLEM
Blue light: Why it matters

By Christopher Lievens, OD, MS, FAAO

The topic of light-related damage to the eyes and adnexa has garnered more attention in recent years. Ultraviolet (UV) light damage has, for much time, been a concern because the incidence of sun damage (sunburn, skin cancers) has steadily been increasing.¹

In parallel fashion, blue light has been studied and discussed in light of the widespread use of modern light bulbs and digital devices that emit blue light.

Spectrum of light
The light spectrum contains much more than what humans can see. Frequencies of light include microwaves, radio waves, and X-rays, to name a few.

60% of Americans use digital devices for more than five hours each day

The visible spectrum has only a very thin portion of wavelengths between 380 nm and 780 nm. The highest energy of the visible spectrum is immediately adjacent to the UV spectrum and is just above 380 nm (the range of high energy light is 380 nm to 460 nm).² (See Figure 1.)

This high energy blue light scatters in our atmosphere and is the reason why the sky appears blue.

Blue light is also produced by light-emitting diodes (LEDs), which are more common than ever before. Because of LED efficiencies, traditional incandescent light bulbs have been replaced by LED bulbs in recent years. LED lighting is widely found in digital technologies, such as televisions, phones, and tablets for commercial usage.

This topic has come under scrutiny as the usage of digital devices increases more and more each year (and by younger individuals each year). A 2016 Vision Council report found that 60 percent of Americans use digital devices for more than five hours each day, and 70 percent of those use at least two or more devices at one time.³

Ocular light transmission
From an ocular health perspective, it has been long known that blue light is toxic to certain ocular structures.⁴ As we age, the ocular risk can change and shift. The longer the wavelength, the higher the proportion of light that passes through the cornea and reaches the lens and retina.

On average, the human cornea absorbs wavelengths below 300 nm, and the lens absorbs less than 400 nm.⁵ Upon closer analysis, though, these numbers change throughout life—a clear crystalline lens at birth and in childhood years transmits light at 300 nm, whereas an adult (and more yellow crystalline lens) transmits at 400 nm⁶. Protection of children’s eyes is then especially important because light transmission is higher at a younger age, allowing higher levels of UV and blue light to reach the lens and retina.⁶

The retina is at a higher risk as it absorbs light over 400 nm.⁷ Given that the spectrum of high-energy blue light is known to be 380 nm to 460 nm, there is a portion of blue light that is problematic. Ocular exposure to light around 435 nm (±20 nm) can induce irreversible cell death in the retinal pigment epithelium (RPE).²

Blue light research
Historically, several large-scale population studies demonstrated the ocular risk to blue light.

First, the Chesapeake Bay waterman study had several iterations of meta-analysis and an association was identified between cumulative blue light exposure and age-related macular degeneration (AMD).⁸

Similarly, the Beaver Dam Eye Study concluded that exposure to bright visible light might be associated with AMD.⁹

Finally, the Visual Impairment Project suggested that individuals with more sunlight exposure are at a significantly increased risk for AMD.⁷

As such, sunlight (and more specifically, cumulative blue light) has been identified as a risk factor for AMD. A specific photosensitive visual pigment appears to be involved in this retinal toxicity, and it is referred to as A2E (N-retinylidene-N-retinylethanolamine).

A 2013 study defined the most toxic wavelengths of light in an in-vitro model. The researchers’ conclusion was that the most loss of retinal cell viability occurred between 415 nm and 455 nm.²

What is additionally worrisome is that retinal cell death occurs via apoptosis (a continual cascade of death of neighboring cells) and likely causes AMD to be so visually destructive.¹⁰

Sun and sleep
Confusion exists about where the risk of ocular damage originates. Blue light emits from the sun, digital devices, and LEDs; know that the sun provides a much greater amount of blue light than digital devices or LEDs.¹¹

Though we spend many hours per day on illuminated screens and computer technologies, it has been proposed that the blue light hazard from said devices may not approach dangerous limits.¹²

What is known, though, is that digital device usage can wreak havoc on our sleep patterns by interfering with human circadian rhythms.
In the absence of blue light, ganglion cells in the human retina stimulate the pineal gland to release melatonin, a hormone which lets our bodies know it is time for sleep. This is in contrast to the presence of blue light, which suppresses melatonin production—our bodies are alert, energized, and ready for work and play. This can be a challenge because many Americans look at their digital devices right before bed.

**What ODs can do**

Blue light protection is becoming a common topic, and some patients are aware of it. Similarly, ultraviolet (UV) protection is widely known, but a specific consideration to protect the eyes against UV rays is limited at best.

Fortunately, these two topics are easy to discuss together. Protections for both blue light and UV have been combined into singular products. This results in a quick and seamless doctor-patient discussion and resonates very well.

Given the ocular risks from UV light and the increasing usage of digital devices (albeit a lower blue light risk), patients need to know how to protect themselves. Spectacle lenses that protect against both forms of light are easy to prescribe. Part of ODs’ responsibility of patient care is to look for opportunities to prevent problems. This is a prime example of that.

**REFERENCES**


**Figure 1.** The range of high energy light is 380 nm to 460 nm; the highest energy of the visible spectrum is just above 380 nm. Image courtesy Transitions Optical
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Sunlight contains UV and blue light. UV light is part of the non-visible light spectrum that we are exposed to every day. It can cause damage to our eyes, particularly the surface and deeper layers of the cornea and the crystalline lens of the eye by cataract formation as well as the increased potential for dry eyes, dystrophies, pinguecula and pterygium of the cornea. Blue light, which is part of the visible light spectrum, may also be a cause for concern. It reaches deeper into the eye than the UV and its cumulative energy effect can cause irreversible damage to the retina. Blue light is one of the main causes of damage to our eyes as we age and is an important factor that can cause the worsome loss of sight-enabling pigmentation in the back of the eye.

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- Correlated Color Temperature, the temperature of a black body light source that would produce similar shade of white to the measurement -how blue or red and white light appears.
- Color Rendering, how truthfully a color is shown by the light measured compared to if the color was lit by bright sunlight.
- Flicker, the speed and characteristics of repeated changes in light intensity particularly noticeable with LED lighting.
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Parkinson’s Disease Tremors, BPI® Electric Blue™ has been beneficial to those suffering from tremors such as those sometimes associated with Parkinson’s disease.

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Donna Williams, author of “Autism: an inside out approach,” has observed that some tinted lenses have helped her and others afflicted with autism. Among those tints that she mentions are BPI® Sahara™ (brownish tan), BPI® IR Blue™ (blue/black), BPI® Signal Green™ (a pure green) and BPI® Signal Blue™ (a pure blue).

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Focus On DIABETES

Diabetic agents
Continued from page 16

In fact, a 2018 consensus guideline from the American Diabetes Association and the European Association for the Study of Diabetes (EASD) recommends an SGLT2 inhibitor as second-line therapy for type 2 diabetes after metformin (especially in patients with established CV disease).13

Evidence from a 2018 analysis suggests that sulfonylurea agents as a class may be associated with a greater risk of CV events and mortality

Pending release of blood glucose and cardiovascular outcomes data, the Food and Drug Administration’s (FDA) approval of dapagliflozin is also expected for type 2 diabetes within the next year.

The bottom line is that all healthcare providers seeing patients with diabetes should be aware of the potential heart- and life-saving benefits of these new agents.

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IN BRIEF

B+L gains FDA approval for Lotemax SM

BRIDGEWATER, N.J.—Bausch + Lomb announced that the U.S. Food and Drug Administration (FDA) has approved Lotemax SM (loteprednol etabonate ophthalmic gel) 0.5%, a new gel formulation for the treatment of postoperative inflammation and pain following ocular surgery.

Lotemax SM was formulated using novel SubMicron (SM) Technology to adhere to the ocular surface and then penetrate key ocular tissues. According to the company, the submicron particles in Lotemax SM help improve drug exposure into the aqueous humor.

“Compared to Lotemax Gel (loteprednol etabonate ophthalmic gel) 0.5%, Lotemax SM delivers a submicron particle size for faster drug dissolution in tears and provides two times greater penetration to the aqueous humor, according to the company.”

Lotemax SM includes moisturizing ingredients (glycerin and propylene glycol), a pH close to that of human tears, and the lowest preservative percentage (0.003% benzalkonium chloride [BAK]), in a loteprednol etabonate formulation, according to the company.

“Dr. Charles E. Housley, ophthalmologist and associate professor of ophthalmology at New York University School of Medicine.”

“B+L gains FDA approval for Lotemax SM”

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Retiring from the Academy, flipping thinking, taekwondo, & tequila

Why retire now from the Academy?

It’s time. Twenty-two years is a long time. I’m tired. I’m older than most people think I am. [Laughs] It’s time for new adventures. At the annual meeting last year in San Antonio, the Academy, the Academy board, and staff showed their appreciation for my contributions, and I really did feel the love. One of the most important things to me was that people talked about not just what I’ve done for the Academy or the profession but how I helped to build an infrastructure that allows them to be better doctors. That makes me feel so good. I had no idea that people felt that way.

What brought you to the American Academy of Optometry, and why did you stay? I had reached a point as a deputy director in two separate organizations that I was spending a lot of energy thinking, “No, I would do that differently, and I would do that differently.” So, it was time to put my money where my mouth was. I got to the final interview, and two hours in I thought, “I may not have this job, but I really like these people.” I stayed because I really like the people.

What keeps you involved with taekwondo at a high level? I continue to learn from my students almost every day. I leave a class and I say, “What did I learn today?” I learned very quickly that I do enjoy teaching, especially adults, some of whom think they are too old or too inflexible or too out of shape because martial arts can take you from wherever you are and improve your life. Following in my Grand Master’s footsteps, I became an international referee. I was able to travel the world a bit and meet amazing athletes, referee friends, and coaches from around the world.

What’s something that your colleagues don’t know about you? Those who work most closely with me know that I have multiple sclerosis and was diagnosed in 1977. I am incredibly lucky, but it is one of the reason why I have stayed with taekwondo as long as I did. I am retiring-ish at the end of April this year.

What do you have any regrets? I wish I had put more balance into working with the American Academy of Optometry Foundation and helped to drive that. The potential of the Foundation is enormous.

What is the one achievement for optometry that you’re most proud of? I think it’s big picture. When I was hired, I was told the Academy doesn’t want to grow, we’re elite. I kept saying, “Prestigious,” and they were, “No, we’re elite.” We did not have significant student involvement. Our annual meeting was stable but in an association if you don’t grow, you die. We were able to flip that thinking to recognize that there are tens of thousands of optometrists practicing that are Academy caliber and should be Academy Fellows. And to flip that sense among students that the Academy is part of their professional futures. I think flipping that thinking was the most significant thing we could do. It has fueled our growth of membership and the nominal growth of our annual meeting, and it got our board thinking bigger. To facilitate thinking big has just been an honor.

What is one of the craziest things you’ve ever done? I went to Ohio State for the first half of my college education. Back before the new stadium was built long ago, I spent a crazy night in the pole vault pit. I don’t know how pole vaulters train now, but it used to be that they would jump off a very high platform into a massive pit of sponges. A bunch of us got in there one night and practiced jumping and falling, and we woke up there the next morning. I’m positive that it had to be someone else’s idea.

What do you have any regrets? I love teaching, especially adults, some of whom think they are too old or too inflexible or too out of shape because martial arts can take you from wherever you are and improve your life. Following in my Grand Master’s footsteps, I became an international referee. I was able to travel the world a bit and meet amazing athletes, referee friends, and coaches from around the world.

What’s the craziest thing you’ve ever done? I went to Ohio State for the first half of my college education. Back before the new stadium was built long ago, I spent a crazy night in the pole vault pit. I don’t know how pole vaulters train now, but it used to be that they would jump off a very high platform into a massive pit of sponges. A bunch of us got in there one night and practiced jumping and falling, and we woke up there the next morning. I’m positive that it had to be someone else’s idea.

—Vernon Trollinger

To hear the full interview with Lois Schoenbrun listen online: optometrytimes.com/LoisSchoenbrun

Photo courtesy Lois Schoenbrun, FAAO
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6. In vitro study over 16 hours to measure wetting substantivity, Alcon data on file, 2015.

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