Earn 2 CE Credits: When the Retina Reveals a Blood Disorder, *Page 59*

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October 15, 2014

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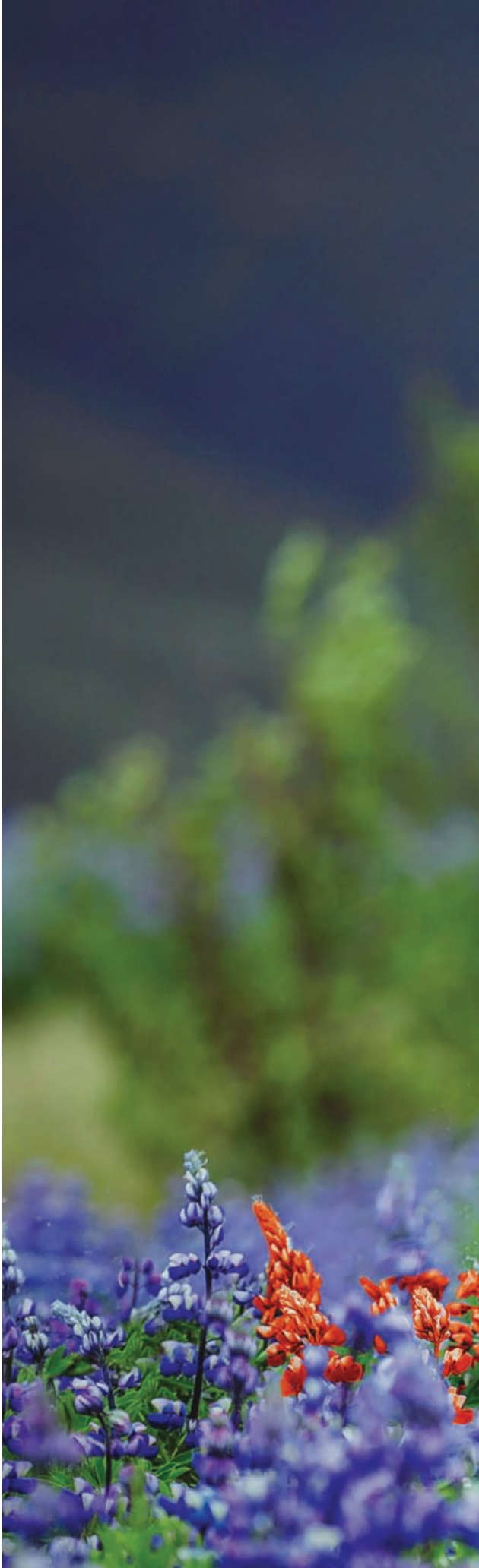

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VOL. 151 NO. 10 ■ OCTOBER 15, 2014

IN THE NEWS

The FDA has OK'd two sustained-release corticosteroid implants for **diabetic macular edema** (DME).

• **Iluvien** (fluocinolone acetonide intravitreal implant, **Alimera Sciences**) is indicated to treat DME in patients who have been previously treated with a corticosteroid without a significant increase in intraocular pressure. The implant had been rejected by the FDA three times before. This approval was based on clinical trial data showing that 28.7% of patients with the implant improved best-corrected visual acuity by 15 letters or more on an ETDRS chart after two years. Iluvien is designed to last about three years. Alimera says it plans to make the implant available in the first quarter of 2015.

• **Ozurdex** (dexamethasone intravitreal implant, **Allergan**) Ozurdex was first approved in 2009 to treat macular edema following retinal vein occlusion. It was approved for non-infectious uveitis in 2010, and in June 2014, as a treatment for DME in adult patients who have an artificial lens implant or who are scheduled for cataract surgery. Now the FDA has expanded the indication for Ozurdex to include all DME patients.

When asked which **disease or ailment** would be the worst that could happen, **blindness** ranked first among African-Americans. Hispanics and Asians ranked blindness second, after cancer. Whites also ranked blindness second, but after Alzheimer's disease. These results come from a **national poll of US adults** conducted by Zogby Analytics for Research!America, supported by Research to Prevent Blindness and the Alliance For Eye and Vision Research.

Children with Amblyopia See Speech Differently

It's one reason why mothers may say: "Look at me when I'm talking to you." **By Renee Buddle, Senior Associate Editor**

Children with amblyopia may have difficulty visually perceiving spoken words due to impaired visual-auditory integration, according to a study researchers conducted at an academic pediatric ophthalmologic clinic at Ann and Robert H. Lurie Children's Hospital of Chicago.

The researchers discovered children with amblyopia were less able than children with 20/20 vision to perceive the McGurk effect—in which a person sees one sound but hears another and yet interprets it as a third sound.

In the study, researchers compared 24 children with a history of amblyopia in one eye to nine children acting as controls. The researchers played the sound "pa" over a silent video of the sound "ka." They asked the children to tell them whether they heard the sound "ka," "pa" or "ta."

"Normal visual-auditory integration produces the perception of hearing a fusion sound 'ta'," the authors wrote.

All nine controls perceived the McGurk effect, but only about one-half of the 24 children with amblyopia did.

"The fact that auditory-visual integration might be compromised reinforces that the decision to treat the child, as well as how aggressively to treat, shouldn't be based on some arbitrary cut-off for visual acuity values or for age," says developmental optometrist Leonard Press, of Fair Lawn, NJ.

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Amblyopic kids may not see what you say.

For some children, amblyopia resolves by five years of age, at which point their auditory-visual perception improves. In this study, all children whose amblyopia had resolved by age five or whose amblyopia had started after that age experienced the McGurk effect. But only about one-fifth of the patients whose amblyopia was unresolved by age five perceived the McGurk effect.

At some point, children with amblyopia will require screening for auditory-visual integration issues, Dr. Press says. "Keep in mind that this is the first study of its kind, and it would have to be replicated before suggesting that all patients with amblyopia routinely undergo central auditory processing evaluations," he adds.

Burgmeier R, Desai RU, Farner KC, et al. The effect of amblyopia on visual-auditory speech perception: Why mothers may say "Look at me when I'm talking to you." JAMA Ophthalmol. 2014 Sep 11 [Epub ahead of print].

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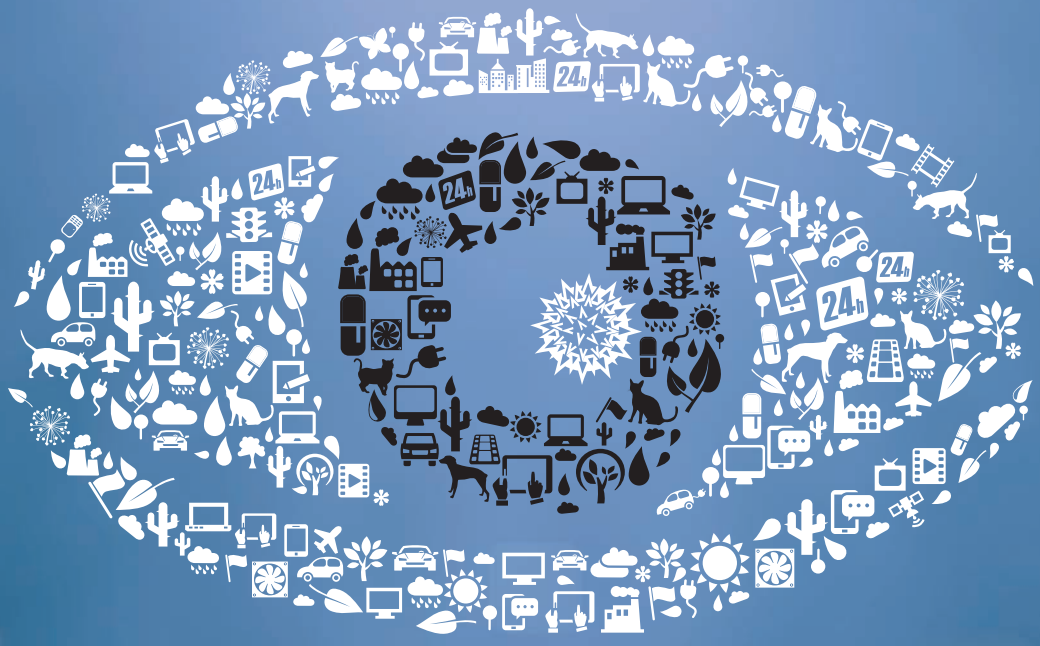

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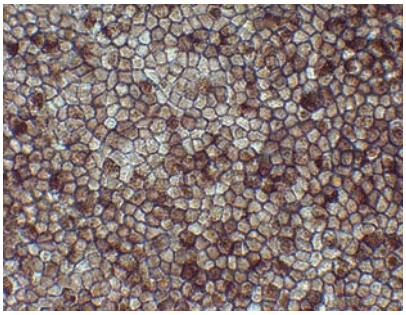
Stem Cells to Reverse AMD Damage

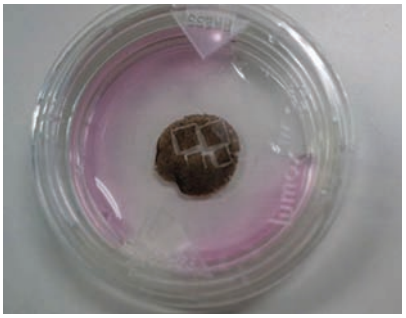
A Japanese woman in her 70s has become the world's first patient to receive tissue derived from induced pluripotent stem cells as part of an experimental treatment to repair damage caused by age-related macular degeneration.

During the two-hour procedure at the Institute for Biomedical Research and Innovation in Kobe, Japan, surgeons grafted a single 1.3mm x 3.0mm sheet of retinal pigment epithelium cells into the subretinal space of one eye. No serious hemorrhaging or complications occurred.[1]

The epithelium sheet was developed by ophthalmologist Masayo Takahashi, MD, PhD, of the RIKEN Center for Developmental Biology using pluripotent stem cells, which have the unique potential to differentiate into almost any type of cell found within the body. The most prominent type of pluripotent stem cell is the embryonic stem cell; however, limited resources and ongoing controversy has prevented widespread adoption. Induced pluripotent stem cells, on the other hand, are artificially derived from an adult somatic cell. In this case, the pluripotent stem cells were derived from the patient's own skin cells, then converted into retinal pigment epithelium cells and grown into the RPE cell sheet.



Retinal pigment epithelium (RPE) cells derived from human induced pluripotent stem cells.



RPE cells formed into a sheet to be implanted into the subretinal space of a patient with AMD.

Images: RIKEN Center for Developmental Biology

This pilot study follows an earlier preclinical safety and feasibility evaluation of human-induced pluripotent RPE cell sheets created without using artificial scaffolds.[2] The research examined cell morphology, physiological behavior, gene expression, immunogenicity and tumor formation in rodent and non-human primate models.

Researchers believe the use of pluripotent stem cells will improve upon current treatments that are designed to halt neovascularization, but do not repair photoreceptor cell damage that may have already occurred prior to administration. The RPE graft, however, could stop further damage and may even eventually stimulate some healing of the epithelium.

Additionally, harvesting the patient's own cells from an innocuous place such as the skin reduces potential complications associated with immune rejection and avoids invasive harvesting procedures.

The current patient will be monitored for both functional integration and adverse reactions during a one-year initial intensive observation period, with subsequent follow-up observation for an additional three years. Five additional patients will be treated using the same procedure as part of the pilot study.

1. RIKEN Center for Developmental Biology. First RPE cell sheet graft transplant. Available at: www.riken.jp/en/pr/topics/2014/20140912_1/. Accessed October 6, 2014.
2. Kamao H, Mandai M, Okamoto S, et al. Characterization of human induced pluripotent stem cell-derived retinal pigment epithelium cell sheets aiming for clinical application. Stem Cell Reports. 2014 Jan 23;2(2):205-18.

'Gatekeeper Cells' are Stiffer in Eyes with Glaucoma

Endothelial cells in Schlemm's canal are stiffer in glaucomatous eyes than in healthy eyes, likely accounting for increased outflow resistance, according to a new study.

This stiffness limits the cells' ability to deform and allow aqueous humor to cross the endothelium and drain into Schlemm's canal.

"Rather than being seen as a simple mechanical barrier to filtration, the endothelium of [Schlemm's canal] is seen instead as a dynamic material whose response to mechanical strain leads to pore formation and thereby modulates the resistance to aqueous humor outflow. In the glaucomatous eye, this process becomes impaired," the authors conclude.

"Our work shows that cells of this endothelial layer act as mechanical gates," says lead author Mark Johnson, PhD, professor of biomedical engineering at Northwestern University. "Therapeutic strategies that alter the stiffness of these cells potentially could lead to a cure for this debilitating disease."

Overby DR, Zhou EH, Vargas-Pinto R, et al. Altered mechanobiology of Schlemm's canal endothelial cells in glaucoma. Proc Natl Acad Sci USA. 2014 Sep 23;111(38):13876-81.

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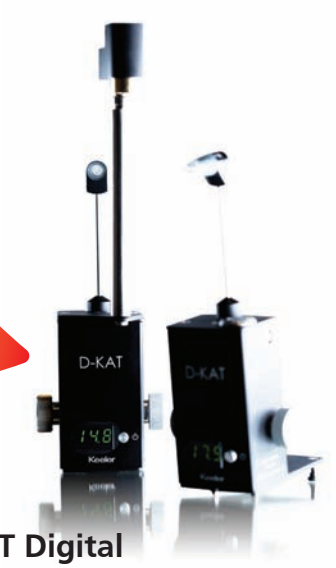

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VisionExpo West: 'A Great CE Program'

An estimated 4,200 eye care professionals—out of more than 12,500 attendees—converged on Las Vegas for Vision Expo West, held in mid-September.

Among the 400-plus continuing education hours and 19 specialty tracks, one of the most attended courses was "Current Concepts in Ocular Surface Disease: The Dry Eye, Corneal Dystrophy, and Lid Disease," presented by Doug Devries, OD, and Jack Schaeffer, OD.

"While two hours is a very short time to cover the broad subject of ocular surface disease, this course did a great job in imparting many clinical pearls, including looking for conjunctival chalasis and exposure considerations in dry eye patients, as well as some of the subtle findings with epithelial basement membrane patients, that an attendee could take back to the clinic and apply immediately," says Dr. Devries.

At VEW's Global Contact Lens Forum, optometrists Barry Eiden, Jack Schaeffer, Louise Sclafani and Rob Davis discussed contact lenses in primary eye care.

The "Global Contact Lens Forum," which kicked off the meeting, was another popular event. Here, 299 attendees learned about trends in GP lenses and picked up pointers on how to launch a specialty lens practice.

Other courses that garnered rave reviews, according to VEW representatives: "Breaking News Healthcare Reform Update," "The Greatest Posterior Segment Disease Course—Ever!" "The Greatest Anterior Segment Disease and Medical Management of Contact Lens Complications Course—Ever!" "Melton-Thomas Treatment Guidelines," "Glaucoma Treatment Decisions," "Creating a 5-Star Patient Experience" and "Retina Grand Rounds."

The crowd-sourced courses were a notable addition this year, in which the audience could decide what to discuss by connecting to speakers directly via text messaging and mobile polling to share ideas and ask questions. Eighteen CE hours of crowd-sourced education was available this year on a variety of topics, ranging from anterior segment and contact lenses to posterior segment and retinal disease.

"This is the first time I can remember when I received so many emails from attendees thanking us for such a great CE program," says optometrist Kirk Smick, co-chairman of VEW's conference advisory board. "I also spoke to several corporate sponsors, and they noticed the fact that the CE courses helped drive buyers to the exhibit hall floor." ■

Mark your calendar for VEW's 2015 meeting in Las Vegas, to be held at the Sands Expo & Convention Center from September 16 to 19. For more information, go to www.visionexpowest.com.

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References: 1. Liew M, Zhang M, Kim E, et al. Prevalence and predictors of Sjögren's syndrome in a prospective cohort of patients with aqueous-deficient dry eye. *Br J Ophthalmol.* 2012;96:1498-1503. **2.** Kassan SS, Moutsopoulos HM. Clinical manifestations and early diagnosis of Sjögren syndrome. *Arch Intern Med.* 2004;164(12):1275-1284. **3.** Sjögren's Syndrome Foundation. Sjögren's Syndrome Foundation. 2013. Available at http://www.sjogrens.org. Accessed September 5, 2013. **4.** Shen L, Suresh L, Lindemann M, et al. Novel autoantibodies in Sjögren's syndrome. *Clin Immunol.* 2012;145:251-255.

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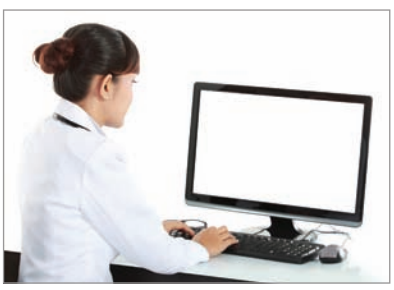

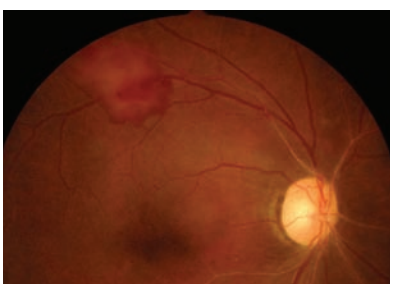

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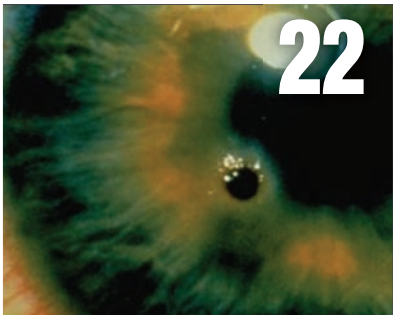

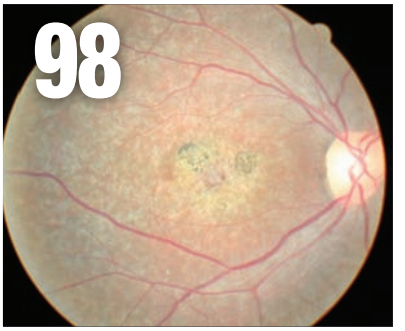

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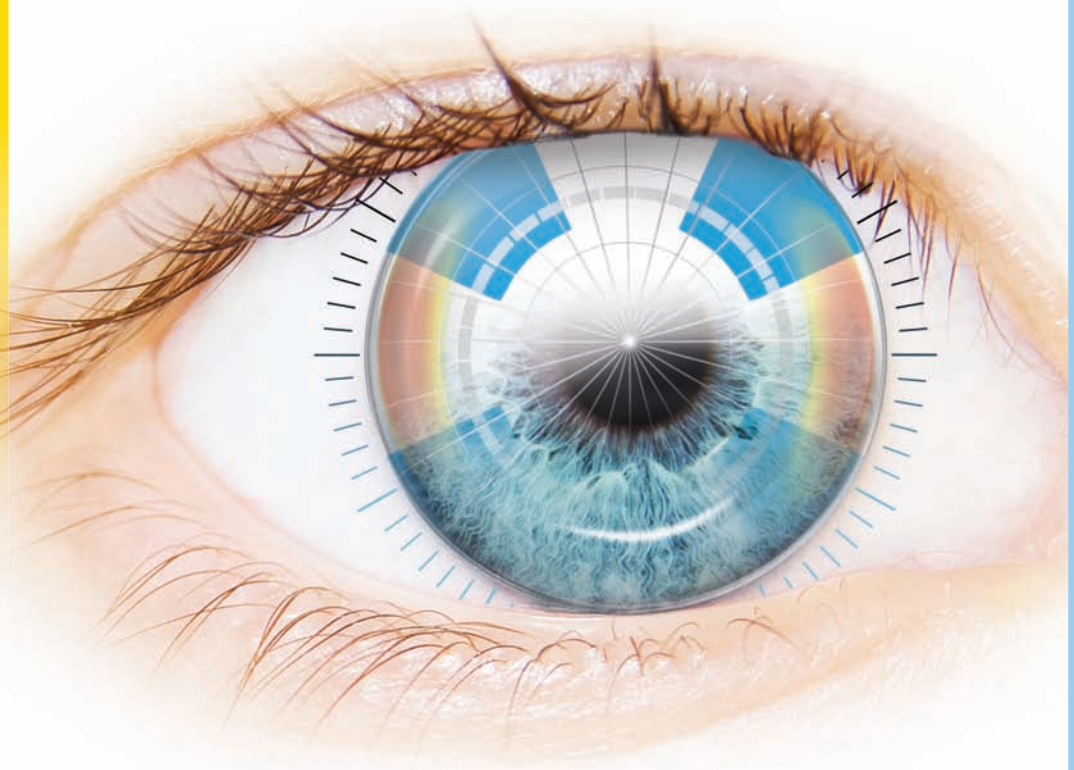

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Communication Breakdown

Information sharing was supposed to flourish under EHR. It hasn't. Try to see it as an opportunity to improve, not an excuse to abort the mission. **By Jack Persico, Editor-in-Chief**

George Bernard Shaw said America and England were two countries "separated by a common language." Medical comanagement often feels the same. Professionals in different fields speak the same language but don't always communicate well or heed each other's judgment. And the electronic health records intended to bridge such gaps sometimes only make them more intractable.

Earlier this month, a Texas hospital let the first US patient with Ebola walk out the door instead of being quarantined. The intake nurse recorded that the patient had recently traveled to Africa, but because the hospital's EHR nursing workflow and physician workflow are separate, that detail didn't show up in the chart the ER physician saw. Same patient record, different views—and a vital piece of information slipped through the cracks.

Headlines like "Electronic-Record Gap Allowed Ebola Patient to Leave Hospital" (*Bloomberg News*, Oct. 4) don't do much to build confidence in our patchwork EHR system. They only reinforce the stories that we all have of our own frustrations in navigating the health care system. Here's mine.

The Case of the Extraneous X-Ray

Earlier this year, during SECO, I hurt my shoulder in the hotel gym. My GP diagnosed tendonitis and recommended a course of physical therapy. I went to PT about 20 times over three months. After every single visit, the place sent me a paper record of the encounter, even when I didn't have an outstanding balance to pay. Just an FYI.

When the therapy didn't seem to be helping, I went back to the GP. "How did it go at PT?" she asked. Had she seen the physical therapist's records, I inquired? No. Hmm, maybe that would have been better than my subjective report. Anyway, she ordered an X-ray and referred me to an orthopedic specialist.

I took off from work and went to the radiology lab my doctor recommended. The only thing that X-ray revealed was how bad my doctors are at sharing records. Trying to get the report from radiology to the orthopedist highlighted how much work remains to be done in EHR.

I called the specialist's office to see if they could pull up the results from the radiology lab. Nope, different system. (Remember, my GP recommended both the lab and the specialist.) Next, I called the GP and asked if they can send the results to the orthopedist before my exam. "What's the fax number?" the receptionist asked. Beats me, I thought. You made the referral, shouldn't you have it or know how to get it? And is a fax really the best way to share radiology images?

"Well," the receptionist said, "maybe you can come by and pick it up before your appointment." Really, the patient as carrier pigeon? In 2014? Confidence waning, I felt I'd better have a physical copy in my hands, so I did stop by the GP's office for the much-vaunted X-ray results. I got no actual images, just a two-sentence description of a radiologist's interpretation, with no contact info for more detail or to obtain copies of the film. I brought this essentially useless bit of health care data to the specialist—who promptly ignored it and ordered a new X-ray. She too had received no record of my interactions with the GP or the physical therapist.

In summary:

- I got PT records I didn't want.
- Two doctors *didn't* get records they *might* have wanted.
- I was tasked with hand delivering results of a test a generalist ordered but a specialist didn't want.
- Time and resources were wasted.

Mind the Gap

With this issue's series on surgical comanagement plus an excellent article on avoiding EHR pitfalls, we detail many ways to bridge potential gaps like these in your practice.

Optometry is often touted—rightfully so—as a potential game changer in the delivery of care to cataract patients, whose ranks grow every year while ophthalmologists' do not. Plus, refractive outcomes are more vital to these patients than ever, and who knows more about refraction than optometrists?

So, keep up on surgical topics and make the effort to connect with your surgeons. And push through those EHR hurdles to unlock its true collaborative potential. My doctors didn't—maybe I'll just sleep in at next year's SECO instead of hitting the gym—but aim higher for your own patients and practice. ■

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A Legend in Your Own Mind

What's your purpose in life? It may have something to do with finding a treasure. Or making a journey. Or something. You better go find out. **By Montgomery Vickers, OD**

Recently I heard about a book that I should have already heard about and maybe I had. It's "The Alchemist," and it's an allegorical novel about finding one's destiny, or so Wikipedia tells me.

Of course, I'm a busy doctor so I haven't actually *read* "The Alchemist," but I look forward to it. I've already downloaded it onto my iPad, so I'm sure once I get sick of watching my grumpy cat videos, I will read it and learn a lot. But I do know that, in the book, Señor Paulo Coelho wrote that we all have a Personal Legend. I agree.

What is your Personal Legend? In other words, what's your purpose in life? Why are you here?

If you want to be happy and successful, it's really important that you figure out the answer to this question. Of course, if you prefer to be miserable and average, you are excused from reading the rest of this column. Bye!

Live the Legend

OK, the rest of you must want the happy/success stuff, so here's a test that will help you figure out how close you are to living out your own Personal Legend:

1. A longtime patient, who hasn't been to see you for two years, calls to ask if you can supply a sample pair of his contact lenses. He promises he'll call you for an examination when he gets back from the beach. You reply:

a. "Sorry, you need an exam first."

b. "Sure, see you soon!"

c. "This makes me vomit."

2. Your second cousin never paid you for the glasses you provided in 2008. You run into him at the family reunion and he's sporting a new pair of expensive drill mounts that he got somewhere else. What do you do?

a. Grab the glasses, point a gun at them and swear you will blow them to smithereens unless he forks over YOUR cash.

b. Ask how his divorce went and how his kid is doing in prison.

c. Eat another piece of grandma's fried chicken.

3. A patient asks you how you feel about the Affordable Care Act. You respond:

a. "I never talk politics while typing 8,000 words into the computer to make sure it believes I actually looked at your eyes."

b. "You know how you felt about your last kidney stone…?"

c. "It's a wonderful first step toward starting my new profession as a house painter."

4. On Saturday afternoon, a patient calls your cell and says something that starts with "On Tuesday, my eye…" You say:

a. "At the sound of the tone, please leave a message. *BEEEEP!*"

b. "Run to the ER!"

c. "Dr. Vickers retired Wednesday."

5. A patient calls and wants a copy of his records from the past 15 years and he'll be by to pick it up in 30 minutes. You assign a trusted staffer to:

a. Get the job done.

b. Explain that you will need a few days to gather the info.

c. Dig a grave in the backyard.

OK, pencils down! Let's grade the test.

It works like this: If you actually took the time to take this test, you have no clue what your Personal Legend is and you should get a life! Geez! Go find yourself, man. ■

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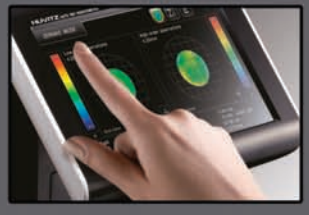

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Don't Cut Corners on Surgery

Just like performing a minor procedure itself, know what you're doing before you submit a claim for one. **By John Rumpakis, OD, MBA, Clinical Coding Editor**

As surgical procedures become more common in optometry practices—either performing them ourselves or acting as comanaging physicians—medical record compliance and subsequent coding are areas of increasing concern.

• ***Medical record***. Surgical procedures (minor or major) require a separate narrative in the medical record referred to as a surgical report. This typically describes the surgical procedure, preparation of the surgical field, instruments and approach used by the surgeon, and a statement of the patient's status at the conclusion of the procedure.

• ***Coding***. Coding a surgical procedure first involves recognizing whether it is designated as a *minor* procedure or a *major* procedure. This designation depends on the length of the global period assigned to the procedure itself: Minor surgical procedures have a global period of zero or 10 days and major surgical procedures have a global period of 90 days. This distinction is important to know because there are different medical coding conventions to be followed for each type of procedure.

While a few states allow optometrists to perform major surgical procedures, the vast majority of ODs perform minor surgical procedures on a daily basis, so let's focus on these more common minor ones.

Office Visit Already Included

Perhaps the most common mistake that ODs make when submitting a claim for a minor surgical procedure is coding for an office visit on the same day as the minor surgical procedure. By definition, minor surgical procedures already include an office visit, so they should not be billed in conjunction with an office visit on the same date.

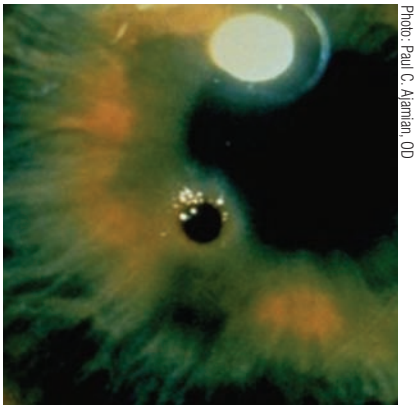

Photo: Paul C. Ajamian, OD

When billing for a minor procedure, such as removal of a corneal foreign body, be aware that the office visit is included in the payment for the procedure.

The National Correct Coding Initiative (NCCI) Policy Manual for Medicare Services clearly delineates this for us: "If a procedure has a global period of 000 or 010 days, it is defined as a minor surgical procedure. E&M [evaluation and management] services on the same date of service as the minor surgical procedure are included in the payment for the procedure. The decision to perform a minor surgical procedure is included in the payment for the minor surgical procedure and should not be reported separately as an E&M service."[1]

However, if you have a significant and separately identifiable E&M service that's unrelated to the decision to perform the minor surgical procedure, then you can separately report that E&M service with modifier -25. "The E&M service and minor surgical procedure do not require different diagnoses," the NCCI policy manual states.[1]

The problem arises when ODs improperly use these modifiers just to get reimbursed for their office visit. The improper use of modifier -25 is a significant issue and has been the subject of investigation by the Office of Inspector General as being health care fraud.

Also, be aware that if you perform a minor surgical procedure on a new patient, the same rules for reporting E&M services apply. According to the NCCI policy manual, "The fact that the patient is 'new' to the provider is not sufficient alone to justify reporting an E&M service on the same date of service as a minor surgical procedure."[1]

While surgical procedures are becoming more and more commonplace in the typical optometric practice, keep in mind that increased scope and privileges also require increased responsibility and compliance. ■

Please send your questions and comments to CodingAbstract@gmail.com.

1. Centers for Medicare & Medicaid Services. The National Correct Coding Initiative Policy Manual for Medicare Services. January 2014. Available at: www.cms.gov/Medicare/Coding/NationalCorrectCodInitEd/index.html. Accessed Sept 23, 2014. Accessed Sept 22, 2014.

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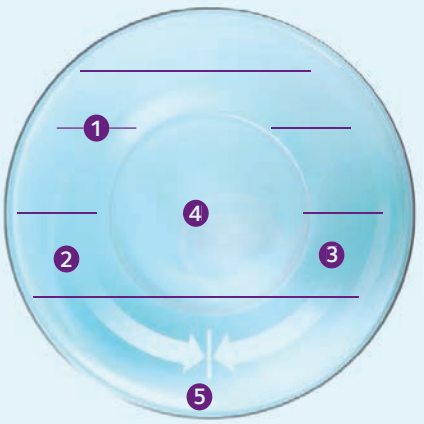

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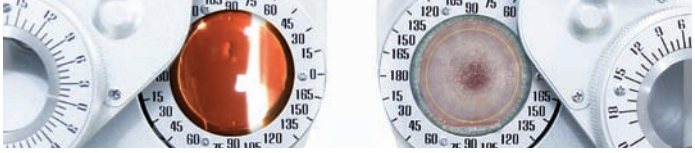


In Pursuit of Emmetropia:

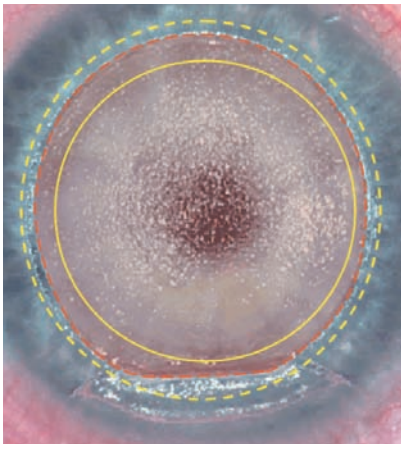
Choosing from the Refractive Surgery Menu

New surgical technology and procedures make it a viable prospect for more patients than ever. Here's an overview of the latest approaches.

By Martin L. Fox, MD, and Christopher J. Quinn, OD

The tremendous success of modern laser vision correction has helped establish refractive surgery comanagement as a leading subspecialty in optometric eye care during the last two decades. With the establishment of new technologies and the refinement of surgical techniques, we are rapidly approaching a point when patients with nearly all varieties of refractive error will be afforded the opportunity to achieve excellent levels of uncorrected acuity.

Thus, all primary eye care providers should have a working knowledge of the procedures currently available—as well as those on the near horizon—so your patients can make informed decisions about which surgical options are most suitable. Inevitably, patients interested in refractive surgery will have a variety of vital questions. So, how do you most effectively counsel patients in the decision-making process?



Corneal flap creation procedure with the Intralase (Abbott Medical Optics) femtosecond laser system.

Here, we present a stepwise approach that will help you determine the most appropriate procedure for each patient who ask you you about surgical vision correction.

General Refractive and Health Assessment

A thorough evaluation of ocular and general systemic health is key in the initial assessment of any refractive surgery candidate. Also, it is imperative to have a good understanding of the patient's visual goals and expectations. Early presbyopic low myopes, who hope to eliminate spectacle use altogether, and patients with unrealistic expectations require extensive education about the potential outcomes. Presbyopic or pre-presbyopic patients need to understand the concept of accommodative loss with age. As such, it is best to illustrate what they can expect when performing near visual tasks when fully corrected for distance acuity. Such patients can opt for a monvision outcome with surgery designed to undercorrect the non-dominant eye. Alternatively, they can elect for full correction

with the option of presbyopic inlay enhancement surgery.

Those with active or chronic ocular conditions such as glaucoma, dry eye, blepharitis or recurrent herpes simplex keratitis do not qualify for surgery until these issues are under control, have resolved or have been successfully treated.

From a systemic standpoint, patients with active collagen vascular disease (e.g., lupus, rheumatoid arthritis, Sjögren's syndrome) are not strong candidates for refractive surgery. Neither are cancer patients who are currently undergoing chemotherapy. While these systemic conditions are not absolute contraindications to surgery, affected individuals should only consider surgery if the underlying disease is quiescent.

A comprehensive ophthalmic evaluation is imperative, as the results will help tailor your surgical recommendation. Appropriate testing should include a refraction, pachymetry measurement, corneal topography, ocular surface evaluation, binocular vision assessment and peripheral retinal evaluation. A cycloplegic refraction is a necessary last step in the refractive surgical evaluation of a phakic patient.

Thin corneal pachymetry (i.e., readings less than 480µm) or asymmetric topography will require further assessment of corneal structural integrity with technologies such as the Pentacam (Oculus) to ascertain whether laser vision correction remains a viable option. These measurements also will help you determine whether alternative treatments might offer a better safety profile for the patient, with equivalent or even superior visual outcomes.

Once you've determined that the individual has good ocular and systemic health, you, the surgeon and the patient can begin deciding upon the most appropriate option.

Appropriate Age Range

In general, patients older than 21 years of age with established refractive stability can be considered for surgery. Patients aged 18 to 21 years may be considered for laser vision correction on a case-by-case basis, with the understanding that they might be at a higher risk for future enhancement treatments because of evolving refractive errors.

Laser Vision Correction

When patients ask about long-term vision correction options, it is very likely that most of their questions will center upon LASIK and photorefractive keratectomy (PRK).

When coupled with femtosecond laser flap creation, today's customized, excimer laser-based corneal ablative procedures yield significantly better safety and predictability profiles than surgeries performed with past technologies. Femtosecond laser-produced corneal flaps are remarkably consistent in shape, placement, size and depth. Flap side cut design with this instrument permits better stability and is associated with a significantly lower incidence of flap slip, flap striae and postoperative dry eye.

Further, wavefront-guided LASIK permits the calculation of customized ablation profiles for those patients with significant higher-order aberrations. Such procedures—specifically tailored to the individual patient's optical system—improve the likelihood that they will achieve uncorrected vision that's equal or, in some cases, superior to the results they've experienced with contact lenses or glasses.

In conjunction with these surgical advances, we now have enhanced corneal tomography devices that enable us to more accurately predict postoperative outcomes in patients who are good candidates. Such commercially available tomographers include the Pentacam, Galilei G2 (Zeimer) and Visante Omni (Carl Zeiss Meditec). These instruments allow for early detection of corneal float, elevation abnormalities or keratoconic progression, which cannot always be detected with routine corneal topography or keratometry alone.

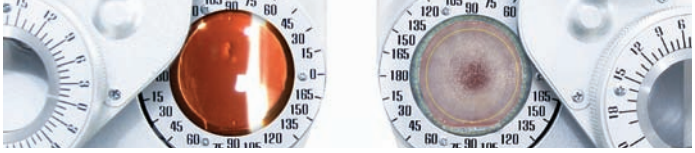
Approximately 98% of bladeless LASIK and PRK patients who are deemed to be good candidates experience outstanding postoperative visual success.[1] Myopia of up to 9.00D, hyperopia up to 2.50D and astigmatism up to 3.50D can be successfully treated via either approach (however, LASIK permits faster, more comfortable visual rehabilitation than PRK).

To minimize the risk of postoperative ectasia, individuals with thin corneas (i.e., less than 480µm) and normal topography are better candidates for PRK than LASIK. For patients with thin corneas and asymmetric/irregular topography or high levels of ametropia, further evaluation with your refractive surgeon will be required to assess surgical management decisions.

High Astigmatism

Individuals who present with myopic astigmatism in excess of 3.50D still may be potential candidates for laser vision correction. following treatment with astigmatic keratotomy using the femtosecond laser. This procedure can correct up to 6.00D of astigmatism, and will permit patients to proceed with laser vision correction after a six-week healing period.[2]

Likewise, GP contact lens patients who struggle with high astigmatism should consider femtosecond laser astigmatic keratotomy to improve corneal morphology, lens fit and comfort.



Working Alongside Ophthalmology

It is essential to establish a strong relationship with an experienced refractive surgeon to ensure the most successful comanagement experiences. Above all else, choose only to work with a surgeon who will respect you as an equal partner in the decision-making process for your patients. Be mindful of the potential consequences in partnering with a self-proclaimed "pioneer" or an "aggressive marketer," and remain cautious of working with surgeons whose only tangible credential is "a high volume of refractive procedures performed."

Consistently research refractive surgeons in your area by speaking with both patients and your optometric colleagues. Only choose to work with a surgeon who can provide the full spectrum of available procedures so that patients are not simply "shoehorned" into a procedure that might be familiar to the surgeon, but not necessarily the most appropriate option for the individual. Subspecialty training in cornea is a real plus, as those surgeons are best qualified to address anterior segment issues.

Successful refractive surgery generates great satisfaction. And while the majority of patients should enjoy excellent outcomes, it is critical to partner with a surgeon who is well versed on all issues that could potentially arise after even uneventful surgery.

When patients ask you about refractive surgery, the discussion will inevitably turn to the question of candidacy. As the field of refractive surgery has grown, a one-size-fits-all approach is no longer appropriate. A patient who may not have been the right candidate for traditional laser vision correction might now benefit from a host of excellent alternatives, including phakic intraocular lens implantation, laser astigmatic keratotomy, intrastromal implants or even femtosecond laser refractive clear lens exchange.

Implantable Collamer Lenses

For individuals with myopia equal to or greater than 9.00D, abnormally thin corneas, dry eye or abnormal topography, a phakic IOL may be an excellent refractive option. Patients with less than 9.00D of myopia also may be candidates for phakic IOLs if they prefer a non-laser corrective option.

One such lens, the Visian ICL (Staar Surgical Company), uses a hybrid hydrogel material referred to as a "collamer" that is comprised of collagen and is therefore highly biocompatible.

The lens is implanted into the posterior chamber and positioned behind the iris. Also, both eyes typically are implanted on the same day—creating a "LASIK-like" experience for the patient.

Study data suggests that ICL implantations are both safe and effective. However, one report noted a very small risk of significant anterior subcapsular cataract development in 1% of implanted patients.[3] If this should occur, symptomatic patients should be referred for standard cataract surgery.

A toric version of the lens soon will be available for myopes with associated astigmatism. This will allow for the correction of up to 4.00D of astigmatism following ICL implantation. The FDA's ophthalmic devices panel issued premarket approval status for the Visian Toric ICL in March of 2014.

Other phakic IOLs being developed include the Veriseye (Abbott Medical Optics) and AcrySof Cachet (Alcon). Both are anterior-chamber lenses positioned in front of the iris.

Keratoconus Stabilization

Until fairly recently, patients with keratoconus or pre-keratoconus were not considered candidates for laser vision correction. However, several technological advances have helped make refractive surgery possible for affected individuals. By working in concert with your refractive surgeon, you can customize a plan that not only improves visual quality, but also halts ectasia.

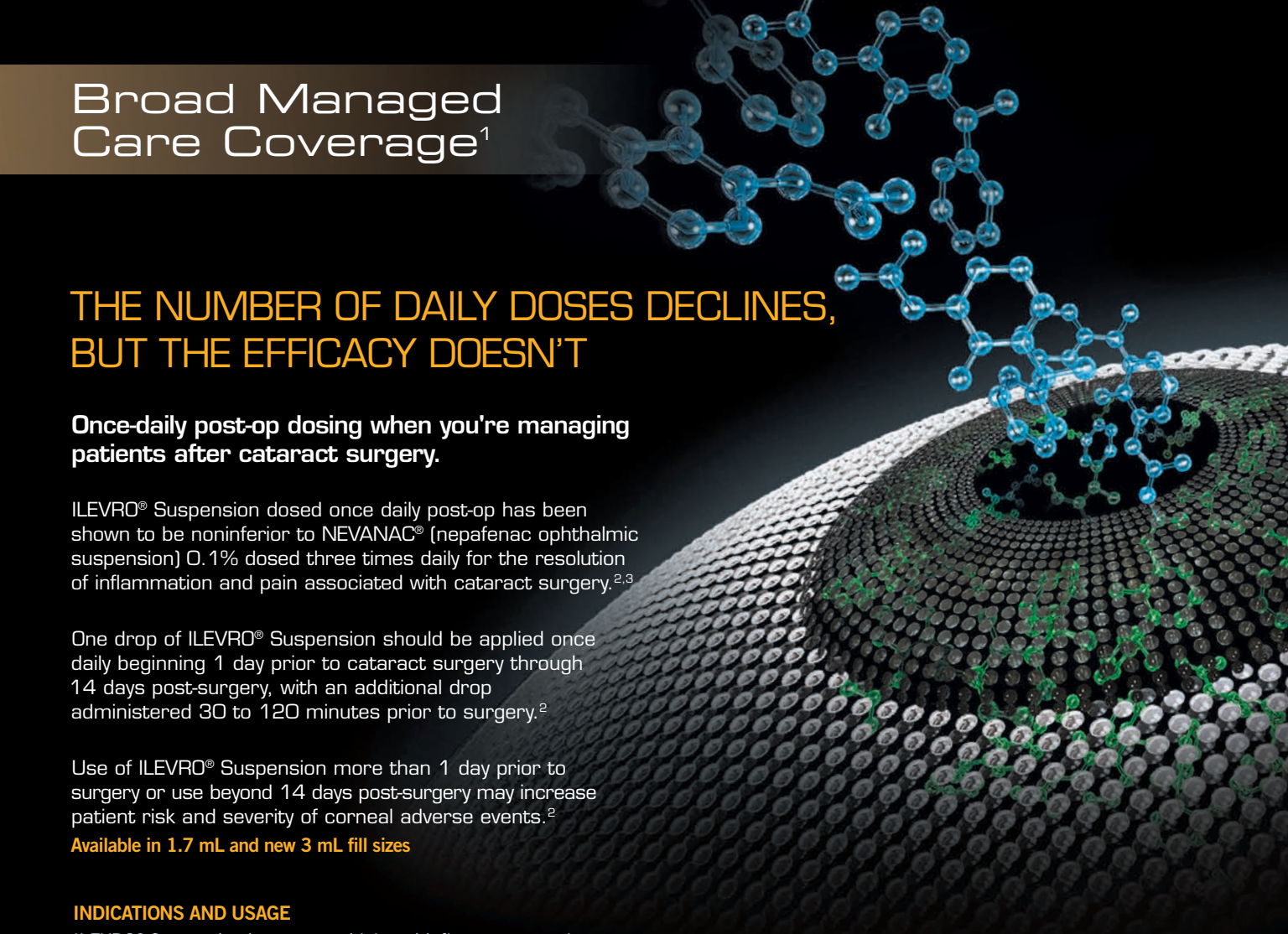
• *Corneal collagen crosslinking* (CXL) is a revolutionary treatment for patients with keratoconus. In the past, we treated all keratoconic patients with spectacle lenses first, followed by toric soft lenses and then rigid lenses before surgical intervention (i.e., penetrating keratoplasty) was contemplated. Today, however, we believe that CXL should be considered an early, first-line treatment to halt disease progression.

The CXL procedure exposes the cornea to UVA illumination after saturation with 0.1% riboflavin drops. Early keratoconic patients with pachymetry measurements greater than 400µm are the most suitable candidates for treatment.

Although rigid contact lenses may offer acceptable visual results, they do not stop keratonconus progression. CXL, on the other hand, has been shown to slow or halt the progression of corneal ectasia and astigmatic distortions. A 2010 study indicated that 97% of patients who undergo CXL during the early stages of the ectactic process showed no evidence of further disease progression.[4]

Patients who present with early ectatic signs on the posterior corneal surface may now be considered for combined CXL and lamellar or surface excimer ablation procedure.[5] For this procedure, the patient's cornea is saturated with riboflavin immediately after the refractive treatment, and then is exposed to the UV irradiation process. This increases collagen lamellar and strand crosslinking, enhancing corneal rigidity.

Broad Managed Care Coverage[1]



THE NUMBER OF DAILY DOSES DECLINES, BUT THE EFFICACY DOESN'T

Once-daily post-op dosing when you're managing patients after cataract surgery.

ILEVRO® Suspension dosed once daily post-op has been shown to be noninferior to NEVANAC® (nepafenac ophthalmic suspension) 0.1% dosed three times daily for the resolution of inflammation and pain associated with cataract surgery.[2,3]

One drop of ILEVRO® Suspension should be applied once daily beginning 1 day prior to cataract surgery through 14 days post-surgery, with an additional drop administered 30 to 120 minutes prior to surgery.[2]

Use of ILEVRO® Suspension more than 1 day prior to surgery or use beyond 14 days post-surgery may increase patient risk and severity of corneal adverse events.[2]

Available in 1.7 mL and new 3 mL fill sizes

INDICATIONS AND USAGE

ILEVRO® Suspension is a nonsteroidal, anti-inflammatory prodrug indicated for the treatment of pain and inflammation associated with cataract surgery.

IMPORTANT SAFETY INFORMATION

Contraindications

ILEVRO® Suspension is contraindicated in patients with previously demonstrated hypersensitivity to any of the ingredients in the formula or to other NSAIDs.

Warnings and Precautions

- Increased Bleeding Time – With some nonsteroidal anti-inflammatory drugs including ILEVRO® Suspension there exists the potential for increased bleeding time. Ocularly applied nonsteroidal anti-inflammatory drugs may cause increased bleeding of ocular tissues (including hyphema) in conjunction with ocular surgery.
- Delayed Healing – Topical nonsteroidal anti-inflammatory drugs (NSAIDs) including ILEVRO® Suspension may slow or delay healing. Concomitant use of topical NSAIDs and topical steroids may increase the potential for healing problems.
- Corneal Effects – Use of topical NSAIDs may result in keratitis. In some patients, continued use of topical NSAIDs may result in epithelial breakdown, corneal thinning, corneal erosion, corneal ulceration or corneal perforation. These events may be sight threatening. Patients with evidence of corneal epithelial breakdown should immediately discontinue use.

  Patients with complicated ocular surgeries, corneal denervation, corneal epithelial defects, diabetes mellitus, ocular surface diseases (e.g., dry eye syndrome), rheumatoid arthritis, or repeat ocular surgeries within a short period of time may be at increased risk for corneal adverse events which may become sight threatening. Topical NSAIDs should be used with caution in these patients.

  Use more than 1 day prior to surgery or use beyond 14 days post-surgery may increase patient risk and severity of corneal adverse events.
- Contact Lens Wear – ILEVRO® Suspension should not be administered while using contact lenses.

Adverse Reactions

The most frequently reported ocular adverse reactions following cataract surgery occurring in approximately 5 to 10% of patients were capsular opacity, decreased visual acuity, foreign body sensation, increased intraocular pressure, and sticky sensation.

For additional information about ILEVRO® Suspension, please refer to the brief summary of prescribing information on adjacent page.

References: 1. Formulary data provided by Pinsonault Associates, LLC, PathfinderRx, June 2014. **2.** ILEVRO® Suspension prescribing information. **3.** NEVANAC® Suspension prescribing information.

For more resources for eye care professionals, visit MYALCON.COM/ILEVRO

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BRIEF SUMMARY OF PRESCRIBING INFORMATION

INDICATIONS AND USAGE
ILEVRO® Suspension is indicated for the treatment of pain and inflammation associated with cataract surgery.

DOSAGE AND ADMINISTRATION
Recommended Dosing
One drop of ILEVRO® Suspension should be applied to the affected eye one-time-daily beginning 1 day prior to cataract surgery, continued on the day of surgery and through the first 2 weeks of the postoperative period. An additional drop should be administered 30 to 120 minutes prior to surgery.

Use with Other Topical Ophthalmic Medications
ILEVRO® Suspension may be administered in conjunction with other topical ophthalmic medications such as beta-blockers, carbonic anhydrase inhibitors, alpha-agonists, cycloplegics, and mydriatics. If more than one topical ophthalmic medication is being used, the medicines must be administered at least 5 minutes apart.

CONTRAINDICATIONS
ILEVRO® Suspension is contraindicated in patients with previously demonstrated hypersensitivity to any of the ingredients in the formula or to other NSAIDs.

WARNINGS AND PRECAUTIONS
Increased Bleeding Time
With some nonsteroidal anti-inflammatory drugs including ILEVRO® Suspension, there exists the potential for increased bleeding time due to interference with thrombocyte aggregation. There have been reports that ocularly applied nonsteroidal anti-inflammatory drugs may cause increased bleeding of ocular tissues (including hyphemas) in conjunction with ocular surgery. It is recommended that ILEVRO® Suspension be used with caution in patients with known bleeding tendencies or who are receiving other medications which may prolong bleeding time.

Delayed Healing
Topical nonsteroidal anti-inflammatory drugs (NSAIDs) including ILEVRO® Suspension, may slow or delay healing. Topical corticosteroids are also known to slow or delay healing. Concomitant use of topical NSAIDs and topical steroids may increase the potential for healing problems.

Corneal Effects
Use of topical NSAIDs may result in keratitis. In some susceptible patients, continued use of topical NSAIDs may result in epithelial breakdown, corneal thinning, corneal erosion, corneal ulceration or corneal perforation. These events may be sight threatening. Patients with evidence of corneal epithelial breakdown should immediately discontinue use of topical NSAIDs including ILEVRO® Suspension and should be closely monitored for corneal health. Postmarketing experience with topical NSAIDs suggests that patients with complicated ocular surgeries, corneal denervation, corneal epithelial defects, diabetes mellitus, ocular surface diseases (e.g., dry eye syndrome), rheumatoid arthritis, or repeat ocular surgeries within a short period of time may be at increased risk for corneal adverse events which may become sight threatening. Topical NSAIDs should be used with caution in these patients.

Postmarketing experience with topical NSAIDs also suggests that use more than 1 day prior to surgery or use beyond 14 days post surgery may increase patient risk and severity of corneal adverse events.

Contact Lens Wear
ILEVRO® Suspension should not be administered while using contact lenses.

ADVERSE REACTIONS
Because clinical studies are conducted under widely varying conditions, adverse reaction rates observed in the clinical studies of a drug cannot be directly compared to the rates in the clinical studies of another drug and may not reflect the rates observed in practice.

Ocular Adverse Reactions
The most frequently reported ocular adverse reactions following cataract surgery were capsular opacity, decreased visual acuity, foreign body sensation, increased intraocular pressure, and sticky sensation. These events occurred in approximately 5 to 10% of patients.

Other ocular adverse reactions occurring at an incidence of approximately 1 to 5% included conjunctival edema, corneal edema, dry eye, lid margin crusting, ocular discomfort, ocular hyperemia, ocular pain, ocular pruritus, photophobia, tearing and vitreous detachment.

Some of these events may be the consequence of the cataract surgical procedure.

Non-Ocular Adverse Reactions
Non-ocular adverse reactions reported at an incidence of 1 to 4% included headache, hypertension, nausea/vomiting, and sinusitis.

USE IN SPECIFIC POPULATIONS
Pregnancy
Teratogenic Effects.
Pregnancy Category C: Reproduction studies performed with nepafenac in rabbits and rats at oral doses up to 10 mg/kg/day have revealed no evidence of teratogenicity due to nepafenac, despite the induction of maternal toxicity. At this dose, the animal plasma exposure to nepafenac and amfenac was approximately 70 and 630 times human plasma exposure at the recommended human topical ophthalmic dose for rats and 20 and 180 times human plasma exposure for rabbits, respectively. In rats, maternally toxic doses ≥10 mg/kg were associated with dystocia, increased postimplantation loss, reduced fetal weights and growth, and reduced fetal survival.

Nepafenac has been shown to cross the placental barrier in rats. There are no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, ILEVRO® Suspension should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Non-teratogenic Effects.
Because of the known effects of prostaglandin biosynthesis inhibiting drugs on the fetal cardiovascular system (closure of the ductus arteriosus), the use of ILEVRO® Suspension during late pregnancy should be avoided.

Nursing Mothers
ILEVRO® Suspension is excreted in the milk of lactating rats. It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when ILEVRO® Suspension is administered to a nursing woman.

Pediatric Use
The safety and effectiveness of ILEVRO® Suspension in pediatric patients below the age of 10 years have not been established.

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

NONCLINICAL TOXICOLOGY
Carcinogenesis, Mutagenesis, Impairment of Fertility
Nepafenac has not been evaluated in long-term carcinogenicity studies. Increased chromosomal aberrations were observed in Chinese hamster ovary cells exposed in vitro to nepafenac suspension. Nepafenac was not mutagenic in the Ames assay or in the mouse lymphoma forward mutation assay. Oral doses up to 5,000 mg/kg did not result in an increase in the formation of micronucleated polychromatic erythrocytes in vivo in the mouse micronucleus assay in the bone marrow of mice. Nepafenac did not impair fertility when administered orally to male and female rats at 3 mg/kg.

PATIENT COUNSELING INFORMATION
Slow or Delayed Healing
Patients should be informed of the possibility that slow or delayed healing may occur while using nonsteroidal anti-inflammatory drugs (NSAIDs).

Avoiding Contamination of the Product
Patients should be instructed to avoid allowing the tip of the dispensing container to contact the eye or surrounding structures because this could cause the tip to become contaminated by common bacteria known to cause ocular infections. Serious damage to the eye and subsequent loss of vision may result from using contaminated solutions.

Use of the same bottle for both eyes is not recommended with topical eye drops that are used in association with surgery.

Contact Lens Wear
ILEVRO® Suspension should not be administered while wearing contact lenses.

Intercurrent Ocular Conditions
Patients should be advised that if they develop an intercurrent ocular condition (e.g., trauma, or infection) or have ocular surgery, they should immediately seek their physician's advice concerning the continued use of the multi-dose container.

Concomitant Topical Ocular Therapy
If more than one topical ophthalmic medication is being used, the medicines must be administered at least 5 minutes apart.

Shake Well Before Use
Patients should be instructed to shake well before each use. U.S. Patent Nos. 5,475,034; 6,403,609; and 7,169,767.

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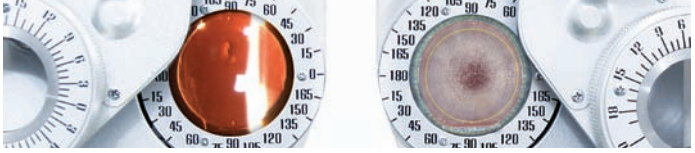


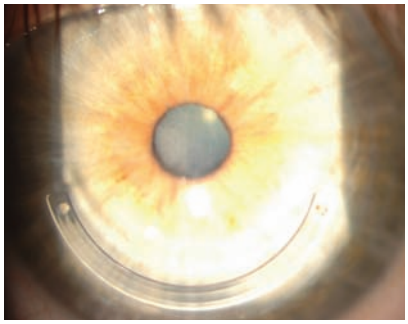
It is worth noting that some refractive surgeons are now combining CXL with LASIK and PRK (i.e., PRK and LASIK Xtra [Avedro, Inc.]) in non-keratoconous patients to reduce or eliminate the risk of postoperative ectasia.

• ***Intacs.*** In patients with more advanced keratoconus, femtosecond-assisted Intacs (Addition Technology) implantation is an effective approach to improve visual function. The laser is capable of creating precision placement channels that accept the intrastromal rings. This measure enhances corneal morphology and allows for better uncorrected acuity, improved spectacle correction and increased contact lens tolerance.

A preoperative evaluation of corneal morphology will determine whether symmetrical or asymmetrical ring placement is advisable. Additionally, we recommend that patients consider combination CXL and Intacts implantation to further decrease the likelihood of keratoconic progression.

• ***Laser-assisted keratoplasty.*** For keratoconus patients who present with advanced disease or exhibit significant scarring, corneal transplantation is often the only management option. Fortunately, femtosecond technology offers improved comfort, safety and predictability while speeding visual recovery.

With traditional penetrating keratoplasty, the surgeon removes the diseased host cornea using a circular trephine. However, laser-assisted keratoplasty allows the surgeon to produce a custom-shaped, multiplanar incision to remove the cornea and then create a matching donor graft. With this "jigsaw puzzle" fit, host/donor apposition is now much more accurate. Thus, laser-assisted keratoplasty patients typically experience rapid healing, as well as visual recovery within six weeks of surgery.[6] Additionally, patients usually develop very low levels of postoperative regular astigmatism.



Intacs (Addition Technology) intrastromal ring implantation in a patient with asymmetric keratoconus.

Presbyopia Correction

Until very recently, monovision LASIK was the only viable surgical option for presbyopic patients. While the surgical management of presbyopia continues to be challenging today, femtosecond laser refractive clear lens exchange with multifocal or accommodating intraocular lenses is gaining popularity.

Additionally, two new corneal inlay surgical solutions await FDA approval—the AcuFocus Kamra and the ReVision Optics Raindrop.

• ***The Kamra inlay*** is designed for implantation into a femtosecond-created pocket that's centere d over the pupil. This effectively reduces pupillary diameter to 1.5mm, and improves near vision via an optical pinhole effect without significantly impacting distance acuity. Post-LASIK and pseudophakic IOL patients experience significant improvements in near vision function following Kamra implantation.[7]

• ***The Raindrop inlay*** is a hydrogel lens that measures 2mm in diameter. It is positioned under a LASIK flap, which creates a prolate cornea and yields a multifocal effect.

All eye care providers should enhance their working understanding of the latest refractive surgery options available to their patients. This is a field that continues to advance rapidly and, as such, requires ongoing education to most effectively guide patients seeking your advice and counsel. ■

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Dr. Quinn is the president of Omni Eye Services of New Jersey.

Neither author has any direct financial interests in any of the products mentioned.

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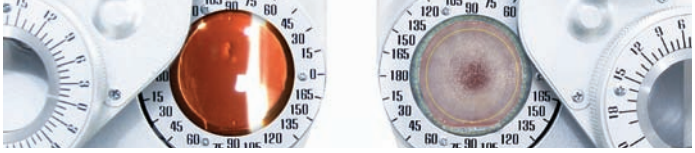
5. Spoerl E, Huhle M, Seiler T. Introduction of cross-links in corneal tissue. Exp Eye Res. 1998 Jan;66(1):97-103.
6. Fox ML. Ocular Surgery News. Article pending publication, October 2014.
7. Personal communication with Jeff Machat. August 2014.

Links to Dr. Fox's Surgical Videos on YouTube

• Femtosceond laser corneal flap creation for LASIK
Available at: www.youtube.com/watch?v=i3T8CoSA8Hs
• Astigmatic keratotomy using a femtosecond laser
Available at: www.youtube.com/watch?v=IHRleq_SYjg
• Femtosecond laser-assisted keratoplasty
Available at: www.youtube.com/watch?v=uyPo2MU7myI
• Double-ring Intacs implantation in a keratoconus patient
Available at: http://www.youtube.com/watch?v=-xPGlxfasec



Where Do You Stand on These Refractive Surgery Controversies?

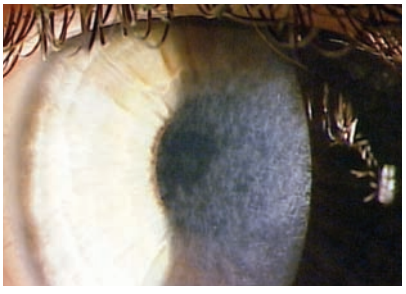
The good news: options abound. The bad news: ditto. **By Brian P. Den Beste, OD**

When Henry Ford introduced the Model-T, he made the tongue-in-cheek comment, "It comes in any color you want, as long as you want black." Refractive surgery began that way too, with radial keratotomy (RK) offering just one option to patients wishing to free themselves of corrective lenses. If you weren't a good candidate, you didn't get it, plain and simple.

Nowadays, so many options are available in refractive surgery it can be tough to decide which to recommend for each patient.

Excimer laser technology has given us photorefractive keratectomy (PRK) and subsequently LASIK (laser in situ keratomileusis). The excimer brought predictability and safety to refractive surgery outcomes.

Meanwhile, boundaries between cataract and refractive surgery are collapsing. Specialty intraocular lenses have brought refractive considerations to cataract surgery, while phakic IOLs and clear lens extraction allow surgeons to employ cataract techniques and technology for purely refractive purposes. More recently, femtosecond laser technology is now also used in some cataract procedures. It's also being studied for femto-only refractive surgical procedures that could do away with the excimer altogether.



Corneal haze after PRK treatment of high myopia.

With all these changes, it's easy to understand why recommendations are no longer so clear cut. To help bring some clarity, this article discusses three prominent controversies in choosing refractive surgery procedures: What's the best surgical option when correcting high myopia? Which is better—monovision or multifocal IOLs? And, who really needs femto laser cataract surgery?

1. What's the Best Refractive Surgical Option for High Myopia?

For some patients, it's an easy decision. The 18-year-old who wears a -15.00D contact lens is best suited for a phakic IOL. The 25-year-old with a spectacle correction of -6.00-3.00x180 and a steep and thick cornea is a better candidate for LASIK or PRK.

But what do you suggest for the 40-year-old with refraction of -7.00-1.25x90, a keratometry reading of 44D and pachymetry measurement of 550µm? The refractive surgical options for this patient include PRK/LASIK, clear lens extraction or phakic IOLs. Let's consider each.

• ***PRK/LASIK.*** In the late '90s, the myopic treatment limits for PRK and LASIK kept expanding, which increased the pool of patients who we would accept as "good candidates." With time, however,

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ACUVUE OASYS	147	73		✓
AIR OPTIX AQUA	138	102		
Biofinity	160	82	✓	

Retains moisture for a full 16 hours.[1]

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over the leading silicone hydrogel lenses[2]

2 to 1 vs. ACUVUE OASYS

3 to 1 vs. AIR OPTIX AQUA

4 to 1 vs. Biofinity

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REFERENCES: 1. Data on file. Bausch & Lomb Incorporated. Rochester NY; 2013. **2.** Results from a 22-investigator, multi-site study of Bausch + Lomb Ultra contact lenses with MoistureSeal technology, on 327 current silicone hydrogel lens wearers. After 7 days of wear, subjects completed an online survey. Subjects rated performance across a range of attributes. Preference comparisons represent only those subjects expressing a preference. Ratio is based on the average across the silicone hydrogel lenses represented in the study.

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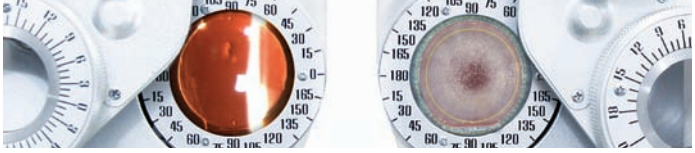
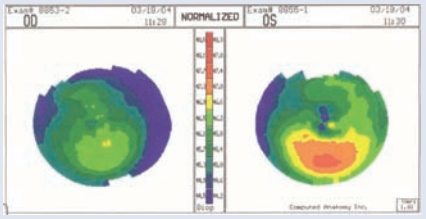


Irregular Astigmatism and Refractive Surgery

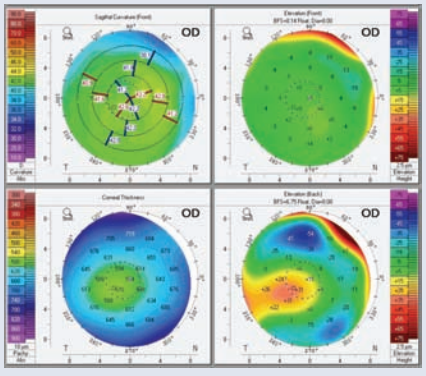
What about irregular astigmatism? Does it prevent a patient from receiving LASIK?

Not necessarily. As long as the patient has good vision through a spectacle lens, asymmetric astigmatism can be accounted for in refractive surgery, provided that the posterior corneal surface is normal and the corneal thickness is average. While astigmatism is a contraindication with LASIK, this scenario can still be treated—but only with PRK and only if the asymmetry is stable and not more than a couple of diopters.[1]



Asymmetric astigmatism.

Also, if the posterior cornea is bowed inward or doesn't parallel the contour of the anterior cornea, there will be a much greater chance that post-surgical ectasia will occur. So, first determine whether the posterior corneal surface is normal. Advanced topography instruments (e.g., Pentacam, Galilei, Orbscan) measure both the anterior and posterior corneal curvatures; the posterior corneal curvature is called posterior float. Usually, patients with an abnormal posterior float should not have laser refractive surgery. But if the corneal thickness is at least average and doesn't thin over the area of the abnormal float, the Rx is mild to moderate (less than 3D) and the posterior float is in the normal range, then this patient is a possible candidate for PRK.



Elevated posterior corneal float.

we realized that certain parameters need to be met to ensure great vision and a safe outcome. For example, one laser is currently approved for treatment up to -11.00D, but it's an uncommon patient (if any) who can safely undergo this amount of corneal flattening and thinning.

Thinning the cornea too much increases the risk of ectasia, one of the most severe complications to consider with LASIK or PRK in patients with high myopia. When the cornea is too thin, the result is a weakened structure that can flex or bend in an irregular fashion. The effect is a keratoconus-like scenario that's correctable with only a rigid lens or a corneal transplant—not a good outcome for an elective procedure!

Most seasoned clinicians now prefer a residual stromal bed of 300µm to 350µm left in the cornea. How do you calculate this? First, determine how much tissue will be ablated. To do so, multiply the spherical equivalent of the refractive error by 15µm, a ballpark number of how much tissue is ablated per diopter. For example: a -6D myope will lose 90µm (6 x 15) of central corneal thickness on average. Now that you can gauge the extent of corneal thinning, and take into account that the typical flap is about 100µm, then add up these numbers along with the desired residual thickness. You'll find that the -6D patient requires a central corneal thickness of at least 540µm to be safe (100 + 90 + 350 = 540).

Another guideline that many practices try to follow is to limit laser ablation of the corneal stroma to 100µm or less, if at all possible. So, if the math cuts it too close, choose PRK. Remember, because no flap is created with PRK, you retain an extra 100µm of corneal stroma. Although the epithelium is removed at the time of PRK surgery, it grows back in about three days with the assistance of a bandage soft contact lens.

The other number to consider is the keratometry (K) reading, the measurement of the curvature of the anterior surface of the cornea. Quality of vision, which really relates to contrast sensitivity, relies heavily on the resultant K reading. Ideally, the patient's resultant K should be 39D or steeper to preserve quality of vision. When flattening the center beyond this, corneal higher-order aberrations increase and you lose the natural prolate corneal anatomy. If treating a hyperope, post-op Ks should be under 50, as a rule of thumb.

To determine the post-op K reading using the initial K reading, take the spherical equivalent of the myopic spectacle correction and multiply by 0.7 (a shorthand number to determine the corneal power). For example: 8D x 0.7 yields 5.6. If the patient's initial K reading is steep—say, 45D or 46D—then this patient would be in the group expected to do best (45 - 5.6 = 39.4).

PRK is an option for higher corrections to avoid thinning the cornea too much. (Remember, you retain 100µm of untouched stroma.) However, when treating high myopia, a significant incidence of corneal haze and loss of best-corrected acuity can occur (with or without mitomycin). To decrease this chance of corneal haze and scarring, it is best to keep the

Postoperative Inflammation and Pain Can Make a Bad Impression

CHOOSE **DUREZOL® EMULSION** TO HELP RESOLVE INFLAMMATION AND PAIN[1]

BROAD MANAGED CARE COVERAGE[2]

INDICATIONS AND USAGE:
DUREZOL® Emulsion is a topical corticosteroid that is indicated for:
- The treatment of inflammation and pain associated with ocular surgery.
- The treatment of endogenous anterior uveitis.

Dosage and Administration
- For the treatment of inflammation and pain associated with ocular surgery instill one drop into the conjunctival sac of the affected eye 4 times daily beginning 24 hours after surgery and continuing throughout the first 2 weeks of the postoperative period, followed by 2 times daily for a week and then a taper based on the response.
- For the treatment of endogenous anterior uveitis, instill one drop into the conjunctival sac of the affected eye 4 times daily for 14 days followed by tapering as clinically indicated.

IMPORTANT SAFETY INFORMATION
Contraindications: DUREZOL® Emulsion, as with other ophthalmic corticosteroids, is contraindicated in most active viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal diseases of ocular structures.

Warnings and Precautions
- Intraocular pressure (IOP) increase – Prolonged use of corticosteroids may result in glaucoma with damage to the optic nerve, defects in visual acuity and fields of vision. If this product is used for 10 days or longer, IOP should be monitored.
- Cataracts – Use of corticosteroids may result in posterior subcapsular cataract formation.
- Delayed healing – The use of steroids after cataract surgery may delay healing and increase the incidence of bleb formation. In those diseases causing thinning of the cornea or sclera, perforations have been known to occur with the use of topical steroids. The initial prescription and renewal of the medication order beyond 28 days should be made by a physician only after examination of the patient with the aid of magnification such as slit lamp biomicroscopy and, where appropriate, fluorescein staining.
- Bacterial infections – Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions, steroids may mask infection or enhance existing infection. If signs and symptoms fail to improve after 2 days, the patient should be re-evaluated.
- Viral infections – Employment of a corticosteroid medication in the treatment of patients with a history of herpes simplex requires great caution. Use of ocular steroids may prolong the course and may exacerbate the severity of many viral infections of the eye (including herpes simplex).
- Fungal infections – Fungal infections of the cornea are particularly prone to develop coincidentally with long-term local steroid application. Fungus invasion must be considered in any persistent corneal ulceration where a steroid has been used or is in use.
- Contact lens wear – DUREZOL® Emulsion should not be instilled while wearing contact lenses. Remove contact lenses prior to instillation of DUREZOL® Emulsion. The preservative in DUREZOL® Emulsion may be absorbed by soft contact lenses. Lenses may be reinserted after 10 minutes following administration of DUREZOL® Emulsion.

Most Common Adverse Reactions
- Post Operative Ocular Inflammation and Pain – Ocular adverse reactions occurring in 5-15% of subjects included corneal edema, ciliary and conjunctival hyperemia, eye pain, photophobia, posterior capsule opacification, anterior chamber cells, anterior chamber flare, conjunctival edema, and blepharitis.
- In the endogenous anterior uveitis studies, the most common adverse reactions occurring in 5-10% of subjects included blurred vision, eye irritation, eye pain, headache, increased IOP, iritis, limbal and conjunctival hyperemia, punctate keratitis, and uveitis.

For additional information about DUREZOL® Emulsion, please refer to the brief summary of prescribing information on adjacent page.

For more resources for eye care professionals, visit MYALCON.COM/DUREZOL

References: 1. DUREZOL® Emulsion prescribing information. **2.** Formulary data provided by Pinsonault Associates, LLC, PathfinderRx, March 2014.

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(difluprednate ophthalmic emulsion) 0.05%

THE RESULTS YOU WANT. THE RELIEF THEY NEED.

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BRIEF SUMMARY OF PRESCRIBING INFORMATION

INDICATIONS AND USAGE
Ocular Surgery
DUREZOL® (difluprednate ophthalmic emulsion) 0.05%, a topical corticosteroid, is indicated for the treatment of inflammation and pain associated with ocular surgery.
Endogenous Anterior Uveitis
DUREZOL® Emulsion is also indicated for the treatment of endogenous anterior uveitis.

DOSAGE AND ADMINISTRATION
Ocular Surgery
Instill one drop into the conjunctival sac of the affected eye 4 times daily beginning 24 hours after surgery and continuing throughout the first 2 weeks of the postoperative period, followed by 2 times daily for a week and then a taper based on the response.

Endogenous Anterior Uveitis
Instill one drop into the conjunctival sac of the affected eye 4 times daily for 14 days followed by tapering as clinically indicated.

DOSAGE FORMS AND STRENGTHS
DUREZOL® Emulsion contains 0.05% difluprednate as a sterile preserved emulsion for topical ophthalmic administration.

CONTRAINDICATIONS
The use of DUREZOL® Emulsion, as with other ophthalmic corticosteroids, is contraindicated in most active viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal disease of ocular structures.

WARNINGS AND PRECAUTIONS
IOP Increase
Prolonged use of corticosteroids may result in glaucoma with damage to the optic nerve, defects in visual acuity and fields of vision. Steroids should be used with caution in the presence of glaucoma. If this product is used for 10 days or longer, intraocular pressure should be monitored.

Cataracts
Use of corticosteroids may result in posterior subcapsular cataract formation.

Delayed Healing
The use of steroids after cataract surgery may delay healing and increase the incidence of bleb formation. In those diseases causing thinning of the cornea or sclera, perforations have been known to occur with the use of topical steroids. The initial prescription and renewal of the medication order beyond 28 days should be made by a physician only after examination of the patient with the aid of magnification such as slit lamp biomicroscopy and, where appropriate, fluorescein staining.

Bacterial Infections
Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions, steroids may mask infection or enhance existing infection. If signs and symptoms fail to improve after 2 days, the patient should be re-evaluated.

Viral Infections
Employment of a corticosteroid medication in the treatment of patients with a history of herpes simplex requires great caution. Use of ocular steroids may prolong the course and may exacerbate the severity of many viral infections of the eye (including herpes simplex).

Fungal Infections
Fungal infections of the cornea are particularly prone to develop coincidentally with long-term local steroid application. Fungus invasion must be considered in any persistent corneal ulceration where a steroid has been used or is in use. Fungal culture should be taken when appropriate.

Topical Ophthalmic Use Only
DUREZOL® Emulsion is not indicated for intraocular administration.

Contact Lens Wear
DUREZOL® Emulsion should not be instilled while wearing contact lenses. Remove contact lenses prior to instillation of DUREZOL® Emulsion. The preservative in DUREZOL® Emulsion may be absorbed by soft contact lenses. Lenses may be reinserted after 10 minutes following administration of DUREZOL® Emulsion.

ADVERSE REACTIONS
Adverse reactions associated with ophthalmic steroids include elevated intraocular pressure, which may be associated with optic nerve damage, visual acuity and field defects; posterior subcapsular cataract formation; secondary ocular infection from pathogens including herpes simplex, and perforation of the globe where there is thinning of the cornea or sclera.

Ocular Surgery
Ocular adverse reactions occurring in 5-15% of subjects in clinical studies with DUREZOL® Emulsion included corneal edema, ciliary and conjunctival hyperemia, eye pain, photophobia, posterior capsule opacification, anterior chamber cells, anterior chamber flare, conjunctival edema, and blepharitis. Other ocular adverse reactions occurring in 1-5% of subjects included reduced visual acuity, punctate keratitis, eye inflammation, and iritis. Ocular adverse reactions occurring in < 1% of subjects included application site discomfort or irritation, corneal pigmentation and striae, episcleritis, eye pruritus, eyelid irritation and crusting, foreign body sensation, increased lacrimation, macular edema, sclera hyperemia, and uveitis. Most of these reactions may have been the consequence of the surgical procedure.

Endogenous Anterior Uveitis
A total of 200 subjects participated in the clinical trials for endogenous anterior uveitis, of which 106 were exposed to DUREZOL® Emulsion. The most common adverse reactions of those exposed to DUREZOL® Emulsion occurring in 5-10% of subjects included blurred vision, eye irritation, eye pain, headache, increased IOP, iritis, limbal and conjunctival hyperemia, punctate keratitis, and uveitis. Adverse reactions occurring in 2-5% of subjects included anterior chamber flare, corneal edema, dry eye, iridocyclitis, photophobia, and reduced visual acuity.

USE IN SPECIFIC POPULATIONS
Pregnancy
Teratogenic Effects
Pregnancy Category C. Difluprednate has been shown to be embryotoxic (decrease in embryonic body weight and a delay in embryonic ossification) and teratogenic (cleft palate and skeletal) anomalies when administered subcutaneously to rabbits during organogenesis at a dose of 1–10 mcg/kg/day. The no-observed-effect-level (NOEL) for these effects was 1 mcg/kg/day, and 10 mcg/kg/day was considered to be a teratogenic dose that was concurrently found in the toxic dose range for fetuses and pregnant females. Treatment of rats with 10 mcg/kg/day subcutaneously during organogenesis did not result in any reproductive toxicity, nor was it maternally toxic. At 100 mcg/kg/day after subcutaneous administration in rats, there was a decrease in fetal weights and delay in ossification, and effects on weight gain in the pregnant females. It is difficult to extrapolate these doses of difluprednate to maximum daily human doses of DUREZOL® Emulsion, since DUREZOL® Emulsion is administered topically with minimal systemic absorption, and difluprednate blood levels were not measured in the reproductive animal studies. However, since use of difluprednate during human pregnancy has not been evaluated and cannot rule out the possibility of harm, DUREZOL® Emulsion should be used during pregnancy only if the potential benefit justifies the potential risk to the embryo or fetus.

Nursing Mothers
It is not known whether topical ophthalmic administration of corticosteroids could result in sufficient systemic absorption to produce detectable quantities in breast milk. Systemically administered corticosteroids appear in human milk and could suppress growth, interfere with endogenous corticosteroid production, or cause other untoward effects. Caution should be exercised when DUREZOL® Emulsion is administered to a nursing woman.

Pediatric Use
DUREZOL® Emulsion was evaluated in a 3-month, multicenter, double-masked, trial in 79 pediatric patients (39 DUREZOL® Emulsion; 40 prednisolone acetate) 0 to 3 years of age for the treatment of inflammation following cataract surgery. A similar safety profile was observed in pediatric patients comparing DUREZOL® Emulsion to prednisolone acetate ophthalmic suspension, 1%.

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

NONCLINICAL TOXICOLOGY
Carcinogenesis, Mutagenesis, and Impairment of Fertility
Difluprednate was not genotoxic *in vitro* in the Ames test, and in cultured mammalian cells CHL/IU (a fibroblastic cell line derived from the lungs of newborn female Chinese hamsters). An *in vivo* micronucleus test of difluprednate in mice was also negative. Treatment of male and female rats with subcutaneous difluprednate up to 10 mcg/kg/day prior to and during mating did not impair fertility in either gender. Long term studies have not been conducted to evaluate the carcinogenic potential of difluprednate.

Animal Toxicology and/or Pharmacology
In multiple studies performed in rodents and non-rodents, subchronic and chronic toxicity tests of difluprednate showed systemic effects such as suppression of body weight gain; a decrease in lymphocyte count; atrophy of the lymphatic glands and adrenal gland; and for local effects, thinning of the skin; all of which were due to the pharmacologic action of the molecule and are well known glucocorticosteroid effects. Most, if not all of these effects were reversible after drug withdrawal. The NOEL for the subchronic and chronic toxicity tests were consistent between species and ranged from 1–1.25 mcg/kg/day.

PATIENT COUNSELING INFORMATION
Risk of Contamination
This product is sterile when packaged. Patients should be advised not to allow the dropper tip to touch any surface, as this may contaminate the emulsion.
Use of the same bottle for both eyes is not recommended with topical eye drops that are used in association with surgery.

Risk of Secondary Infection
If pain develops, or if redness, itching, or inflammation becomes aggravated, the patient should be advised to consult a physician.

Contact Lens Wear
DUREZOL® Emulsion should not be instilled while wearing contact lenses. Patients should be advised to remove contact lenses prior to instillation of DUREZOL® Emulsion. The preservative in DUREZOL® Emulsion may be absorbed by soft contact lenses. Lenses may be reinserted after 10 minutes following administration of DUREZOL® Emulsion.

Revised: May 2013
U.S. Patent 6,114,319

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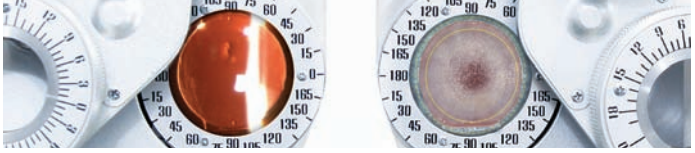


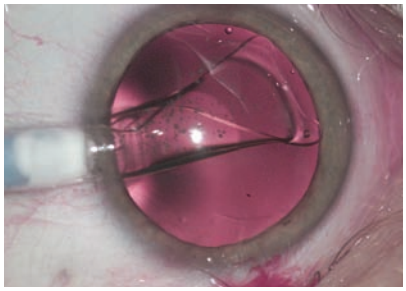
amount of laser treatment under 100µm regardless of the corneal thickness.

The third finding to consider is the pupillary diameter. If the scotopic pupil is large (greater than 7mm), the ablation zone diameter must be enlarged to lessen or avoid the halo effect with night vision. However, if the treatment diameter is enlarged, the 15µm per diopter rule no longer applies; it could be more like 20µm/D.

• ***Clear lens extraction or phakic IOLs.*** These options spare the cornea and avoid the potential for ectasia (since no stroma is removed) and neurotrophic keratitis (as corneal sensitivity is unchanged). But these procedures are surgically more complex and more expensive than LASIK or PRK, carry a risk of intraocular infection and are usually performed one eye at a time.

Clear lens extraction (CLE) replaces a non-cataractous lens with an IOL, while phakic IOLs preserve the existing crystalline lens and add a little more refractive horsepower with a lens implant. Phakic IOLs can be positioned either anterior to the iris (the Veriseye, Abbott Medical Optics) or posterior to it (the Visian ICL, Staar Surgical). Phakic IOLs offer the advantages of reversibility and the preservation of accommodation, and the Visian ICL eliminates concerns about halo because the optics are behind the pupil. When compared to high myopic LASIK, outcomes with the ICL are said to offer better quality of vision.[2]

The Visian ICL is usually chosen for individuals who are younger and not presbyopic—it's FDA approved for ages 21 to 45—or not a candidate for corneal refractive surgery. The device is not currently available in toric powers in the United States, so sometimes the ICL has to be combined with LASIK or PRK to correct astigmatism.



For high myopes, an implantable collamer lens can offer better quality of vision than LASIK.

Probably the biggest surgical concern for the Visian ICL is touching the crystalline lens and inducing an anterior cortical or subcapsular cataract. The major disadvantage of the Veriseye is that it is physically attached to the iris, which can cause pigmentary dispersion and chronic inflammation.

The ICL implant requires an anterior chamber depth of 3.0mm or greater, which is usually not an issue in most high myopes. One or two YAG laser peripheral iridotomies are performed one week preoperatively to prevent pupillary block glaucoma.

Clear lens extraction is less expensive than ICL, less surgically challenging and offers the advantage of correcting astigmatism with a toric implant. It is the modality chosen for an older presbyopic patient. Clear lens extraction can also be performed on hyperopes, whereas the Visian only corrects -3D to -20D of myopia. Besides, hyperopes would be poorly suited to the ICL because they tend to have shallow anterior chambers, increasing the risk of pupillary block/angle closure glaucoma.

In summary, the older presbyopic patient with a normal peripheral retina would do best with clear lens extraction. The younger patient with less than 7D of myopia who has a normal corneal pachymetry (550µm or thicker) and typical corneal steepness is generally a LASIK or PRK candidate. The patient who is not presbyopic with this same correction but with large pupils or with collagen vascular disease and dry eyes would probably be best served with the ICL.

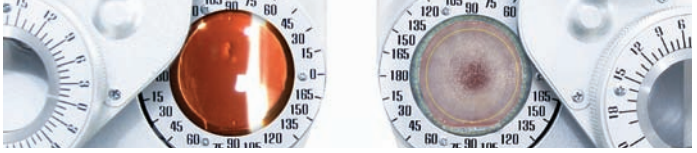
So, in our 40-year-old patient, if he has no retinal issues and no sign of early cataract, I'd suggest LASIK, or an ICL if the scotopic pupil is 7mm or if there is any collagen vascular disease or dry eye.

2. Which Patients Are Best Suited to Multifocal IOL, Accommodative IOL or Blended Vision/Monovision?

It's difficult to predict which patients will be able to tolerate a multifocal. A multifocal IOL is analogous to a multifocal soft contact lens in the visual compromise and adaptation period needed, but with one huge difference: it's not so easy to remove an IOL. Optometrists have come to expect that some patients will have visual concerns after this procedure, as they often do with multifocal contacts.

Simply put, multifocals are great—for some people; it's just challenging to tell which ones. Of course, we all want our patients to be "100% happy," but in my experience, too many poorly selected patients complain of compromised vision, night-time obscurations and dysphotopsias (unusual temporal shadows) with multifocal IOLs. At least one study found a higher rate of patient satisfaction with monovision, without the risk of visual obscurations and the added cost that multifocal IOLs incur.[3]

Hyperopes seem to have the highest acceptance rate for multifocal IOLs, but they also do extremely



well with monovision. Depth of focus, which is a function of a smaller pupillary diameter, seems to work best with hyperopic patients, and some are able to read and see in the distance with a standard monofocal IOL.

Blended vision or modified monovision also works well.[3] With a residual refractive error of -1.25D to -1.50D in the non-dominant eye, it's amazing how well these patients function in good illumination. If your patient has been successful in the past with monovision with contact lenses or LASIK, they almost always do well with this strategy using IOLs.

The accommodating or flexing IOLs have fewer dysphotopsias compared to multifocal IOLs, but sometimes experience flexure anomalies that compromise the patient's final refractive result. They also have a smaller optic zone compared to standard monofocal IOLs, which can negatively affect night vision. Also, compared to the newer monofocal IOL designs, they may have a higher incidence of posterior capsular opacity.[4]

3. Who Really Needs Femto Laser Cataract Surgery?

Surgeons disagree on this question, with some advocating routine use of femto, others believing its greater precision is primarily a benefit only to those patients receiving a premium IOL, and still others waiting for more compelling safety and outcomes data to show up in the literature before adopting the technology.

As with any other laser procedure, results are more predictable than with manual techniques. The femto laser makes a perfect corneal incision and, more importantly, anterior capsulorhexis. That is often the most challenging and important part of the surgery regarding post-op IOL performance. This is especially advantageous in patients who opt for premium IOLs. When the capsulorhexis is perfectly sized and centered, toric and multifocal IOLs have the best chance of exact centration and least chance of tilt.

Other patients who are more likely to benefit from use of femto technology are those with a dense brunescent nuclear sclerosis, low endothelial cell count or hypermature cataract (a totally white cataract makes it more difficult to perform the capsulorhexis). Also, the patient with 1.5D or less of corneal astigmatism usually benefits from the precision of the femto laser's limbal relaxing incisions; above that range, a toric IOL may offer a better solution.

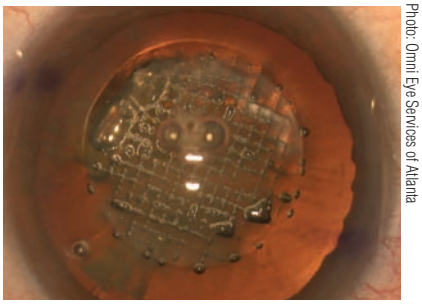


Photo: Omni Eye Services of Atlanta

A femtosecond laser neatly fragments the lens nucleus, but even better is its ability to make a perfectly circular capsulorhexis.

Still, skilled high-volume surgeons can often perform just as well with handheld instruments. Younger and less experienced surgeons may come to rely on the femto more than veterans. (Perhaps ironically, the best surgeons are the ones investing in this expensive technology, but most likely need it the least.)

As this element of the surgery is a non-covered benefit, patients have a higher out-of-pocket fee when the femto laser is used. Patients have to weigh the purported benefits against the added costs; some certainly do gravitate toward the newest techniques and the latest technology, but not all senior citizens on a fixed income will.

Traumatic cataracts that often have zonular dehiscence should not undergo a femto procedure; the laser fragmentation can result in a sudden loss of the nucleus into the vitreous. Patients with a history of anterior basement membrane disease or recurrent corneal erosion are not good candidates either, as the laser docking can cause a corneal abrasion, depending on the laser's interface. Small orbital fissures can complicate the procedure and patients with prior RK or penetrating keratoplasty should avoid it. It's also contraindicated for LASIK patients, as gas bubbles can go under the flap.

In summary, we like the femto technology and offer it to patients who can benefit from the laser limbal relaxing incisions, have hard brunescent nuclei or significant amount of corneal endothelial issues. Time will tell if this marvelous technology makes enough of a difference in surgical outcomes (complications and final vision) compared to standard phacoemulsification to become standard of care. ■

Dr. Den Beste is the founder of Lasik Pro Eye Consultants in Orlando, Fla.

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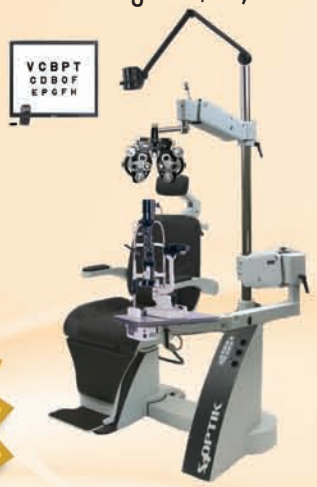

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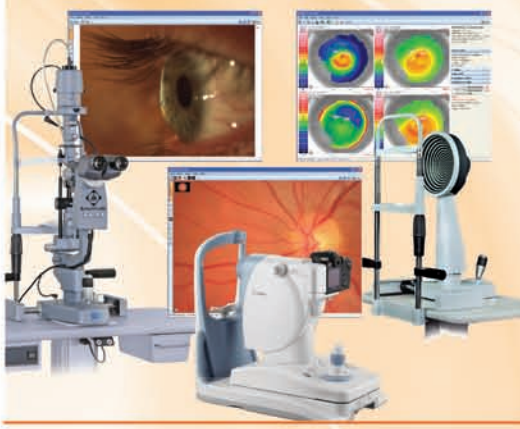

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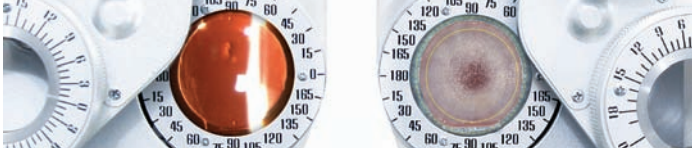


IOL Advances:
How to Discuss Them with Patients

You've got the knowledge you need to start the conversation. But it requires a delicate balance to avoid establishing the wrong expectations.

By Renee Buddle, Senior Associate Editor

An optometrist refers a cataract patient for surgery, and the ophthalmologist sits down with the patient and informs him that he could benefit from a premium intraocular lens (IOL) that will correct for the effects of presbyopia. Confused, the patient asks, "What is presbyopia, and what's an IOL?" and, "Why didn't my doctor tell me about this?"

Result: the patient leaves the office overwhelmed by the barrage of new information because they weren't informed of the options sooner. It's better all around if the patient had the chance to at least learn the basics from their optometrist.

"An example is a toric IOL," says Paul M. Karpecki, OD, of Koffler Vision Group in Lexington, Ky. "Often, patients have better results from these lenses than any other options available, but may not pursue this option if they've not heard about it previously."

Paul Ajamian, OD, who runs the Omni Eye Services comanagement center in Atlanta, has heard this scenario before. He says patients want to hear their IOL options first from their family doctor of optometry. ODs know their patients best because patients have gone to them the longest; in many cases, the relationship spans decades. Bottom line: Patients value your expertise and the connection you share with them.

"We're looking for patients who have come to us after their optometrist has already talked to them about their refractive options," says Dr. Ajamian. "Most surgeons worth their salt welcome that information from the OD because the OD knows the refractive and vision history, and lifestyle demands of patients, better than the ophthalmologist."

But while there is nothing wrong with suggesting a specific lens if you have a good comanagement relationship with your surgeon, leave yourself some wiggle room; the surgeon might not use it or the patient may not be a good candidate. "Treat cataract surgery like retina surgery," one ophthalmologist advises. "As a cataract surgeon, I would tell my patient with a retinal detachment to discuss the options with the retina surgeon, and I would refrain from giving retina guidance." In other words: educate, don't advocate.

While so-called premium IOLs (i.e., multifocals, torics, accommodating lenses) have been around for almost a decade, newer iterations perform better than their predecessors. The designs are more complex than monofocal IOLs, the patient selection criteria more stringent and patients need considerable prep to make an informed decision when they go in for surgery.

That's where you come in.

Lens Discussion

There are many lenses on the market and ultimately choosing the right one is the responsibility of the comanaging OD and surgeon. Here's how to help patients get acquainted with the newest IOL concepts and options.

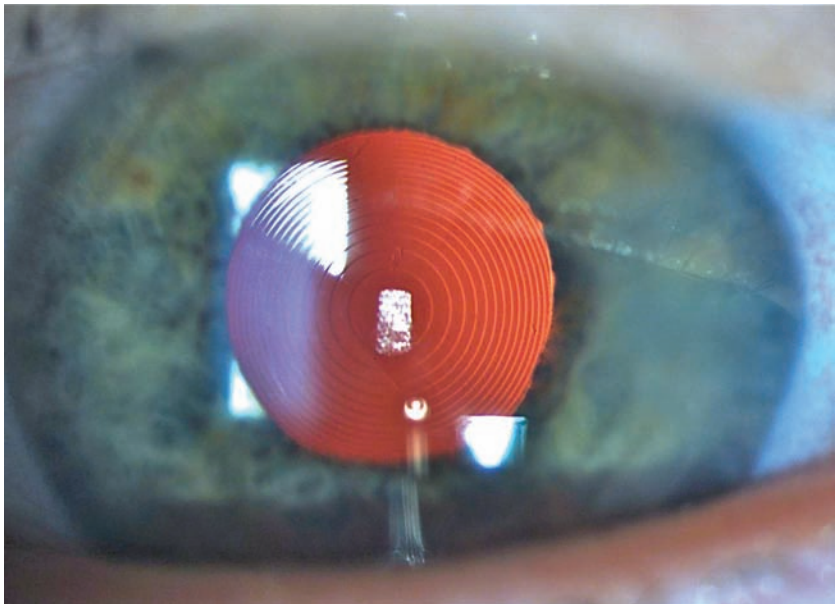
• ***Torics.*** Toric IOLs are for astigmatic patients that need correction for 1.00D or above. Jonathan Stein, MD, an instructor at the NYU department of ophthalmology, suggests explaining to patients that toric lenses correct for

distance, but not intermediate or near vision. Eric Donnenfeld, MD, Clinical Professor of Ophthalmology at NYU Medical Center, cautions against implanting them in patients with irregular corneas, such as keratoconus. Torics now come in cylinder options from +6.00D to +34.00D. The AcrySof IQ Restor IOL +3D (Alcon) and the Tecnis Toric Aspheric IOL (Abbott Medical Optics) both benefit from this wider range of potential correction, Dr. Donnenfeld says.

A sample conversation with the patient might begin like this: "The shape of your eye causes some blurriness that conventional IOLs won't correct. Luckily, you have a lot of options to address it. Glasses or contacts would do a great job, but if you want to avoid that, you might be able to have it corrected surgically. New IOL designs build that correction in. For astigmatism under 1.00D, surgeons with access to a femtosecond cataract laser also can reshape your cornea during cataract surgery too."

• ***Multifocals.*** These IOLs offer patients the greatest range of vision, says Dr. Stein. But they require some visual compromise and neuroadaptation. Early on, most multifocals came with +4D adds. Now, lower-add multifocal IOLs (e.g., add powers of +2.75D to +3.25D) expand the potential range of vision, Dr. Donnenfeld says. And some multifocal IOLs will soon come with a toric correction as well, he says.

Because multifocals split the light rays into two foci as they pass through the lens, the patient's ocular anatomy needs to be free of any conditions that might reduce vision. Dr. Donnenfeld says patients should have good retinal and ocular surface function and tear film quality to be suitable candidates for multifocal IOL implantation. Patients with previous corneal surgery such as LASIK, or those with a history of epithelial basement membrane dystrophy, don't do well with multifocals. Other comorbidities include glaucoma, macular degeneration, epiretinal membrane or diabetic retinopathy.



The lens used in this piggyback fit is well centered and showed adequate movement.

A sample patient conversation: "You've probably been wearing reading glasses since your 40s or 50s. If you're happy with that, you can stay with them after the surgery. But some new IOL options could allow for less dependence on those readers—and maybe even eliminate them completely." Be sure to fully educate about the potential for glare and halos in some patients during the adaptation period.

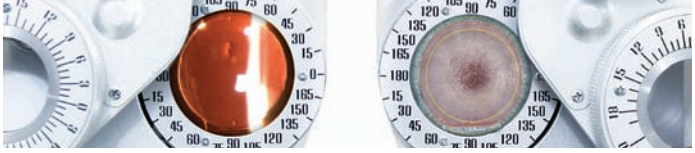
• ***Accommodating lenses.*** These IOLs avoid the trade-offs inherent in multifocality by flexing in a way analogous to the natural human lens, but offer a more limited range of correction. Two FDA-approved lenses, the Crystalens and its toric version, the Trulign Toric—both from Bausch + Lomb—correct for intermediate and distance vision but not near, says Dr. Stein. Patients do well with accommodating lenses, but will have more difficulty reading up close.

"Because they have very flexible haptics," says Dr. Donnenfeld, accommodating lenses "are less predictable at achieving emmetropia and may require excimer laser enhancements more frequently to achieve optimal distance than a conventional IOL."

You might follow the discussion of multifocals by segueing into a discussion of accommodating lenses. You could say, "The surgeon will want you to think about how much up close vision you need vs. intermediate vision. Think of it as cell phone vs. laptop. Which do you use more?" As always, stress that the surgeon will need to consider a variety of anatomical and visual factors when making the final call.

The Right Attitude

You play a key role in explaining IOL choices to patients before they reach the ophthalmologist's office,



Comanagement Do's and Don'ts

The optometrist is the "gatekeeper" who brings the patient in and begins a multi-step process that will end in the surgical suite's recovery room. Here's advice from experts on how to coordinate care with the surgeon.

- **DO** let the ophthalmologist know the type of lens(es) you discussed with the patient and document that in the patient's medical records. The patient needs a basic understanding of what lenses or procedures they are candidates for before seeing the surgeon, according to Dr. Ajamian.
- **DON'T** recommend presbyopic lenses for patients with macular degeneration, significant glaucoma or other ocular health issues, or who've had LASIK. Dr. Karpecki cautions that these patients have corneal wavefront aberrations already, and are best treated with monofocal lenses.
- **DON'T** refer patients with advanced Fuchs' dystrophy (indicated by morning blur lasting more than two hours; a failed cornea in the other eye after cataract surgery; pachs greater than 600µm to 640µm, depending on baseline; or specular microscopy less than 800µm) for cataract surgery. The patient must be corrected with DSEK and then undergo cataract surgery at a later date, according to Dr. Karpecki.
- **DO** inform the surgeon of topography/keratometry readings for the degree of astigmatism. These measurements determine whether the patient may benefit from a toric IOL, according to Dr. Mann. And be sure to explain to patients what astigmatism is—many don't know.
- **DO** tell patients not to wear contact lenses for at least two weeks before undergoing their preoperative evaluation so the results of keratometry measurements and ocular surface readings won't be skewed, says Dr. Mann.
- **DO** bring up patient history to the surgeon. For example, a history of trauma means the zonules may have weakened, Dr. Karpecki says. Another example: the patient is on Flomax for benign prostate hypertrophy (BPH), which may cause floppy iris syndrome in some patients for whom the surgeon must choose the IOL carefully, he says.
- **DON'T** refer patients for IOL surgery who have poor ocular surface health secondary to dry eye or meibomian gland dysfunction, says Dr. Karpecki. Treat the ocular surface disease first. "If a patient comes into my office and I measure osmolarity and it's 330 or I see central corneal staining, I have to tell patients they're not the right a candidate yet for surgery because we may not get the right calculations," he adds.
- **DO** inform patients you'll be seeing them after surgery for postoperative care, says Dr. Whitley. Make sure they know you'll share their care with surgeons. "We're a surgical practice and we do everything to keep the referromg OD involved," he says. "Tell patients you typically share in the care of postoperative examinations." The decision on whether to be comanaged is up to the patient. However, it's best to educate patients on your role in the perioperative process.

but the patient conversation can be daunting with so much ground to cover. You don't want to spend 30 minutes discussing complex IOL designs, but you do want to introduce them.

Focus on outcomes, not technical specs, says Kevin Waltz, OD, MD, founder of Eye Surgeons of Indiana in Indianapolis. Resist the temptation to color a conversation with reports of bad experiences based on only a few cases, or with earlier generation lenses. The conversation needs the right balance—neither hype nor negativity about a particular lens, to help patients decide what's best for them. "You want to undersell and overdeliver," says Dr. Ajamian.

So, what's the best way to talk about IOLs?

1. Know your surgeons. Stay current about the capabilities and outcomes of the surgical practices you refer to so that you'll be able to tell the patient what to expect in a concrete way, says Dr. Ajamian. Find out what the surgeons' IOL and surgical preferences are. "Spend some time with surgeons doing rounds at their office or going into surgery with them," says Dr. Ajamian. "It gives you a good feel for what your patients will experience."

2. Introduce them to your preferred surgeon, suggests Walter Whitley, OD, Director of Optometric Services at Virginia Eye Consultants, a tertiary referral center in Norfolk, Va. Explain why you choose to work with that particular surgeon, the IOL options your surgeon implants and any relevant details about their surgical approach, especially if they incorporate the femtosecond laser into the procedure.

3. Obtain educational tools from the surgeon for the patient to read or create your own, adds Dr. Whitley. If you have an ongoing referral relationship with a surgical practice, sync up your educational efforts with theirs. That could include profiles of the surgeon's outcomes, the various advanced technology IOLs available and any innovative technologies or lenses they use, and what to expect in the post-op period. When the patient does their homework, they'll make a better decision.

Matching Patient Personalities with IOL Options

Making IOL recommendations requires understanding patients' personalities. The key: Never guarantee anything, says Dr. Ajamian.

(continued on page 94)

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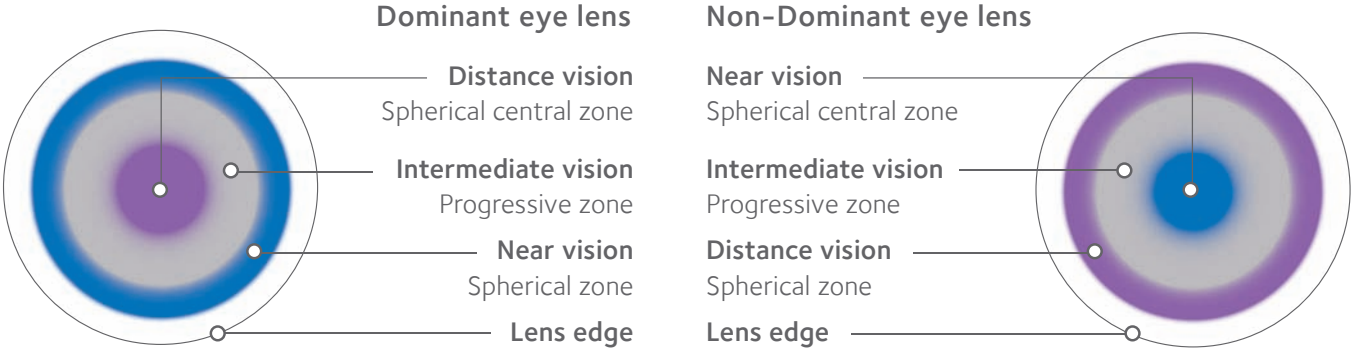

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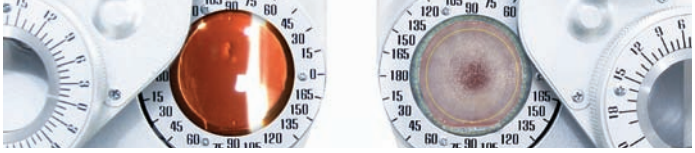


Postop Predicaments in Cataract Procedures

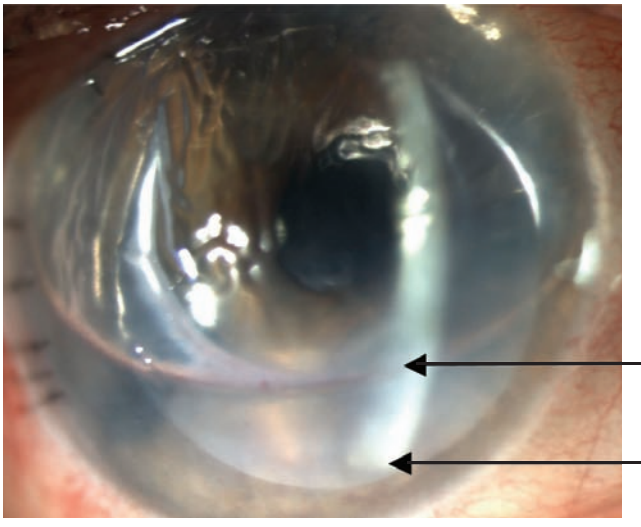
Three non-routine cataract cases showcase surgical advances and highlight increasing postoperative visual expectations. **By Landon Jones, OD, and Audrey Talley Rostov, MD**

Optometrists' primary responsibility in cataract surgery is to ensure good medical eye care during the postoperative period. Fortunately, the advent of small-incision phacoemulsification techniques now allows for earlier recovery of visual function.[1,2]

At the same time, with increased emphasis on reducing dependency on corrective eyewear following cataract surgery, our care is evolving. Patients are now regarding cataract surgery as more of a refractive procedure, and expect us to help them achieve an excellent visual outcome.

Thus, the care we now provide extends from a solid understanding of medical complications to a vigilant attentiveness to the vision expectations of the patient.[3] As a result, comanaging providers must remain attuned to the nuances of specialty intraocular lenses, and return patients for surgical intervention in a time-appropriate manner.

This article outlines three interesting cases that highlight both important roles as postsurgical providers.



Securely attached DSEK graft and appropriate air bubble following reversal of pupillary block.

Case #1: Pupillary Block After Combined DSEK

• ***History.*** A 79-year-old white female presented for a one-day follow-up after combined Descemet's stripping endothelial keratoplasty (DSEK) and cataract extraction with monofocal IOL implantation in the right eye. She reported no abnormal complaints of ocular discomfort, but had noticed a persistent headache since the procedure.

Topical postoperative medications included ofloxacin 0.3% QID, prednisolone acetate 1% QID and bromfenac 0.09% QD. Over-the-counter lubricants and Muro 128 solution (Bausch + Lomb) were also prescribed for the early postoperative period. The patient had a history of endothelial dystrophy and had already undergone DSEK in the fellow eye five months prior.

• ***Diagnostic data.*** The patient's visual acuity on day one was limited to hand motion OD. The endothelial graft was well centered and the cornea showed 1 to 2+ stromal edema, as expected. There

was no graft dehiscence.

Anterior bowing of the iris was visible 360° with an occluded angle, despite a patent prophylactic peripheral iridectomy inferiorly. The anterior chamber was maximally filled with air in place of aqueous humor. Intraocular pressure by applanation tonometry measured 46mm Hg OD.

• ***Diagnosis and management.*** This patient had pupillary block. After alerting the surgeon, we decided to immediately lower the intraocular pressure behind the biomicroscope.

With a metal dilator, we applied pressure just posterior to the sutured temporal incision. This depression allowed immediate escape of air to achieve a more defined air bubble within the anterior chamber. As a result, the anterior chamber structures returned to their normal state and the patient's IOP reduced to 6mm Hg. Her symptoms abated just as quickly.

• ***Discussion.*** Air-bubble management following endothelial graft surgery is an important responsibility of the postoperative care provider. Pupillary block is a serious post-op complication and could result in permanent vision loss if improperly managed.

To review, the perioperative injection of air into the anterior chamber during surgery is intended to create tension against the graft and prevent dehiscence. Despite an uncomplicated surgical case, air can inadvertently become trapped behind the iris, which can lead to irido-corneal touch. (Prophylactic peripheral iridectomies are routinely created during endothelial graft cases to mitigate undesired pupillary block. The air bubble is expected to assume about 60% of the anterior chamber's height on the first day after surgery, and to not encompass the iridectomy.) This is why patients are discouraged from bending forward in the immediate postoperative period. In addition, the patient is asked to spend most of the first 24 hours on his or her back, as the tension of air against the graft is most effective when the patient is in a supine position.

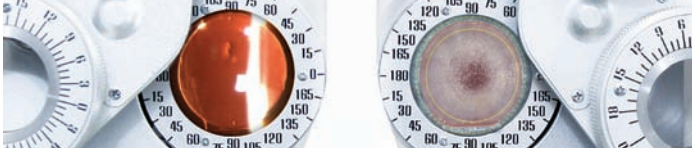
Because the bubble interferes with visual acuity, patients are reassured of its reabsorption over the following few days.

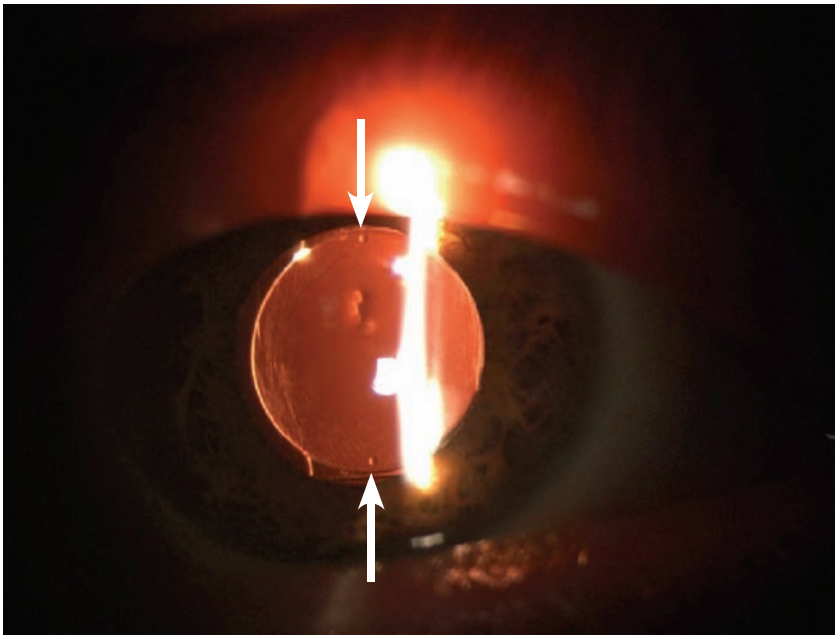
Take great care when applanating corneas with new endothelial grafts due to graft instability. Prophylactic oral acetazolamide or IV mannitol may be administered perioperatively to deter postoperative pressure rise and to potentially minimize the need for applanation tonometry on day one. If needed, pneumotonometry is the preferred method of assessing intraocular pressure this early in the postoperative period.

Case #2: Toric IOL Rotation

• ***History.*** A 53-year-old white male returned to the office for a one-week follow-up after uncomplicated cataract extraction with Trulign Toric IOL (Bausch + Lomb) insertion in the right eye. He noted improved vision in this eye when compared with his vision before the cataract procedure, but did not believe that the vision was as sharp as that achieved postoperatively in his left eye. (This fellow eye had also been implanted with a Trulign Toric IOL one month prior.)

• ***Diagnostic data.*** Uncorrected vision in the right eye measured 20/60 at distance, 20/32 at intermediate and 20/32 at near. The eye best corrected to 20/20 after the manifest refraction yielded +0.25-2.00x115.





Toric IOL in posterior vault formation following surgical repositioning of the axis. The arrows point to the IOL axis markers.

Slit lamp biomicroscopy confirmed a well-healing eye with expected anterior chamber reaction and a clearing corneal stroma. Both clear corneal incisions were sound and had not required suturing. Posterior pole evaluation revealed a healthy, unremarkable posterior segment. The IOL was in its intended posterior vault formation—but the axis of rotation was at 109°. This contrasted with the surgeon's intended axis of 89°.

• ***Diagnosis and management.*** This patient had undesired postoperative astigmatism due to IOL rotation, and returned to the cataract surgeon in a timely fashion. At this consultation, the cataract surgeon ordered a surgical reposition of the IOL, which he performed the following day using ORA wavefront aberrometry (WaveTec Vision) to precisely realign the IOL.

One week after the repositioning procedure in the right eye, his distance, intermediate and near acuities were 20/15-, 20/20 and 20/40 respectively with a plano refraction.

• ***Discussion.*** Postoperative examination of specialty intraocular lenses requires additional attention to detail. Both the Trulign Toric IOL and the Crystalens accommodating IOL (Bausch + Lomb) are designed to be optimally positioned for translation when the haptic hinges are in a posteriorly flexed state within the posterior capsule. At the slit lamp, there should be visible space between the IOL optic and the posterior iris plane. The IOL is said to be in a state of posterior vault.

But, Z-formation (also called Z-syndrome) can occur when one of the two hinges moves anteriorly, creating a tilted IOL optic that typically induces undesired astigmatism. In addition, both hinges may flex forward anteriorly, creating a negative vault. This would likely lead to the patient becoming more myopic.

The rotational stability of a toric IOL determines the effectiveness of the outcome; there is a 3.3% loss of effectiveness for each degree of rotation.[4] Therefore, assuming the degree of rotation is the same, a higher-powered toric IOL off alignment will yield more undesired astigmatism than a misaligned low-powered toric IOL. Toric designs, such as the AcrySof IQ Toric IOL (Alcon), have shown excellent rotational stability and rotate less than 4° on average from the initial placement at six months after surgery.[5]

Undesired toric IOL rotation can occur early or late in the postoperative period. A large degree of IOL rotation may occur in eyes with relatively long axial lengths, especially during the first few days post-op.[6] The posterior capsule appears to adhere more tightly to the IOL within the first postoperative month.

For this reason, urgently refer patients with rotated IOLs back to the surgeon. Most surgeons request that the patient be returned within one to two weeks when toric IOL rotation is discovered.

Case #3: Peripheral Corneal Ulcer After Surgery

• ***History.*** A 53-year-old white female presented with a complaint of a "beet red" left eye and twinges of severe eye pain when moving the eye in a lateral direction over the past two months. She also complained of visual blur, whether focusing at distance or near. She was concerned that she had perhaps inadvertently rubbed facial moisturizer into her eye.

Three years earlier, this patient had undergone uncomplicated cataract surgery in her left eye. She had a history of multiple sensitivities to topical and systemic medica-

tions and was therefore anxious about any type of treatment for her condition.

• ***Diagnostic data.*** Visual acuity in the left eye, which had previously been best-corrected to 20/25-, now measured 20/50 with pinhole. Biomicroscopy examination revealed a diffusely edematous cornea and an eroded limbal corneal suture at the large cataract incision. The site of the eroded suture was also deeply infiltrated with a 2+ cellular reaction in the anterior chamber. In addition, there was sectoral engorgement of conjunctival vasculature along with early corneal neovascularization pointing to the infiltrate.

• ***Diagnosis and management.*** This patient had a peripheral, sight-threatening corneal ulcer following cataract surgery in the left eye.

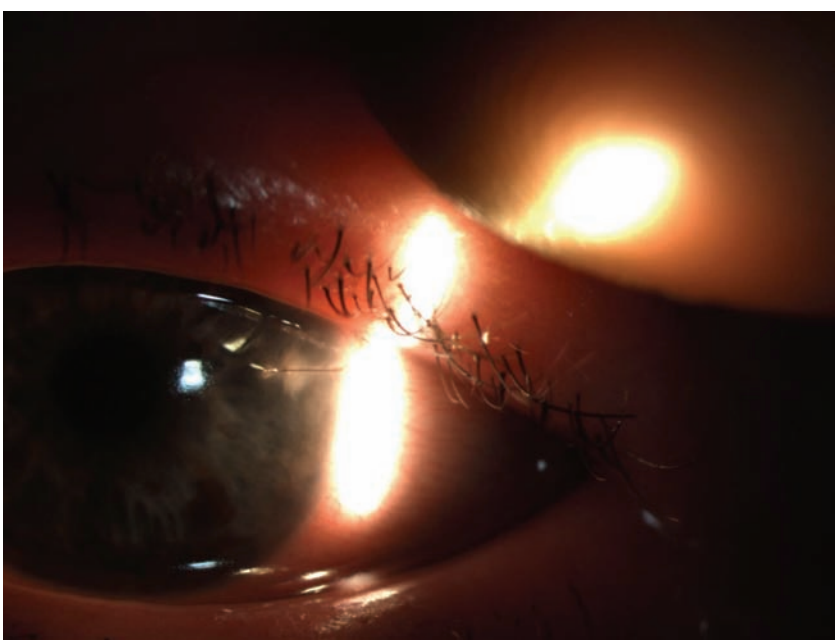
We needed to remove the suture. Because it was sight threatening, a same-day corneal culture with agar plating was initiated. The suture was placed in a thioglycolate broth tube and sent out to the lab.

We considered fortified antibiotics, but decided against them due to the patient's history of sensitivities and allergies. Instead, we treated her every hour with AzaSite (azithromycin 1%, Akorn) and Zymaxid (gatifloxacin 0.5%, Allergan), both of which she had tolerated in the past.

The lab report came back the next day identifying *Staphylococcus aureus*, so we discontinued AzaSite. The ulcer proceeded to respond well to the topical fluoroquinolone treatment.

• ***Discussion.*** Most in-situ corneal sutures we encounter are monofilament nylon. This material has a characteristic black and shiny look. These sutures weaken with time but do not biodegrade. Sometimes we see sutures made of Vicryl (polyglactin, Ethicon), which are eventually absorbed by the body.

Knowing when and why the surgeon has used corneal sutures is the key to determining whether to remove them.



Eroded limbal suture resulting in infectious keratitis following cataract surgery.

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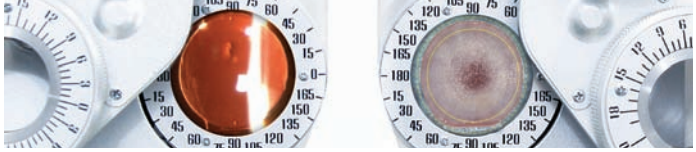

Most of the time, postoperative cataract patients in our office have undergone clear-corneal incision cataract surgery, which usually does not require a suture. Occasionally, a surgeon reinforces one of these incisions with a small limbal stitch to ensure that the wound does not leak. Keep in mind that its presence does not indicate that there was a perioperative complication.

Issues involving IOL malposition, when detected in the immediate postoperative period, are considered to be urgent referrals.

Common postsurgical practice supports removing these sutures at about one month after surgery. The sutures can remain in for longer, but most doctors recommend removal before three months.

Sutures that induce corneal astigmatism may prompt more immediate removal. Larger incisions or multiple interrupted sutures in one area may require multiple office visits for more strategic and delayed removal.

Eroded corneal sutures notoriously cause patient discomfort and often lead the patient to come in urgently. They should always be removed unless there is concern about an open globe. As this case demonstrates, untreated, eroded or broken sutures can lead to corneal ulcers and corneal neovascularization. This supports studies that claim short-term prophylactic antibiotic treatment is indicated following suture removal.[7]

Be sure to contact your surgeon if you have any doubt about when or how to extract such corneal sutures.

Postoperative care provides an engaging and rewarding opportunity to practice at the full scope of our profession. Critical to this care is a solid understanding of unforeseen medical complications with associated treatment regimens, as well as the ability to manage patient expectations.

For any sight-threatening medical postoperative complication, be sure to promptly notify the surgeon and refer the patient back. In addition, postoperative complexities regarding refractive visual outcomes should also be returned for an enhancement consultation.

Issues involving IOL malposition, when detected in the immediate postoperative period, are also considered to be urgent referrals. This offers the surgeon more flexibility with retreatment options and can ultimately lead to better patient outcomes with reduced chair time. ■

Dr. Jones practices at Northwest Eye Surgeons, a surgical subspecialty office in Seattle, WA.

Dr. Talley Rostov is a partner and a cornea, cataract and refractive surgeon at Northwest Eye Surgeons.

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Smooth Your Transition to EHR

It's been a shotgun wedding. Could a little more attention make it a happy marriage? Here's how to get through the rough patches. **By Brett M. Paepke, OD, and Jason R. Miller, OD**

Left to our own devices, far fewer doctors would have taken on the Herculean task of converting from paper to electronic records so quickly and abruptly. Such is the power of a federal mandate. As with any change that's forced rather than voluntary, mistakes and frustrations are inevitable. But to thrive in a busier and more competitive future, we need to embrace new ideas that might set us up to be better, more productive clinicians. Electronic health records (EHRs) are at the foundation of this transformation.

The primary goals of EHR implementation include improving practice efficiency through paperless workflow, enhancing access to patient data to support clinical decision making and increasing patient compliance through education. You gain an organized office with accurate data at each workstation and support the practice's financial health by reducing Rx remakes and transcription errors.

Many eye care providers have already implemented or are looking to integrate EHRs into their

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practices. But both new EHR converts and prospective ones must be educated about common concerns when merging their software into their daily work life. From esoteric rules governing meaningful use (MU) milestones to everyday snafus, we will outline these issues and offer the most effective solutions.

Meaningful Use

The term *meaningful use* generates a wide array of emotions—resentment, frustration, perhaps worries about government oversight and hopefully also a bit of positive anticipation for a better future—but, in reality, MU just requires minor modifications to the way we already do things. For example, a few core requirements in Stage 1 ask providers to document things like problem lists, patient demographics, active medications and medication allergies. We all have done this from day one of our training, but the move to an EHR requires providers to become familiar with how each piece of data is added to the patient's record.

Stage 1 MU challenges providers because of its inability to let us see how changes we make today translates to improved patient care. It can help to think of the MU program as a "crawl-walk-run" scenario.

Stage 1 represents the crawling phase, where data gets captured and recorded properly. If certain parts of a patient record are not documented in a specific way, it can compromise the ability to electronically exchange that data with others so it can be incorporated into the recipient's system.

Thus, jumping right into the exciting parts, where data gets shared among providers, would be running before you can crawl.

With that in mind, here are some of the Stage 1 objectives that tend to

present bigger challenges to providers moving from paper records:

1. Clinical Summaries

The goal: More than 50% of encounters should end with the patient receiving an official document summarizing data from the visit within three days.

The challenge: Potential change to checkout procedures required to provide patients with the summary.

Things like active medications, medication allergies, diagnoses and associated care plans allow patients and their families to better understand the visit, as well as provide them with a document they can take to other health care providers.

Today's Meaningful Users know this as a document they traditionally printed out for patients, but the advent of personal health records (PHRs) and portals allow for electronic delivery by pulling the relevant data directly from the patient's encounter in the EHR. For example, a patient can log into their PHR and generate a clinical summary of their previous visits whenever they desire. Additionally, secure messaging systems allow providers to exchange the electronic form of these documents with each other and drop medication lists, medication allergies and diagnoses right into the patient's record in their EHR.

2. Patient Electronic Access

The goal: More than 50% of unique patients need to have online access to their health information within four days of their visit.

The challenges: Patient acceptance; workflow modification required to assign and dispense online access credentials.

While assigning usernames and passwords to patients seems easy, doing so takes a good deal of effort. A patient who sees no value in electronic access will simply refuse or discard their credentials. While this won't count against the provider for Stage 1, it makes the patient an impossible target for increased expectations in Stage 2.

Functionality can vary between EHR vendors, but connecting the practice to personal health records allows patient access to the information in their medical record. This promotes patients' involvement in their own care and supplies other doctors with valuable clinical information. For example, if a patient tells her primary care physician that her eye doctor is treating her for a condition, but isn't sure of the medication name or diagnosis, the patient can access her PHR and provide the latest clinical summary to her PCP.

Office meetings should be held to determine the optimal point of the encounter for delivery of credentials as well as the proper approach to promotion.

It can help to think of PHR promotion in the same regard as dispensary sales. There are practices that excel at anti-reflective lens dispensing; if their techniques are explored, they undoubtedly promote and recommend the technology at multiple points in the encounter.

For example, everyone in the practice who wears glasses likely has anti-reflective lenses, the doctor prescribes them from the exam room, the opticians follow through with their own recommendations, there might be in-office promotional materials, and so on. The net effect is that the value of AR-coated lenses increases through each stage

Taking the First Few Steps Without a Giant Leap

Even the staunchest supporters of EHR concede that temporary scheduling modifications need to be considered prior to the "go live" date. This will allow the entire office staff some extra time per patient during the first few days or weeks to get acclimated to differences in documentation and workflow. Without this adjustment, the potential for falling behind and getting frustrated increases significantly. There is just no escaping the fact that changing the way a provider has documented care for their entire career represents a big challenge.

Many providers note initial decreases in workflow efficiency when manually entering their findings into a computer, and difficulty maintaining a sense of engagement with the patient while doing so. Perhaps this represents an opportunity, though, to take advantage of efficiency boosters such as scribes and/or equipment integrations. For sure, the transfer of data at the push of a button allows greater accuracy and an even better patient experience than transcribing findings onto paper.

To prepare users for the transition, EHR vendors may offer a demo or "sandbox" environment where new customers can practice and learn how to customize their production environment with their preferences. This can be a perfect time to give staff and family members their long overdue eye exams while they serve as demo patients. With proper preparation, practice and planning, any initial slowdown can be short-lived.

of the visit. What would happen to sales if the office simply handed the patient a brochure? Quite often, the latter approach is taken with PHR promotion. The low levels of patient use that result will ultimately come back to haunt the provider in Stage 2.

3. Medication Reconciliation

The goal: More than 50% of patients transitioned/referred into the provider's care need to have medication reconciliation performed.

The challenge: Obtaining an official, accurate list of a patient's medications.

Gone are the days of a patient handing over a Post-It note with a few medications scribbled on it. Meaningful Use steps up the expectations on providers to maintain accurate and up-to-date lists of their patients' medications. Why? Accuracy of the med list is not only important to the care of the patient in the practice, but also for the clinical documents that get shared between providers in MU.

As a Menu objective, medication reconciliation involves the use of an official medication list to populate or update the list in the EHR. To ensure success, notify all front office staff who answer telephones of this need when scheduling an inbound referral. Often, that call will originate from the referring provider's office that can provide the list or Summary of Care document immediately. This avoids tracking down a medication list at the time of the encounter.

4. Transition of Care Summary

The goal: More than 50% of patients transitioned/referred out of the provider's care need to have a Summary of Care document sent to the receiving provider.

The challenge: Workflow modification during the referral process.

This objective is complementary to medication reconciliation, as the Summary of Care document contains the active medication list needed for review and a summary of previous procedures, medication allergies, diagnoses and other pertinent information useful to the patient's care.

To meet this Menu objective, providers need to generate a Summary of Care document in the EHR and include it with any other materials that they typically provide during a referral. Certified EHRs make this process straightforward as the document is critical to data sharing. However, the challenge is making this additional step in the referral process routine.

5. Record Vital Signs

The goal: More than 50% of unique patients of any age need to have their height and weight documented, and 50% of patients older than three must have their blood pressures documented.

The challenge: Deciding how to report on objective; modification to exam testing protocol.

The measurement and documentation of vital signs (e.g., blood pressure, height/weight) represents one of the biggest potential changes for eye care providers. Philosophically, optometrists need to decide if and how vital signs pertain to the care they provide. Logistically, how, when and where these vital signs are documented during an encounter must be considered.

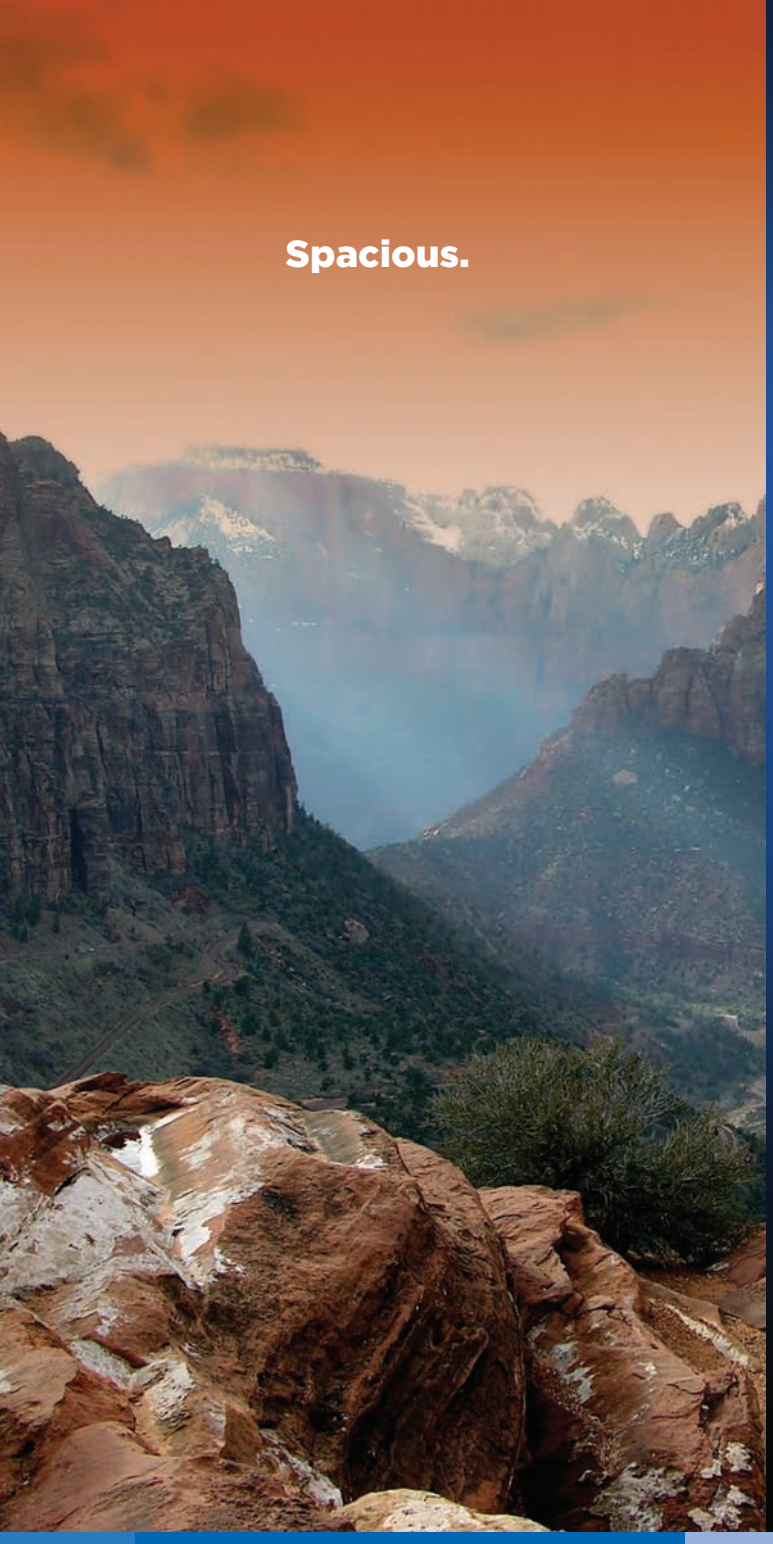
Opinions abound regarding ODs and the vital signs objective, but make no mistake: all eligible professionals are held to the same objectives in MU and there are no specialty-specific exclusions. The

Auto-Coding Doesn't Mean Correct Coding

EHRs allow you to automatically code an encounter. While this is a nice feature, be aware that auto-coding engines simply tally the number of elements addressed in the EHR during the encounter. Auto-coding features have no way to consider the actual medical necessity of those elements as they relate to the Reason for Visit. As a result, auto-coding features alone don't guarantee the codes generated are appropriate or will pass an audit.

As an example, imagine a patient presenting for emergency care whom the optometrist saw one week earlier for a comprehensive encounter. Does the Reason for Visit at the second encounter require a comprehensive review of systems or an update to past, family and social history? The temptation is to pull that data forward from the previous visit so all the fields in the EHR are completed. However, the medical record needs to reflect what was actually performed during the course of the encounter. If a review of systems isn't pertinent to the Reason for Visit, it shouldn't be performed or populated in that encounter. An encounter with more fields populated than necessary to address the Reason for Visit will reflect an artificially high CPT code for the visit when auto-coded.

So while auto-coding has its place, it shouldn't be relied upon to replace a provider's coding knowledge. In instances where the EHR precisely reflects what the provider deemed necessary for the care of the patient based on that day's Reason for Visit, however, auto-coding will produce the proper code.



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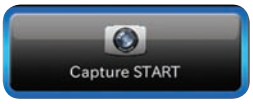

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A Crash Course on Meaningful Use

To encourage EHR adoption and ease the financial burden on practices, CMS currently provides incentive payments to doctors who "meaningfully" use certified electronic health record technology (CEHRT). The payment program is winding down, however; 2014 is the last year a practice can start Meaningful Use (MU) and become eligible for incentive payments.[1]

Eligible professionals must demonstrate MU yearly and meet a number of goals and objectives in three stages, each with increasing requirements, to receive incentive payments and, soon, to avoid penalties. Providers who have not participated and attested to MU by October 1, 2014 will be subjected to a 1% reduction in Medicare reimbursements in 2015, with an additional 1% taken away for each subsequent year they do not demonstrate meaningful use (the penalty eventually maxes out at 3% to 5%).[1]

To meet the MU requirements in the first year, you must comply with goals and objectives for 90 consecutive days to garner incentive payments. Every year after that, you must complete the required objectives for the full year. Note that 2014 represented a small change to this as CMS allowed all providers to report over a 90-day period, again in an effort to allow EHR vendors to get 2014 certified products into the hands of their users.

Examples of Stage 1 and 2 core and menu objectives for EPs are outlined in the table below. A full list of objectives can be found on the CMS website. Stage 3 will not begin until 2017 at the earliest and the final rules are not yet available.[2]

New Rule for Deadlines

Originally, the deadline for beginning stage 2 or 3 was after meeting the objectives of stage 1 or 2 for two years. However, modifications to this timeline ended up in Stage 2 starting in 2014 for EPs that had successfully attested to Stage 1 in 2012 or earlier, and Stage 3 getting delayed until 2017. The net effect is that providers who began the MU program in 2011 followed Stage 1 criteria for three years and will likely do the same for Stage 2.

To add slightly more confusion to the timelines, CMS decided to allow the option to providers scheduled for Stage 2 in 2014 to attest to Stage 1 objectives again if they were unable to "fully implement" 2014 CEHRT due to delays in availability.[5]

1. Medicare and Medicaid EHR Incentive Program Basics. Available at: www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Basics.html.
2. Meaningful Use Work Group. Draft Recommendations Meaningful Use Stage 3. Available at: www.healthit.gov/facas/sites/faca/files/muwg_stage3_draft_rec_07_aug_13_.v3.pdf.
3. Centers for Medicare and Medicaid Services. Core and Menu Set Objectives Stage 1 (2014 Definition). Available at: www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/EP_MU_TableOfContents.pdf.
4. Centers for Medicare and Medicaid Services. Stage 2 Overview Tip Sheet. Available at: www.cms.gov/regulations-and%2520guidance/legislation/ehrincentiveprograms/downloads/stage2overview_tipsheet.pdfhttps://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/Stage2Overview_Tipsheet.pdf.
5. Stage 2 Final Rule. Available at: www.gpo.gov/fdsys/pkg/FR-2014-09-04/pdf/2014-21021.pdf.

	2011	2012	2013	2014	2015	2016	2017	2018
2011 first year of MU	Stage 1	Stage 1	Stage 1	Stage 2*	Stage 2	Stage 2	Stage 3	Stage 3
2012 first year of MU		Stage 1	Stage 1	Stage 2*	Stage 2	Stage 2	Stage 3	Stage 3
2013 first year of MU			Stage 1	Stage 1	Stage 2	Stage 2	Stage 3	Stage 3
2014 first year of MU				Stage 1	Stage 1	Stage 2	Stage 2	Stage 3

**Eligible for Stage 1 again if provider attests to inability to "fully implement 2014 Edition CEHRT for an EHR reporting period in 2014 because of issues related to 2014 Edition CEHRT availability delays."[5]*

	Stage 1[3]	Stage 2[4]
Completion of:	• 13 required core objectives • 5 menu objectives from a list of 9 • Total of 18 objectives	• 17 core objectives • 3 menu objectives from a total list of 6 • A total of 20 objectives
Core Objectives	• Use CPOE for medication orders directly entered by any licensed healthcare professional who can enter orders into the medical record per state, local and professional guidelines. • Implement drug-drug and drug-allergy interaction checks. • Maintain an up-to-date problem list of current and active diagnoses.	• Use secure electronic messaging to communicate with patients on relevant health information. • Perform medication reconciliation for transitions of care in which the patient is transitioned into the care of the EP. • Provide summary of care record for each transition of care or referral.
Menu Objectives	• Implement drug formulary checks. • Incorporate clinical lab-test results into EHR as structured data. • Generate lists of patients by specific conditions to use for quality improvement, reduction of disparities, research or outreach.	• Record electronic notes in patient records. • Imaging results accessible through CEHRT. • Record patient family health history.

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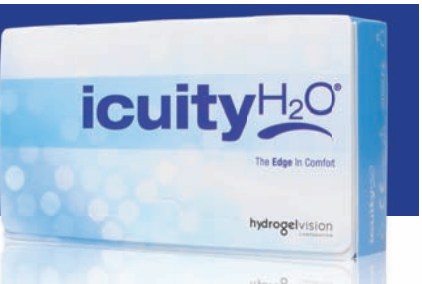

only exclusions available are for eligible professionals who believe that the documentation of blood pressure, height/weight or both are not relevant to their scope of practice.

6. Protect Electronic Health Information

The goal: Perform a security risk analysis addressing how the practice protects electronic health information.

The challenge: Investment of resources (e.g., time and money).

As a key component of both a solid HIPAA security policy and Meaningful Use attestation, the security risk analysis forces the provider to look for potential weaknesses in how their practice safeguards electronic protected health information (ePHI). Not only does the EHR system need to be considered, so too must any ePHI that might reside elsewhere in the practice (such as diagnostic equipment databases). When risks and deficiencies are identified, a risk mitigation plan must be designed, implemented and monitored with appropriate documentation.

A common example that turns up through the course of a security risk analysis is the presence of unsecured hard drives connected to diagnostic equipment like perimeters, cameras and OCTs. Even if a workstation is password protected, a drive can be stolen and easily hooked up to another computer, allowing ePHI to be accessed. Risk mitigation for this scenario might involve plans to employ full disk encryption for all data; documentation would be maintained to show how and when this was acomplished.

Achieving Meaningful Use Through Team Meetings

While the provider is considered the Meaningful User, full staff participation is required for success.

MU-related meetings should begin in advance of the planned start date of the reporting period and should involve a discussion of each objective, how it will be accomplished in the office and who is responsible. Have a discussion of "why" each objective is significant to the care of the patient to foster staff understanding. Many practices find weekly meetings leading up to the start of the reporting period offer the greatest benefit.

Soliciting input from the entire team can be extremely beneficial. For example, during the discussion of assigning PHR access to a patient, the decision needs to be made about the best point of delivery and discussion of these credentials. While the provider might feel compelled to make that call, the front office staff likely knows better.

Appointing an "MU Lead" can also be helpful. This would ideally be a self-motivated staff member with an interest in leading the practice's MU educational efforts. They would be responsible for keeping abreast of any changes or challenges that arise and coordinating efforts to overcome them.

Once the MU reporting period has started, a review of the MU "scorecard" (part of all CEHRT) can be incorporated into meetings to serve as a barometer of progress. This allows success to be praised and particular areas of weakness to be identified and remedied. Without initial frequent review of statistical performance, fixing problem areas can be difficult.

While there is no requirement that a practice outsource this undertaking, the scope of the security risk analysis can be daunting. Thus, providers may wish to enlist an experienced third party to offer guidance and assistance with the process.

Auto-Populating

With ICD-10 around the corner and the Centers for Medicare & Medicaid Services (CMS) performing regular audits, it is important to continually improve record keeping. Specifically, we will discuss the "copy/paste" feature of many EHR systems.

• ***Remember, there is a time and place for a copy or paste.*** Copying and pasting has been termed "auto-populating" or "cloning." The 1997 Documentation Guidelines permit use of data gathered at an earlier visit as long as the information is germane to the visit and it's clear the physician actually looked at the data that was forwarded from the previous record.

• ***Review information from earlier visits.*** You can demonstrate this with an audit log in the EHR, a check box or signature that the information was reviewed—for example, if you go back and review information from an earlier visit and even bring some of it forward with a note that states: "no changes from previous exam dated _____," with the doctor's initials.

• ***Record what you actually do.*** "Information germane to the visit" means that data cannot be brought forward for the sole purpose of improving the level of coding.

Anticipate and Overcome

No transition from paper to digital records will be entirely free of setbacks. But with preparation and staff participation, you'll be able to anticpate the stumbling blocks and move past them more smoothly. ■

Dr. Paepke practices at FirstView Eye Care Associates in Plattsburgh, New York. Dr. Miller is a partner at EyeCare Professionals of Powell, Ohio, and serves as an adjunct faculty member for the Ohio State University College of Optometry.

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REVIEW® OF OPTOMETRY

A Simple Switch Solves a Curious Case

Christine Sindt, OD, FAAO

Sensitivity to the disinfectant preservatives in multi-purpose solutions can detrimentally impact the contact lens wearing experience. When this happens, CLEAR CARE® Cleaning & Disinfecting Solution is a simple, reliable problem-solver for many patients.

An 18-year-old man with an unusual medical history had a toric contact lens fit in our clinic for his right eye only. While the patient had never before worn a contact lens and had no ocular health problems, he did have a chromosomal abnormality, which manifested in, among other things, poor eye tracking. As a result of our refractive findings, we decided to correct the right eye with a contact lens for distance and leave the left eye uncorrected for near vision.

We selected a silicone hydrogel toric contact lens with a 2-week replacement frequency and instructed the patient to use a branded multi-purpose disinfecting solution (MPDS)—providing a sample and lens case to start him out.

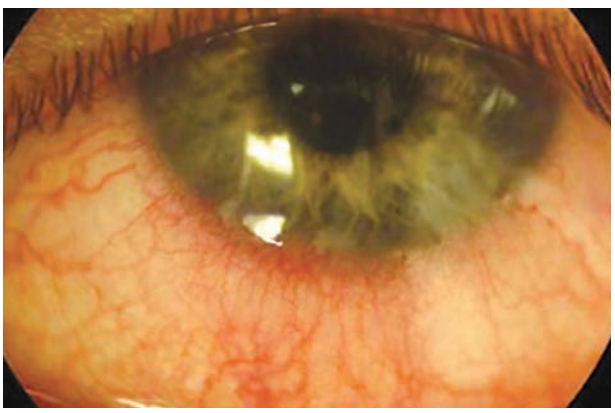

FIGURE 1 Eye with inflammatory limbitis, which can present as an unusually severe allergic reaction to the preservatives in multi-purpose disinfecting solutions. *(Photo courtesy Christine Sindt, OD.)*

Unexpected Reaction

When the patient returned for follow-up at 2 weeks, he presented with a very red, itchy, and uncomfortable right eye (Figure 1). On slit lamp examination, the pattern of redness and associated neovascularization suggested an inflammatory limbitis. The patient reported wearing, rinsing, and storing lenses as instructed, and both the lens fit and the lens condition were within normal limits. So we turned our attention to the care solution.

Some probing into the patient's history revealed that several members of his family had experienced allergic reactions to MPDS preservatives in the past. Given the presentation and the history, we concluded that this patient's signs and symptoms were most likely a consequence of the care system rather than of the lens.

While daily disposable lenses are an excellent choice for patients with solution sensitivity issues, in this case the need for toric correction limited the daily disposable lens options available at the time. So instead of removing solutions altogether, we decided to remove the issue of disinfectant preservatives by switching the patient to CLEAR CARE® Solution.

CLEAR CARE® Solution provides the strong disinfection and deep cleaning of hydrogen peroxide but neutralizes into a gentle, preservative-free saline solution. As a result, contact lenses are left feeling more like new, ocular tissues are not compromised by residual preservative, and wearers experience enhanced comfort on insertion and longer asymptomatic wear—very similar to daily disposable lenses.[1]

Switching to CLEAR CARE® Solution

- While significant hypersensitivity is rare, some patients may experience subtler irritation from disinfectant preservatives in multi-purpose solutions
- Making a switch to CLEAR CARE® Solution often improves comfort—and delivers proven antimicrobial efficacy[5,6]
- At the end of the disinfecting cycle, CLEAR CARE® Solution leaves very little residual peroxide—well below the ocular awareness threshold[3,4]
- Using CLEAR CARE® Solution is simple, but patients benefit from careful instructions about how it differs from multi-purpose solutions

Why CLEAR CARE® Solution?

The powerful disinfection of hydrogen peroxide makes CLEAR CARE® Solution effective—even in the presence of bacterial and fungal biofilms. Organisms in biofilms are often much harder to eradicate than free-floating ("planktonic") forms of the same species. However, studies have found that microorganisms in

biofilms on worn contact lenses that were resistant to many lens care solutions were susceptible to CLEAR CARE® Solution.[2]

While hydrogen peroxide gives it excellent disinfecting power, CLEAR CARE® Solution is also a gentle solution because, by the end of the disinfection cycle, the peroxide has been broken down into a gentle saline solution. When used as directed, the unique, patented CLEAR CARE® Solution is specifically formulated to leave extremely low levels of residual peroxide—well beneath the ocular awareness threshold—in the case after lens soaking, so lenses can be safely and comfortably inserted.[3,4] CLEAR CARE® Solution also contains the proprietary surfactant Pluronic 17R4 which enhances lens cleaning.

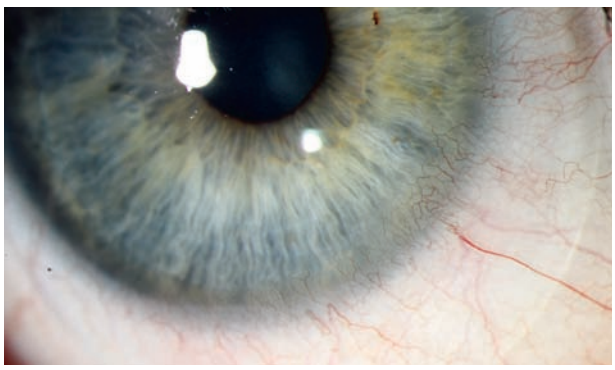

FIGURE 2 This patient's eye after switching to CLEAR CARE® Solution. Redness and pain have resolved, leaving just a small amount of neovascularization about the limbus.
(Photo courtesy Christine Sindt, OD.)

A Clear Difference

After 2 weeks with a fresh lens and a switch to CLEAR CARE® Solution, the patient returned with his inflammatory signs and symptoms greatly diminished (Figure 2). The affected eye was white and quiet, except for a thin residual pannus in the limbal area. This was unsurprising, given the strength of the patient's initial reaction.

Indeed, this level of preservative allergy is extremely rare; in my years of practice, I have seen only two cases with a reaction of this level. But less severe sensitivity to MPDS preservatives, while not common, often presents subtly as vague dryness and itching, with some injection and edema of the bulbar conjunctiva and perhaps a mild papillary reaction on the palpebral conjunctiva.

Whether it manifests as a significant hypersensitivity, as in this patient's case, or as a milder irritative reaction, it is useful to take a systematic approach to helping the patient with contact lens discomfort. We do this by changing one aspect of the lens/lens care system at a time, starting with what we believe to be the most likely culprit. Changing the lens, the solution, and modality of wear all at once may solve the problem, but this approach will yield no useful information about which element was the main contributor. As this case illustrates, the contact lens care solution may well be the source of contact lens-related problems—and switching solutions is generally the easiest change to make.

Patient Counseling

When I talk to patients about switching from an MPDS to CLEAR CARE® Solution—nearly always in situations far less acute than this one—I discuss the advantages of its cleaning efficacy and of its neutralization into a gentle saline solution. I let patients know that the preservative disinfectants in some MPDSs can irritate the ocular surface and that the reason for changing solutions is to limit that effect.

I then go carefully, usually with the support of my contact lens technician, over the instructions for using CLEAR CARE® Solution, emphasizing the necessity of avoiding direct exposure to unneutralized peroxide and the importance of faithfully replacing the lens case, always using fresh solution, and soaking lenses for at least 6 hours. I think the level of instruction and the seriousness we convey with our instructions helps heighten patient awareness of the importance of lens care and encourages compliance.

Outside of extraordinary cases like this one, asking and talking about contact lens solution use allows us to make sure patients understand that the solution they use is important to us—and to their enjoyment of contact lens wear. Emphasizing patients' comfort and safety, and taking the time to make them conscious of the importance of lens care, helps patients view lens care as important and then to act accordingly.

Christine Sindt, OD, FAAO, is director of the contact lens service and a clinical associate professor of ophthalmology and visual sciences at the University of Iowa, Iowa City, IA.

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When the Retina Reveals a Blood Disorder

The majority of anemias, hemoglobinopathies and hematological malignancies have retinal manifestations. Here's what you need to know when you see one.

By Rim Makhlouf, OD

The retina—a tissue pervaded by blood vessels—is prone to disorders that affect the blood. These blood (or hematological) disorders include anemias, hemoglobinopathies and hematological malignancies, which have been known to cause significant ocular complications. In fact, they can lead to ocular manifestations in up to 90% of cases.[1]

Sometimes these ocular findings are the presenting symptom of the disease.

This article discusses such conditions and their retinal manifestations.

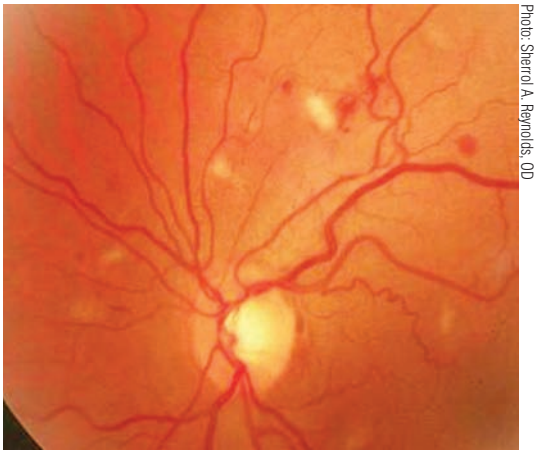

Photo: Sherrol A. Reynolds, OD

Retinopathy in a patient with severe anemia. Note the retinal hemorrhages, cotton-wool spots and venous tortuosity.

Anemias

Anemia is a common blood disorder in which a person's blood has a lower-than-normal number of red blood cells (RBCs) and can occur if the RBCs don't contain enough hemoglobin. Hemoglobin is an iron-binding protein found within RBCs that carries oxygen from the lungs to the rest of the body. Thus, anemia can lead to hypoxia.

Causes of anemia include impaired RBC production, increased RBC destruction,

Release Date: October 2014
Expiration Date: October 1, 2017
Goal Statement: Hematologic disorders can have retinal manifestations, some of which may lead to severe vision loss, including blindness. While retinal manifestations of hematological disorders may be asymptomatic, they may also be the presenting symptom of a serious underlying systemic disease. This course describes such retinal manifestations, and explains how to handle them, if encountered.

Faculty/Editorial Board: Rim Makhlouf, OD
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and acute or chronic blood loss. It can also stem from nutritional issues such as iron, vitamin or folate deficiency. Anemia is typically diagnosed using a complete blood count (CBC) analysis, which measures the number of RBCs and the hemoglobin level, while its classification is determined by flow cytometry, which measures the size of RBCs.

Posterior segment findings: Anemic retinopathy typically presents with retinal hemorrhages, Roth's spots, cotton-wool spots and retinal edema. Roth's spots are white-centered hemorrhages often associated with bacterial endocarditis, but they can also occur in other conditions. The white center could represent coagulated fibrins, including platelets, focal ischemia, inflammatory infiltrates, infectious organisms or an accumulation of neoplastic cells.[2]

Other findings may include preretinal or vitreous hemorrhage and macular star. Retinal vessels usually appear normal, although pale arterioles and dilated vessels may be seen. The prevalence of some degree of retinopathy is about one-third in anemic patients and increases with the severity of anemia and presence of thrombocytopenia, a disorder of low platelets. In fact, concomitant severe anemia and thrombocytopenia have been found to be an important risk factor for developing retinopathy.[2] Vision is usually not affected unless the macula is involved.

Optic neuropathy with cecocentral scotomas may occur in patients with pernicious anemia, which is a condition in which the body can't make enough healthy RBCs because it doesn't have enough vitamin B_{12}. These ocular changes are nonspecific and may closely resemble diabetic or hypertensive retinopathy. The critical blood levels below which retinopathy may occur are a hemoglobin concentration of 8g/dL and a platelet concentration of <50 × 109/L.[3]

While the pathophysiology of anemic retinopathy is not fully understood, it seems to be related to: retinal hypoxia, which is a known potent stimulus to the dilation of retinal veins; venous stasis, which contributes to capillary engorgement, increased fragility and resulting bleeding; angiospasm, a spasmodic contraction of the blood vessels with increased blood pressure; and increased capillary permeability.[4] Despite all of this, anemic retinopathy can be reversed by treating the underlying anemia.

Hemoglobinopathies

Hemoglobinopathies constitute a heterogeneous group of hereditary hemoglobin disorders characterized by either defective (e.g., sickle cell disease) or reduced (e.g., thalassemias) globin chain synthesis, which results in chronic hemolytic anemia.[5]

• ***Sickle cell disease (SCD).*** This is a prevalent genetic disorder in the United States and has an autosomal recessive mode of inheritance. It is mostly found in populations of African descent and results from a single mutation in the beta-globin protein, an important constituent of hemoglobin found within RBCs. When the latter are exposed to unusual conditions such as hypoxia, hyperosmolarity or acidosis, their mutated hemoglobin polymerizes, rendering the sickled RBC rigid and non-deformable.

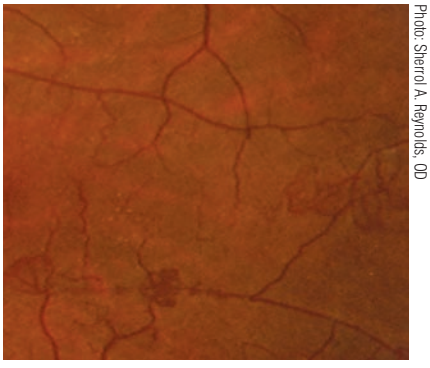


Photo: Sherrol A. Reynolds, OD

Sea-fan neovascular formations can occur in patients with proliferative sickle cell retinopathy.

Although historically thought of solely as a disorder of the RBCs, SCD is actually a multifactorial disease that also involves interactions between RBCs, the vascular endothelium, vasoactive factors and other blood cells. The increased adhesion of sickled RBCs to the vascular endothelium, for example, is known to add to the damage from the mechanical obstruction of the blood vessels. Furthermore, recent evidence suggests that SCD is also an inflammatory condition, a procoagulant condition, a proangiogenic condition and a vasculopathy, all of which contribute to the vaso-occlusive phenotypic expression of the disease.[6]

Posterior segment findings: Vaso-occlusive phenotypes of SCD, including sickle cell retinopathy, are likely the result of chronic vasculopathy induced by sickled RBCs as well as other extrinsic factors. SCD retinopathy primarily involves the retinal vasculature and can be classified into non-proliferative and proliferative states. SCD-associated ischemia may involve both the posterior pole, including the macula, and the peripheral retina. The peripheral retina is usually more prominently affected than the posterior pole. Retinal vascular occlusions typically occur in the peripheral retina, where the vessels may terminate abruptly as hairpin loops.[6]

In children, only arterioles and capillaries are occluded, whereas both arteries and veins occlude in adults. Possible explanations include the implication of more than just sickled red blood cells, such as endothelial activation and other factors mentioned earlier, and the

possible presence of repeated vascular events in adults in comparison to children.

For the same reasons, posterior pole retinal vascular occlusions, such as central retinal artery occlusion (CRAO), branch retinal artery occlusion (BRAO) and submacular choroidal infarction, are more common in adults.

The macula may be affected by abnormal perfusion due to vaso-occlusive episodes that may progress to ischemia and enlargement of the foveal avascular zone (FAZ), which are typically detected using fluorescein angiography. Macular infarcts appear as retinal thinning on optical coherence tomography. Other macular findings may include epiretinal membranes, schisis, holes and, rarely, posterior pole neovascularization.[6]

Common, associated non-proliferative findings include angoid streaks, salmon patch hemorrhages, intraretinal hemorrhages, iridescent refractile deposits, black sunburst lesions and peripheral venous tortuosity.

The etiology of angoid streaks in SCD is unknown. Salmon patch hemorrhages are named after their color, and they represent peripheral circumscribed preretinal hemorrhages between the sensory retina and the internal limiting membrane in front of the retinal vasculature. Iridescent refractile deposits represent hemosiderin-laden macrophages and their presence is associated with a resolved salmon patch or intraretinal hemorrhage. When an intraretinal hemorrhage tracks into the subretinal space, it triggers a retinal pigment epithelium reaction with stellate and spiculate hyperpigmentation, known as black sunburst lesion. Most of these complications are generally asymptomatic.

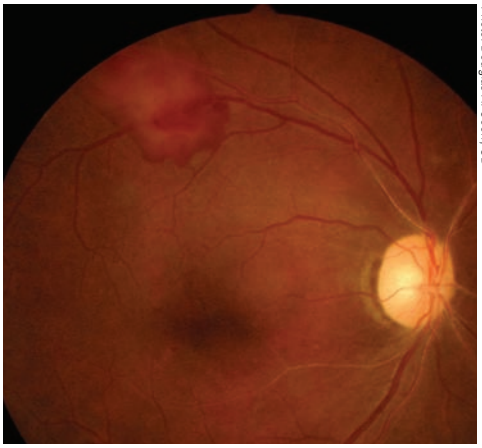


Photo: Douglas A. Coon, OD

Salmon patch hemorrhage is a common associated non-proliferative finding in patients with sickle cell disease.

Neovascular formations, or sea fans, arise from areas of abnormal arteriovenous communications in response to hypoxia. Proangiogenic factors, such as vascular endothelial growth factor (VEGF), are believed to cause sea-fan formation because their expression is regulated by hypoxia. Sea fans leak profusely during fluorescein angiography, most likely due to the VEGF-induced increased vascular permeability. They develop at the border between the avascular and vascular retina, usually temporally. Proliferative SCD retinopathy is primarily a peripheral retina disease and may develop posteriorly with regression of the vascular arcades. New vessels are fragile and leak spontaneously, causing vitreous hemorrhages and severe vision loss. White fibrous tissue is associated with the formation of the vascular component and exerts traction on the retina, causing retinal detachments. (*See "Stages of Proliferative Sickle Retinopathy," below.*)

Treatment of SCD retinopathy aims at preventing ischemic complications, including vitreous hemorrhages and retinal detachments. The current recommended therapy is scatter photocoagulation because it destroys the ischemic retina that is responsible for the proliferative retinopathy and has fewer complications compared to other therapies such as cryotherapy and diathermy.

Currently, there is no evidence that supports active treatment for asymptomatic neovascularization or for neovascularization that does not threaten the macula, as regression can occur in 32% of cases.[6] In those cases, observation is warranted.

Stages of Proliferative Sickle Retinopathy[7]

- Stage I Peripheral arteriolar occlusions
- Stage II Peripheral arteriolar-venular anastomoses (hairpin loops)
- Stage III Neovascular and fibrous proliferations (sea-fan lesions)
- Stage IV Vitreous hemorrhages
- Stage V Retinal detachments

Hypercoagulable States

Normal blood clotting occurs when an adequate balance exists between inhibitors and activators of coagulation. Deficiencies that result in disruption of this normal balance may lead to an abnormal state of hypercoagulability, which in turn leads to thrombotic disorders manifested as intravascular clotting. Clinically, the hypercoagulable states, or blood-clotting disorders, are associated either with an increased risk of thrombosis (pre-thrombotic states) or with a recurrent thrombosis without recognizable factors (thrombosis-prone). A hypercoagulable state is a notable finding in hemoglobinopathies.[8]

• ***Primary hypercoagulable states*** are generally *hereditary* conditions in which an anti-coagulant mechanism is defective.[9] Most common examples include anti-thrombin deficiencies, protein C deficiency,

protein S deficiency and abnormalities of the fibrinolytic system.

• ***Secondary hypercoagulable states*** are generally *acquired* disorders and are associated with underlying systemic conditions that are known to increase the risk of thrombosis. Acquired conditions include anti-phospholipid syndrome, malignancy, pregnancy, use of oral contraceptives, hypertension, hyperlipidemia, diabetes mellitus and abnormalities of blood vessels, such as carotid artery stenosis.

As thrombotic events are common in the older population, suspect hypercoagulable states when they present in a young patient (less than 56 years old). The most common thrombotic retinal events include central retinal vein occlusion (CRVO) and branch retinal vein occlusion (BRVO). Other possible findings include nonarteritic anterior ischemic optic neuropathy (NAION), arterial occlusions and cotton-wool spots.

In suspected patients, inquire into systemic medical history for the presence of recurrent miscarriages as well as thrombotic, vascular and occlusive events.

Whereas the risk of thrombosis in primary disorders is relatively predictable, that risk is difficult to quantify in the acquired states, as the pathophysiology is highly variable and depends on the specific underlying condition(s).

Despite this lack of uniformity, three main causes of thrombosis have been identified (Virchow's triad) and may present themselves individually or in association with each other: abnormalities in blood flow, abnormalities in blood composition and abnormalities in the vessel wall.[10]

Among the acquired hypercoagulable states, antiphospholipid and hyperviscosity syndromes merit discussion:

Ocular Disorders Due to Immunodeficiency

Human immunodeficiency virus (HIV) is a slowly replicating virus that infects vital cells in the immune system and causes acquired immunodeficiency syndrome (AIDS), a state in which the immune system progressively fails, allowing life-threatening opportunistic infections to occur. Infection with HIV occurs through bodily fluids where HIV is present as both free virus particles and as a virus within infected immune cells.

Infection with HIV predisposes ocular structures—including the retina—to a variety of infectious and noninfectious disorders:

Noninfectious Disorder(s)

Noninfectious HIV retinopathy is a microvascular disorder that rarely causes vision loss. It is characterized mainly by cotton-wool spots, but is also associated with microaneurysms, retinal hemorrhages, telangiectasia and areas of nonperfusion. These microvascular signs result from a noninfectious, occlusive microangiopathy caused by the disease and are seen in 70% of patients with advanced HIV disease, but in only 1% of patients with asymptomatic HIV infection.[1] Cotton-wool spots represent infarcts of nerve fibers, occur in approximately 50% of patients with advanced HIV disease, and are the earliest and most consistent finding in HIV retinopathy.[2] They usually don't threaten vision, although they may be associated with small visual field defects in some cases. Retinal vein and artery occlusions have also been observed in patients with HIV disease.

All these microvascular changes are nonspecific and can be found in diabetic or hypertensive retinopathy. Therefore, for patients who present with unexplained microvascular changes or retinal vascular occlusions, consider HIV testing.

Infectious Disorders

Opportunistic infections of the retina due to an immunodeficiency are less frequent but more visually significant. Cytomegalovirus (CMV) retinitis is the most common opportunistic infection in patients with HIV/AIDS. Other infections include toxoplasmosis and histoplasmosis retinitis.

• ***CMV.*** This infection is related to the viruses that cause chickenpox, herpes simplex and mononucleosis and can lie dormant in the body over long periods of time. CMV is typically unnoticed in healthy individuals, but can be life-threatening in those who are immunocompromised.

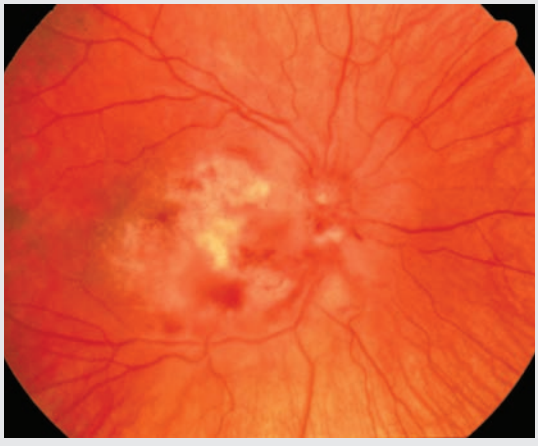


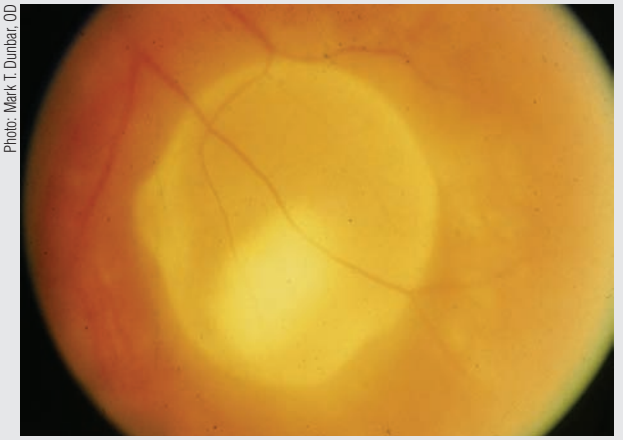
Photo: National Eye Institute, National Institutes of Health

Cytomegalovirus retinitis.

CMV retinitis is characterized by a necrotizing retinitis due to viral invasion of retinal cells, with either edematous white borders or granular white borders and various amounts of hemorrhage.[2] Areas of active infection may appear arcuate or linear. Later, atrophic tissue forms with losses and changes in the retinal pigment epithelium, resulting in increased visualization of the underlying choroidal vasculature.[3] Other findings include perivasculitis, vitritis, anterior uveitis and papillitis.

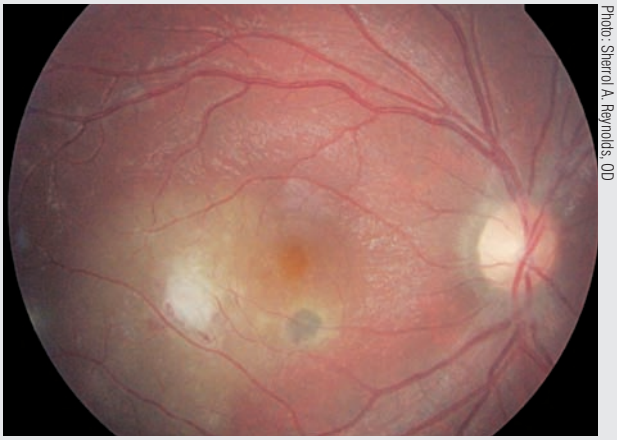
With the introduction of effective anti-retroviral therapy, the incidence of CMV retinitis has significantly decreased. Treatment consists of antiviral administration orally, intravenously or through an intravitreal injection or implant.

Photo: Mark T. Dunbar, OD



The characteristic presentation of active toxoplasmosis shows the classic "headlight in the fog" appearance of a focal necrotizing retinochoroiditis with overlying vitritis.

Photo: Sherol A. Reynolds, OD



An active, unifocal area of acute chorioretinal inflammation located adjacent or near to an old chorioretinal scar is highly suggestive of toxoplasmic chorioretinitis.

• ***Toxoplasmosis.*** Toxoplasmosis is caused by the obligate intracellular protozoan *Toxoplasma gondii* and is the most frequent cause of infectious retinitis in immunocompetent individuals.[4] This parasite can affect most warm-blooded animals, including humans, but cats are the definitive host. Infection of humans can occur by eating infected meat, by ingestion of feces of an infected cat or by transmission from mother to fetus.

In the eye, active toxoplasmosis presents as unilateral focal necrotizing retinochoroiditis, characterized by a whitish and moderately exudative lesion with ill-defined borders. Other presenting features include vitreous inflammation, mild to moderate spillover anterior uveitis and retinal vasculitis. Vitreous inflammation is responsible for the "headlight in the fog" appearance, as it may impair visualization of the fundus; however, the inflammatory focus may also be discernible. Because toxoplasmosis retinochoroiditis is a recurrent disease in the majority of patients, the solitary active inflammatory focus occurs near an old pigmented scar, commonly referred to as "satellite lesion."

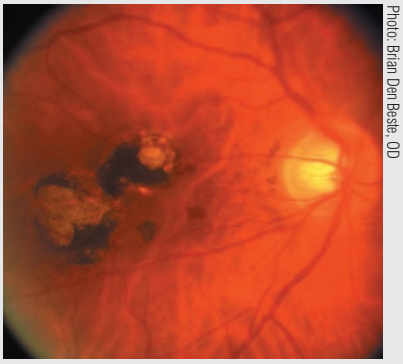
Presentation involves a sudden unilateral onset of floaters, visual loss and photophobia. Decreased visual acuity may occur as a result of macular involvement or severe vitreous inflammation. In immunocompromised patients, the infection may be more severe and rather atypical, and may show large confluent areas of retinochoroidal necrosis, active bilateral lesions and papillitis.[5]

Diagnosis of ocular toxoplasmosis is mainly made by clinical observation. Serologic tests such as serum anti-toxoplasma titers of IgM and IgG may be ordered to confirm the diagnosis, especially in atypical cases.

Prevention of initial infection is the most effective treatment strategy. Actual treatment aims at inhibiting parasite multiplication during the active period of retinochoroiditis and minimizing damage to the retina and optic nerve. The most common treatment consists of oral administration of antiparasitic and antibiotic plus corticosteroid drugs. Intravitreal injection of an antibiotic/steroid combination shows similar levels of efficiency while offering a safer regimen, as the risk for serious systemic side effects is minimized.[5]

• ***Histoplasmosis.*** This disease is caused by the fungus *Histoplasma capsultum*, found in soil and often associated with bat or bird droppings. The route of inoculation is typically respiratory. Ocular histoplasmosis syndrome has a characteristic triad consisting of multiple choroidal (or "histo") spots, peripapillary changes and choroidal neovascularization (CNV) or, alternatively, a resultant disciform scar. There is usually absence of vitreous inflammation, an important element in the differential diagnosis. The chorioretinal scars are often seen close to the posterior pole. Visual impairment is caused by the typical macular involvement of the disease. Most patients are asymptomatic unless CNV develops and involves the fovea, in which case the prognosis is generally reduced.

Photo: Brian Den Beste, OD



Chorioretinal scarring and subretinal hemorrhage in ocular histoplasmosis.

Treatment depends on location of the CNV, and may include laser photocoagulation and intravitreal injections of corticosteroids or anti-vascular endothelial growth factor drugs.

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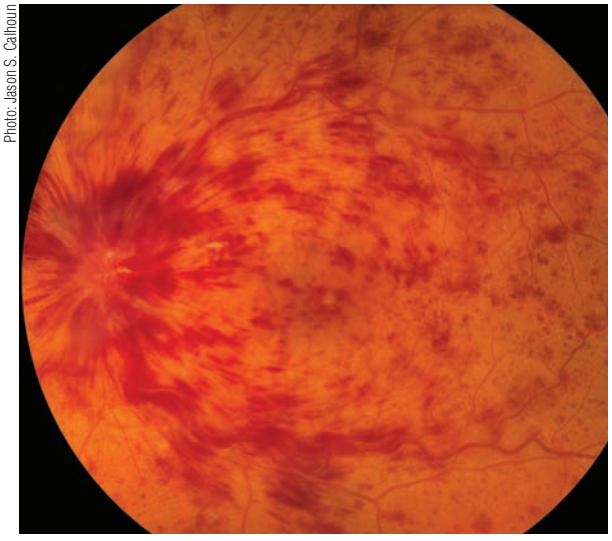
Photo: Jason S. Calhoun



Central retina vein occlusion is one of the most common thrombotic retinal events in hypercoagulable states.

— *Antiphospholipid syndrome.* Previously called lupus anticoagulant syndrome, this is a syndrome of elevated antiphospholipid antibodies that may or may not be associated with lupus. These antibodies induce a procoagulant state through an unclear mechanism, likely involving antibody-protein complexes and platelet activation.

Obstetric complications (such as repeated miscarriages and fetal growth retardation), vascular thrombosis involving the cerebrovascular circulation, and coronary artery insufficiency are the most common manifestations of antiphospholipid syndrome.[10]

The diagnostic criteria requires one clinical manifestation and positive blood tests for the presence of lupus anticoagulant, cardiolipin antibody and anti-β2 glycoprotein I. Thrombotic complications of antiphospholipid syndrome usually require treatment with anticoagulant medication, such as heparin or coumadin.

— *Hyperviscosity syndrome.* This is a group of disorders characterized by increased blood viscosity, usually resulting from increased circulating serum immunoglobins (macroglobulinemia, multiple myeloma) or increased cellular blood components (leukemias, polycythemia or increased red blood cells, thrombocythemia). Increased blood viscosity causes disruption in laminar flow, microvascular stasis and diminished perfusion. Whole blood viscosity, serum viscosity and plasma viscosity may be measured to confirm the diagnosis.

Unlike other hypercoagulable states, hyperviscosity syndrome may be completely reversible with treatments such as phlebotomy, chemotherapy or plasmapheresis, depending on the etiology. Hyperviscosity syndrome does not generally require anticoagulant therapies.[10]

Hematological Malignancies

Hematological malignancies affect the production and function of blood cells. Examples include various types of leukemias and lymphomas.

• ***Leukemia.*** Leukemia is a group of malignancies of the hematopoeitic stem cells in the bone marrow characterized by abnormal proliferation of white blood cells. It is classified by its acute form and chronic form.

Acute leukemia is characterized by replacement of bone marrow with immature cells, which makes the bone marrow unable to produce healthy blood cells. Acute forms are the most common forms of leukemia in children.

Chronic leukemia is characterized by excessive accumulation of mature but abnormal white blood cells. This form occurs almost exclusively in adults.

Given this classification, there are four main types of leukemia: acute lymphocytic leukemia, acute myeloid leukemia, chronic lymphocytic leukemia and chronic myeloid leukemia. Lymphocytic leukemias affect lymphocytes while myeloid leukemias affect red blood cells, other types of white blood cells and platelets.

The exact cause of leukemia is unknown, but a combination of both genetic and environmental factors appears to be involved. Known environmental risk factors include tobacco use, Down syndrome and exposure to certain chemicals. The key to diagnosing most leukemias is a bone marrow aspiration and biopsy.

Posterior segment findings: Ocular involvement is more commonly seen in the acute form of the disease. Fundus changes associated with primary leukemic infiltration resemble those found in anemic retinopathy and include retinal hemorrhages, cotton-wool spots and Roth's spots. Venous dilation was found to be the most common finding in acute leukemia, and is believed to be the initial retinal change in leukemias.[11] Peripheral retinal neovascularization may occur in association with chronic myeloid leukemia. Choroidal deposits in chronic leukemias may give rise to a "leopard skin" appearance. Disc edema and proptosis may also occur as a result of optic nerve head and orbital tissue infiltration, respectively.

• ***Lymphoma.*** Lymphomas are a group of malignancies affecting the lymphatic system, which is part of the immune system. They are the seventh most common form of all cancers, and the third most common form in children. There are two main types: Hodgkin's and non-

Hodgkin's.

Hodgkin's lymphomas are characterized by the presence of Reed-Sternberg cells, which are multi-nucleated or bilobed-nucleated giant cells, usually derived from B lymphocytes.

Non-Hodgkin's lymphoma is the most common form and is in turn divided into many subtypes.

The etiology behind the development of the disease is multifactorial and involves genetic and other factors. Of note, viral infectious diseases such as Epstein-Barr virus and human immunodeficiency virus seem to play a causative role in the disease. Definitive diagnosis of lymphoma is established by lymph node biopsy.

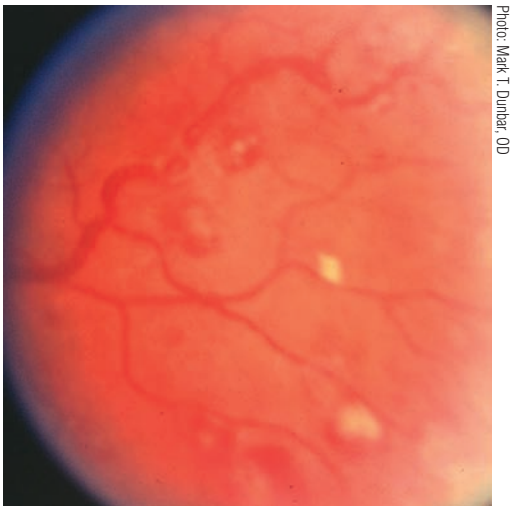


Photo: Mark T. Dunbar, OD

Retinal findings associated with leukemia include white-centered retinal hemorrhages (Roth's spots), cotton-wool spots and venous tortuosity.

Posterior segment findings: Primary intraocular lymphomas can be subdivided into two forms: vitreoretinal and uveal. The former is considered a variant of primary central nervous system non-Hodgkin's lymphoma (PCNSL) and is typically a large B-cell tumor, while the latter is associated with systemic non-Hodgkin's lymphoma.

The hallmark of *primary vitreoretinal lymphoma* is the presence of vitreous cells and white subretinal pigment epithelial deposits. Retinal, choroidal or chorioretinal infiltrates may be present, in which case they may be focal, multifocal or diffuse and are essentially pathognomonic for the disease.[12] Primary vitreoretinal lymphoma is found in approximately 25% of patients with PCNSL and is frequently bilateral. Other possible findings include retinal perivasculitis, exudative retinal detachment and optic atrophy.

Primary uveal lymphoma is usually unilateral and can affect any tissue of the uveal tract including the choroid, iris and ciliary body. Diffuse thickening of the uveal tract results in exudative retinal detachment with the classic feature of solitary or multiple yellow, creamy choroidal infiltrates. The vitreous remains clear with absence of cellular reaction.[13]

Secondary intraocular lymphoma due to disseminated systemic lymphoma most commonly affects the choroid, with clinical features similar to those found in primary choroidal lymphoma. However, it may present either unilaterally or bilaterally and tends to possess a more variable clinical profile that rarely includes iris infiltrates, pseudohypopyon and vitreous cells.[13]

Management of intraocular lymphomas depends on the particular presentation. Secondary intraocular lymphomas are comanaged with an oncologist treating the underlying systemic lymphoma; treatment options include observation, radiation, chemotherapy and bone marrow transplant. Secondary lymphomas that are limited to the choroid are typically treated with low-dose external beam radiotherapy. Vitreoretinal involvement may also be treated with intravitreal chemotherapy. In patients with coexisting PCNSL, high-dose intravenous chemotherapy is the preferred treatment strategy.

Hematological disorders can have retinal manifestations—many of which are generally benign—but may also lead to severe vision loss and, in some cases, blindness. Even though these manifestations may be asymptomatic, they may be the presenting symptom of a serious underlying systemic disease. Additionally, opportunistic infections in cases of hematological diseases can lead to serious retinal complications.

Whenever you see a patient with unexplained retinal vascular or microvascular changes with hemorrhages and cotton-wool spots, always exclude an underlying hematological disorder. ■

Dr. Makhlouf is an assistant professor with a focus on primary eye care and ocular disease at Nova Southeastern University College of Optometry in Fort Lauderdale, Fla.

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1. What is NOT a common finding in anemic retinopathy?
a. Retinal hemorrhages.
b. Roth's spots.
c. Retinal necrosis.
d. Cotton-wool spots.

2. What are possible causes of anemic retinopathy?
a. Decrease in number of red blood cells.
b. Decrease in amount of hemoglobin.
c. Deficiency in the oxygen-binding ability of hemoglobin molecules.
d. All of the above.

3. Which of these conditions is a hemoglobinopathy?
a. Sickle cell disease.
b. Lymphoma.
c. Leukemia.
d. Anemia.

4. What characterizes the mechanism through which sickle cell disease causes vascular occlusions?
a. Inflammatory.
b. Procoagulant.
c. Proangiogenic.
d. All of the above.

5. What is NOT a condition associated with proliferative sickle cell retinopathy?
a. Hairpin loops.
b. Vitreous hemorrhages.
c. Sea fan proliferations.
d. Black sunburst lesions.

6. What are "salmon patches"?
a. Intraretinal hemorrhages.
b. Preretinal hemorrhages.
c. Retinal pigment epithelium hyperpigmentation.
d. Hemosiderin-laden macrophages.

7. Which of these is NOT an acquired hypercoagulable condition?
a. Pregnancy.
b. Protein C deficiency.
c. Antiphospholipid syndrome.
d. Use of oral contraceptives.

8. A young woman presents with a branch retinal vein occlusion (BRVO). She has a positive history for repeated miscarriages and is otherwise healthy. Which of these conditions should you strongly suspect?
a. Leukemia.
b. Antiphospholipid syndrome.
c. Anemia.
d. HIV.

9. Which is NOT a treatment used for hyperviscosity syndrome?
a. Anticoagulant therapies.
b. Phlebotomy.
c. Chemotherapy.
d. Plasmapheresis.

10. Which statement about leukemia is FALSE?
a. Leukemia is a group of malignancies characterized by abnormal proliferation of white blood cells.
b. Acute forms are the most common forms of leukemia in children, while chronic leukemia occurs almost exclusively in adults.
c. Lymphocytic leukemias affect lymphocytes, while myeloid leukemias affect red blood cells, other types of white blood cells and platelets.
d. Tobacco use is not a risk factor for the development of leukemia because it is solely a genetic disease.

11. What is the most common retinal finding in acute leukemia?
a. Retinal hemorrhages.
b. Cotton-wool spots.
c. Venous dilation.
d. Roth's spots.

12. A patient presents with bilateral chorioretinal infiltrates, vitreous cells and white subretinal pigment epithelial deposits. Your diagnosis is:
a. Primary vitreoretinal lymphoma.
b. Primary uveal lymphoma.
c. Secondary intraocular lymphoma.
d. None of the above.

13. What is the treatment of choice for secondary choroidal lymphoma?
a. Observation.
b. Chemotherapy.
c. Low-dose external beam radiotherapy.
d. Bone marrow transplant.

14. The mechanism of HIV retinopathy is:
a. Infectious.
b. Vaso-occlusive.
c. Exudative.
d. Atrophic.

15. What is the earliest and most common sign associated with HIV retinopathy?
a. Cotton-wool spots.
b. Microaneurysms.
c. Retinal hemorrhages.
d. Telangiectasia.

16. The most common opportunistic retinal infection in patients with HIV/AIDS is:

OSC QUIZ

a. CMV.
b. Histoplasmosis.
c. Toxoplasmosis.
d. Syphilis.

17. Fundus examination of a 50-year-old patient reveals a necrotizing retinitis with granular white borders. What is your diagnosis?
a. HIV retinopathy.
b. Toxoplasmosis.
c. CMV retinopathy.
d. Histoplasmosis.

18. Which statement about toxoplasmosis is FALSE?
a. Decreased visual acuity may occur as a result of macular involvement or severe vitreous inflammation.
b. CMV retinopathy is exclusively bilateral.
c. Diagnosis of ocular toxoplasmosis is mainly made by clinical observation.
d. Preventive measures include cooking and freezing meat, washing fruits and vegetables, hand washing and avoiding use of contaminated water.

19. "Headlight in the fog" appearance seen in toxoplasmosis is due to:
a. Vitritis.
b. Inflammatory retinal focus.
c. Satellite lesions.
d. Both a and b.

20. What is most likely to cause visual impairment in histoplasmosis?
a. Peripapillary changes.
b. Histo spots.
c. Choroidal neovascularization in the macular region.
d. All of the above.

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19.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
20.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

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Cold Sore, Hot Lid

It's a common condition. What, if anything, can be done to identify and treat it?

Edited by Paul C. Ajamian, OD

Q A 32-year-old white male with a history of cold sores presented with an itchy upper eyelid and a cluster of small blisters or vesicles. What's the differential diagnosis?

A "Differential diagnoses of such a presentation include allergic dermatitis, herpes zoster dermatitis (shingles), atopic dermatitis, staphylococcal blepharitis or chickenpox," says David Coulson, OD, of Barnet Dulaney Perkins Eye Center in Phoenix.

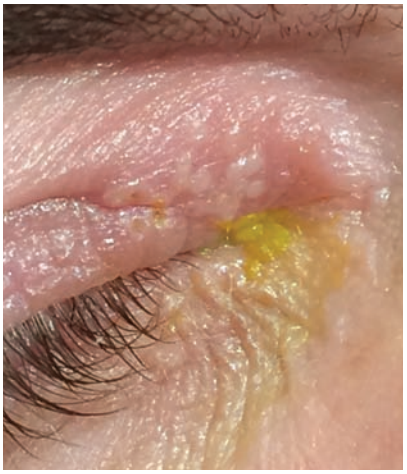
In this patient's case, the telltale history of cold sores and appearance of itchy vesicles on the eyelid suggest a diagnosis of herpes simplex virus type 1 (HSV-1), sometimes called oral herpes. Type 2, or genital herpes, is a different form of the same virus.

Take note that the terms *oral herpes* and *genital herpes* are generalizations because either virus can cause genital herpes—although HSV-1 does so less commonly.

However, that is changing. "HSV-1 is now estimated to be responsible for up to half of new cases of genital herpes," Dr. Coulson says.[1]

HSV-1 is extremely common. Most Americans will be exposed to this virus in their lifetimes. An estimated 50% to 60% of Americans in their 20s and 30s, and 85% age 60 and older, are currently infected with HSV-1.[2] (Interestingly, seroprevalence of both types of HSV appears to be declining in the US.[3])

"The vesicles represent active viral shedding and are contagious," Dr. Coulson says. "For those who are seronegative (not yet infected), the virus must enter through broken skin or mucous membranes. Also, infected individuals can be contagious, even in the absence of visible signs or symptoms. So, wear gloves when examining these patients."



Note the whitish vesicles on the inflamed eyelid. This, along with a cold sore on the lip, indicate a diagnosis of herpes simplex virus type 1 (HSV-1).

However, he adds, "it is rare for this presentation to spread into the eye, although the exact incidence is not known."

Primary HSV infection often occurs in childhood and lasts two to three weeks. Recurrent infections, affecting more than one-third of the world's population, last about one week.

Q How do I treat the patient? Do I need an infectious disease consult?

A "An infectious disease consult need only be considered in complicated infections, or for immunocompromised patients with severe infections," Dr. Coulson says. Otherwise, you can treat or monitor these patients yourself.

To that end, he says, "Although most infections are self-limiting, antiviral treatment for HSV infections can shorten the duration of symptoms and reduce the occurrence of recurrent outbreaks."

- ***Oral drugs*** include acyclovir, famciclovir and valacyclovir.
- ***Topical dermatologic ointment*** formulations of acyclovir are available in 1% and 5% concentrations, but they are less effective than the oral form.

Ophthalmic acyclovir ointment (Zovirax ointment, GlaxoSmithKline) is not available in the US. However, Zirgan ophthalmic gel (gangciclovir, Bausch + Lomb) may be considered for prophylaxis—but be sure to discuss with the patient the substantial cost of the drug and the low incidence of keratoconjunctival involvement, Dr. Coulson says.

"Most herpetic infections in patients presenting to the office are recurrent, and an infection like this would be expected to resolve within a week," he says. "If not, instruct the patient to return right away." ■

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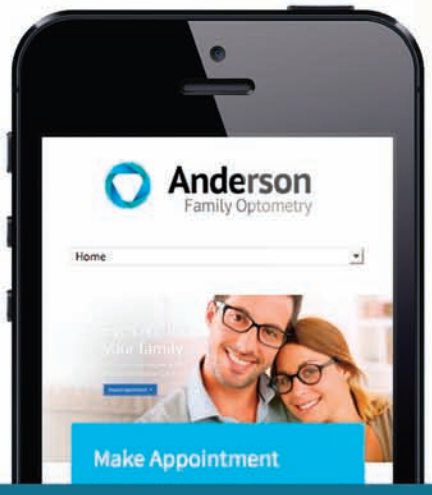

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When the Lens is Down and Out

These key factors must be considered when troubleshooting a decentered scleral lens.

Edited by Joseph P. Shovlin, OD

Q I recently fit a large-diameter scleral lens (18mm) on a moderately severe keratoconus patient with adequate central clearance, but the lens decenters inferiorly. It seems to be creating some comfort issues (awareness and reduced wearing time). Any suggestions for the next lens change?

A Before changing lenses, you need to figure out the reason for the decentration, which is likely one of these two causes: the lens may have excess mass or vault, or the patient's sclera is toric.

Lens Mass/Vault

"Inferior lens decentration could be attributed to lens mass and bearing of the upper lid," explains Greg DeNaeyer, OD, clinical director of Arena Eye Surgeons in Columbus, Ohio. Also, because the patient is complaining of discomfort with a decentered scleral lens, it's likely that lens bearing on the superior nasal quadrant may be causing epithelial erosion, Typically, erosion will show up as staining under slit-lamp examination after lens removal.

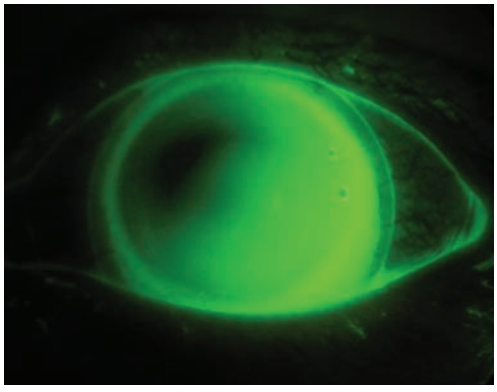
Dr. DeNaeyer suggests several solutions to help alleviate the irritation. First, "increase the overall vault of the lens by steepening the base curve and/or mid-peripheral curves. This will take lens bearing off of the superior nasal cornea," he says.

On the other hand, make sure you don't have too much vault. "The more the lens lifts away from the eye, the greater the lid pressure on the lens," says Jason Jedlicka, OD, from the Cornea and Contact Lens Institute of Minnesota in Edina. So, "decreasing the vault will reduce the lid pressures that drive the lens lower." Of course, he adds, this can only be done if there is already more than enough vault to begin with.

Another possible method, says Dr. DeNaeyer, is to piggyback the scleral lens on top of a soft lens, which acts as a cushion between the area of bearing and the lens. A daily disposable is best suited for this method, and those made of silicone hydrogel in particular should be considered to achieve the greatest possible oxygen transmissibility. Switching the patient to hybrid lenses or specialty soft lenses may also aleviate the problem.

Reducing the lens mass could also help ease discomfort and decentration. To decrease the mass, Dr. Jedlicka suggests trimming the lens thickness, which would lower "the effect of gravity on the lens as well as the lid pressures on the lens." However, make sure that decreasing the lens thickness does affect other aspects of the fit or cause other problems, such as flexure.

Alternatively, try a small-diameter scleral lens such as a 16mm mini-scleral. "The decrease in mass will often help to minimize decentration,"Dr. DeNaeyer says.



The superior nasal tear film thinning (dark fluorescein) appears due to higher scleral elevation superiorly and nasally. The lens decenters inferiorly and temporally in this patient.

Toric Sclera

Aside from excessive lens vault and lens mass, another potential cause of inferior decentration could be toricity of the sclera.

"If the sclera is flatter along the 3 and 9 o'clock meridian," Dr. Jedlicka explains, "the lens will not be able to sit on that meridian." Displacement often results. "Unlike a corneal GP—which will often ride high with the lid—the scleral lens will instead settle inferiorly," Dr. Jedlicka says.

Typically, he adds, this can be recognized through the observation of "tight fit/compression along the horizontal meridian and a looser fit in the vertical meridian."

In these cases, switching the patient to a lens with a toric haptic can help with centration issues. Alternatively, lens diameter can be decreased to lessen the impact of toricity. ■

Not What the Doctor Ordered

This patient returned after uncomplicated cataract surgery with an unexpected "correction" to his glaucoma. How did this happen? **By James L. Fanelli, OD**

A 66-year-old white male, a longstanding glaucoma patient, presented for a standard follow-up exam with a complaint of slowly, progressively decreasing visual acuity.

We've followed this patient in our office for more than 10 years for open-angle glaucoma OU. His glaucoma regimen has evolved during that time; currently he's on Lumigan (bimatoprost 0.01%, Allergan) QHS OU. His intraocular pressure has averaged between 16mm Hg and 19mm Hg OU, with nominal hyperemia. Pachymetry readings were 544µm OD and 551µm OS.

Over the years, his neuroretinal rims and visual fields have remained stable OU. Heidelberg Retina Tomograph-3 (HRT-3, Heidelberg Engineering) imaging and OCT analyses of the retinal nerve fiber layer have not changed since we started measuring them 10 years earlier. Heidelberg Edge Perimeter (Heidelberg Engineering) visual fields confirmed a dense arcuate scotoma OU with a firm nasal step OD, which has also remained stable over time.

His visual decline was due only to cortical and nuclear cataracts OU. Ultimately, the decreased vision has begun to hamper his quality of life, and now it's time to discuss cataract surgery.

Diagnostic Data

Best-corrected visual acuity at this visit was 20/40- OD and 20/50- OS, although when we first met he had been 20/20 OD and OS through myopic astigmatic and presbyopic correction. Pupils were equal, round and reactive to light and accommodation with no afferent defect in either eye.

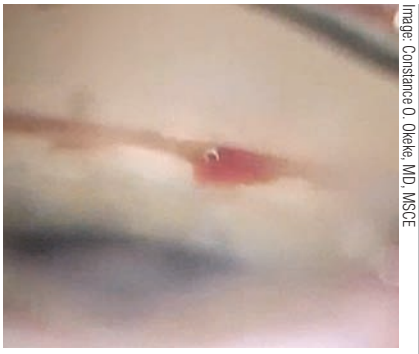


Image: Constance O. Okeke, MD, MSCE

Perioperative bleeding and postoperative inflammation are possible complications of the iStent (Glaukos).

Medications consisted only of OTC vitamins and an occasional allergy medication as needed. He reported no allergies to medications.

IOP measured 16mm Hg OD and 17mm Hg OS with no other change to his glaucoma status described above.

Diagnosis

The patient's crystalline lenses showed mild incipient nuclear sclerosis in both eyes. Accordingly, we made the appointment for his cataract surgery, first in the left eye and followed by the right eye.

Management

Our office protocol for cataract surgery is simple: Once the patient's quality of life is negatively affected by reduced visual acuity, and we're reasonably certain that lens extraction will significantly increase his BCVA and improve his quality of life (and of course, there are no extenuating ocular or systemic issues that would put the patient at risk), we'll refer him to the most appropriate cataract surgeon, given the aforementioned considerations.

I'm a firm believer that the optometrist who's been following the cataract patient for many years is very sensitive to the individual's particular wants and needs and, in conjunction with the patient, is best positioned to offer this type of preoperative information to the surgeon in an effort to achieve excellent visual outcomes. I've discontinued the services of a few surgeons who made their own decisions based on their one, brief, preop consultation with my patient, only for the patient to have recurring issues postoperatively with the visual outcome.

In this vein, I sent an introductory letter to the operating surgeon introducing the patient and relaying pertinent information (in this case, a discussion of longstanding, well-controlled glaucoma), as well as information that pertains to the type of implant to be used and visual outcome goals following surgery (distance correction to plano OU).

Within a month, the patient underwent uneventful cataract surgery in the right eye.

When the patient presented for his one-week post-op visit, there was mild striate keratopathy,

incisional bullous keratopathy as expected, and mild cells and flare in the anterior chamber of the right eye.

The single-vision IOL was well centered in the right eye, and the posterior capsule was clear. Visual acuity OD was 20/25+ and IOP was 17mm Hg. There were no retinal issues, and the patient was compliant with the normal post-cataract drop regimen and continued Lumigan OU. We scheduled him for a second follow-up in two weeks as a final clearance before surgery in the fellow eye a few days later.

At this second visit, the patient specifically asked me what his "pressures" were. He has always taken an active role in his care, and I thought nothing of it and told him (18mm Hg at this visit). He then said something to the effect of, "Looks like that thing they put in my eye to reduce pressure isn't working."

Somewhat surprised by this comment, I went back to the letter I received regarding the one-day post-op visit. (After the pre-op surgical consultation, as well as following the same-day post-op visit with the cataract surgeon, we receive letters outlining the surgeon's significant findings.)

Sure enough, tucked in the middle of the letter—and, frankly, completely missed by me when I first perused it—was a note that an iStent (Glaukos) was implanted in the right eye during the cataract surgery.

Discussion

The iStent is part of a growing glaucoma surgical innovation known as minimally invasive glaucoma surgery (MIGS). The iStent is a small, snorkel-like device implanted through the trabecular meshwork during cataract surgery to allow more aqueous outflow. It essentially acts as an aqueduct that connects the anterior chamber to Schlemm's canal. Because the majority of aqueous resistance through the trabecular meshwork complex likely comes from the juxtacanalicular tissue (JCT), creating a conduit through this tissue appears to relieve the intraocular pressure.[1,2] Currently, the iStent is approved for implantation during cataract surgery in patients with open-angle glaucoma.

Because the device is being implanted into and through the trabeculum to Schlemm's canal, a small amount of bleeding may occur at the time of surgery. Also, postoperative inflammation may

be a bit more pronounced due to its intimate involvement with the uveal tract, and topical steroids may need to be adjusted accordingly. Generally, a wait of two or three months post-implantation is required to accurately assess the efficacy of the device in controlling IOP.

Cataract surgery in and of itself has been shown to decrease IOP by an average of 2mm Hg, and the initial results of iStent implantation indicate that it may further reduce IOP by an additional 3mm Hg.[3] Although not a large decrease, that mild reduction in IOP may make the difference between a patient being treated with two instead of three medicines, or perhaps no medications instead of one. But will it result in an IOP reduction of 7mm Hg to 10mm Hg? Unlikely. So, although the device may reduce IOP by a few points, keep in mind the IOP-lowering effect you're already achieving with the patient's topical drops.

In our patient's case, his treatment with Lumigan resulted in an average 7mm Hg to 10mm Hg reduction from unmedicated levels, and perhaps even more than that. Had his medication been able to stabilize him with just a 3mm Hg to 4mm Hg reduction in IOP, then I would have recommended the iStent from the get-go; however, given his longstanding stability and his medicated IOP reduction of 7mm Hg to 10mm Hg, the iStent would not likely have offered any significant improvement in his quality of life, so I didn't recommend it in my referral letter.

You and I are the ones who handle the postoperative visual needs of the cataract patient, which means we need to step up to the plate in determining refractive outcomes. Likewise, you and I deal with the glaucoma patient's postoperative situation, which means we need to be just as comfortable in making preoperative recommendations that affect the patient's glaucoma postoperatively.

With that in mind, I called the operating surgeon to discuss how important it is that we should jointly decide on iStent implantation in future patients. ■

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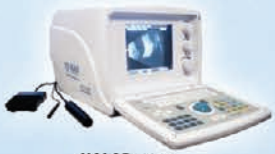

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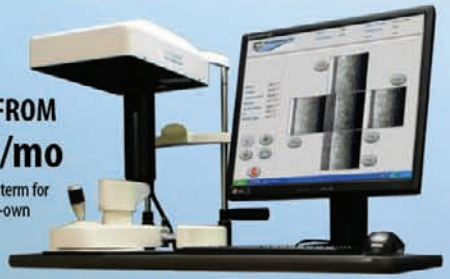

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The Eye is Dotted

This patient reported rapid vision loss in her left eye. We noted a lesion and white dots in the affected macula. What's the diagnosis? **By Mark T. Dunbar, OD**

A 31-year-old black female presented emergently with complaints of visual blur and poor focus in her left eye that began three days earlier. Since initial onset, she noticed a rapid, painless, progressive loss of vision in that eye. Her only other symptom was flashes of light OS.

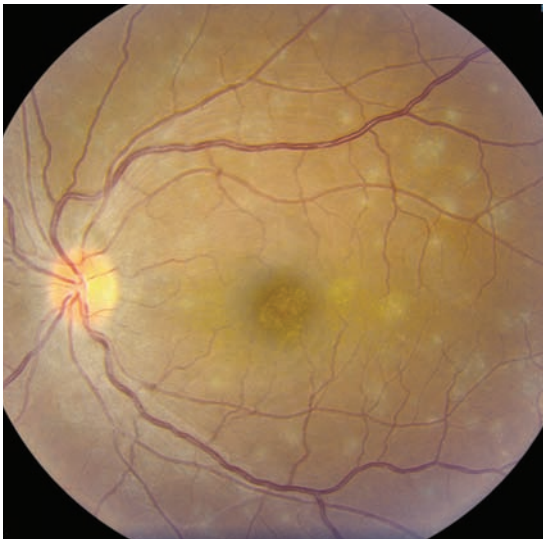
Her medical history was significant for an episode of bronchitis with sinusitis a few weeks ago. She was prescribed a medication, but never went to the pharmacy to have it filled.

Her ocular history included a painful, red eye OS one year earlier, which was believed to be caused by either scleritis or episcleritis. The presentation quickly resolved with topical steroid eye drops and oral NSAIDs.

On examination, best-corrected visual acuity measured 20/20 OD and hand motion (HM) OS. Ocular motility and cover testing were normal. Confrontation visual fields were full to careful finger counting OD, but HM only OS. Pupils were equally round and reactive, with a trace of afferent defect in the left eye. The anterior segments were unremarkable OU.

Dilated fundus exam of the right eye showed a clear vitreous and normal optic nerves, with good rim coloration and perfusion. The remainder of the right eye appeared completely normal.

In the left eye, we documented trace vitreous cells and a central macular lesion that appeared granular in nature and consisted of multiple white dots. Similar lesions were scattered throughout the posterior pole (*figure 1*). We performed a spectral-domain optical coherence tomography (SD-OCT) scan (*figure 2*), as well as fluorescein and indocyanine green (ICG) angiographies (*figure 3*).



1. Fundus images of our patient's left eye. Note the presence of spots throughout the posterior pole.

Take the Retina Quiz

1. What is the most likely location of these white lesions?
   a. Inner retina.
   b. Photoreceptors.
   c. Outer retina and retinal pigment epithelium (RPE).
   d. Choroid.

2. What is the correct diagnosis?
   a. Acute posterior multifocal placoid pigment epitheliopathy (APMPPE).
   b. Acute macular neuroretinopathy (AMN).
   c. Multiple evanescent white dot syndrome (MEWDS).
   d. Diffuse unilateral subacute neuroretinitis (DUSN).

3. How are patients with this condition typically managed?
   a. Observation.
   b. Oral antibiotics.
   c. Anthelmintic drugs (e.g., thiabendazole).
   d. Laser photocoagulation.

4. What is the likely clinical course?
   a. Progressive, with total vision loss.
   b. Chronic and recurrent, with central vision loss.
   c. Episodic recurrences, with generally good vision.
   d. Self-limiting, with good recovery of central vision.

5. What does the SD-OCT show?
   a. Choroidal neovascularization (CNV).
   b. Photoreceptor toxicity.
   c. Disruption of the outer retinal layers at the level of the inner/outer segment junction.
   d. RPE atrophy.



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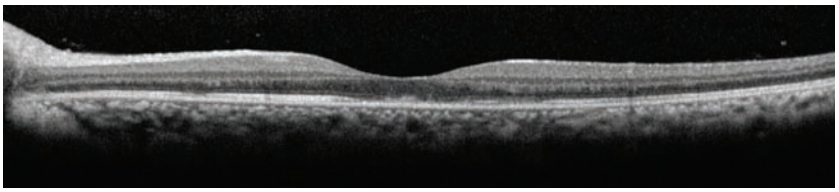

2. An SD-OCT scan through patient's left macula. What does it reveal?

For answers, go to page 98.

Discussion

Our patient has multiple evanescent white dot syndrome (MEWDS). The condition was originally described in 1983 as an acute, unilateral, multifocal retinopathy that affects young adults.[1] Approximately 75% of MEWDS cases are documented in females.[1]

Nearly half of the patients diagnosed with MEWDS report a preceding flu-like illness or viral infection.[1] Interestingly, our patient experienced a bout of bronchitis/sinusitis a few weeks prior to developing ocular symptoms.

The typical age of onset ranges from 14 to 57 years.[1] Patients often complain of visual blur, as well as photopsia or flashing lights. Patients also may complain of a temporal scotoma, which will manifest as an enlarged blind spot on visual field testing. This enlarged blind spot has been termed acute idiopathic blind spot enlargement (AIBSE) syndrome, which may be located on the spectrum of MEWDS and other similar conditions, such as acute zonal occult outer retinopathy (AZOOR) and acute macular neuroretinitis (AMN).[1]

The clinical findings associated with MEWDS include multifocal gray-white patches comprised of small, white dots that are largely concentrated in the paramacular area, at the level of the deep retina or the RPE. Affected individuals also exhibit a granular macular appearance, with tiny, yellow or orange dots in the center of the fovea. This presentation often results in IS/OS disruption, as was the case with our patient. The macular lesion is thought to be distinct from the larger white patches that are seen throughout the posterior pole and retina. Vitreous cells generally are present, as well.

The white patches and granular appearance in the macula will slowly fade over time and become less apparent. This can make the diagnosis even more challenging, depending on when the patient is evaluated. In our patient, the gray-white patches were clearly evident—but, in other cases, it may not be so obvious.

Ancillary testing can be very helpful in confirming a diagnosis of MEWDS. On fluorescein angiography (FA), the gray-white patches will hyperfluoresce in a cluster or wreath-shaped pattern. Indocyanine green (ICG) angiography is perhaps the best diagnostic test for uncovering multiple hypofluorescent lesions. During the late phases of ICG angiography testing, these lesions will correspond to the white patches in the posterior pole. Take note that ICG angiography will show many more spots than can be seen on clinical examination alone.

The etiology of MEWDS is unknown. Some researchers believe it is caused by an underlying viral illness, but tests for herpes zoster, herpes simplex, mumps and measles have been inconclusive.[1] MEWDS is self-limiting, so no treatment is recommended. The patient's vision will improve over the course of several weeks, with gradual resolution of the retinal lesions.

Because our patient demonstrated such profound vision loss, we started her on 30mg of oral prednisone. Her vision improved to 20/40 OS at the six-week follow-up, with complete resolution of the spots. Further, SD-OCT showed no disruption of the IS/OS junction—so we instructed her to discontinue oral prednisone use.

One year later, her visual acuity measured 20/25 OS. ■

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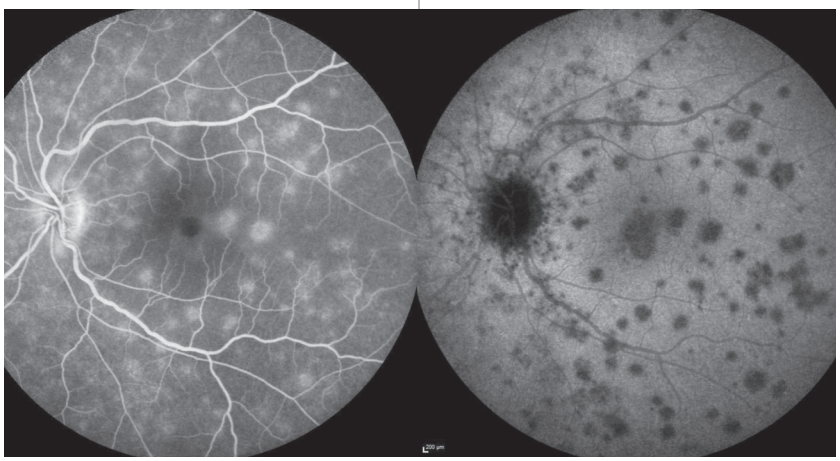


3. Late-stage FA (left) and ICG angiography (right) of her left eye.

New Blepharitis Treatments

A decade ago, we looked at the latest treatment options for blepharitis. It's high time we eye them up again. **By Alan G. Kabat, OD, and Joseph W. Sowka, OD**

We've been authoring the "Therapeutic Review" column for 10 years now. In one of our very first entries, "Put a Lid on Blepharitis," we discussed the importance of differentiating the various forms of blepharitis and creating an individualized treatment strategy for each patient.[1]

Like many procedures and protocols in eye care, blepharitis management has evolved during the last decade. It's time to revisit this topic and examine some of the newest, most promising treatment options.

Calling Your Bleph

A recently published survey of eye care providers suggested that some form of blepharitis is present in nearly half of our patients—whether or not they are symptomatic upon presentation.[2] This means that every practicing optometrist likely sees this condition in one form or another on a daily basis.

Unfortunately, our traditional therapies for blepharitis have relied heavily on ongoing patient-administered intervention and compliance. Newer treatment modalities not only provide more targeted therapy, but also offer the promise of rapid recovery for most individuals.

Scrub-a-Dub-Dub

Lid scrubs have long been the mainstay of blepharitis management. Detergent-based products, such as OcuSoft Lid Scrub or TheraTears SteriLid, applied to the lids and lashes help to remove accumulated debris and excessive oils from the eyelid margins. Also, these products diminish bacterial reservoirs, combating the overgrowth of flora that incites and perpetuates staphylococcal blepharitis.

• ***BlephEx.*** As mentioned previously, the effectiveness of home-based lid scrubs is directly contingent upon the patient's level of dexterity, thoroughness and overall compliance. Recently, however, RySurg introduced BlephEx—a handheld device that allows physicians to perform an in-office "deep cleansing" of the lid margins. James Rynerson, MD, principal developer of BlephEx and CEO of Rysurg, LLC, refers to this new treatment as "microblepharoexfoliation."

BlephEx is indicated for removal of lid debris and microbial biofilm, which Dr. Rynerson touts as the primary source of all ocular surface inflammation. The device incorporates a disposable, high-speed, rotating microsponge designed to clean both the anterior and posterior lid margins, making it appropriate for all forms of blepharitis. In practice, we use BlephEx in cases of staphylococcal and seborrheic blepharitis, demodicosis and even MGD as a form of debridement scaling for the meibomian glands.[3]

Be aware that there is no ICD-9 code associated with BlephEx at this time, and thus no insurance coverage. Patients' out-of-pocket costs for the procedure typically range from $150 to $200, or more in some cases. Like dental cleanings, this procedure is recommended semi-annually—or even more frequently in severe cases.

Dropping Acid (on the Lids)

While surfactant cleaners certainly have a role in blepharitis management, they can be messy, irritating and unpleasant for some patients. Moreover, if conventional cleansers fail to control bacterial replication adequately, practitioners may need to resort to more aggressive therapies, such as topical antibiotics or antibiotic-steroid combinations.

• ***i-Lid Cleanser.*** Recently, NovaBay Pharmaceuticals introduced this novel antiseptic agent specifically indicated for the treatment of blepharitis. The company describes it as "the first FDA 510K-cleared prescription product to clean the lids and lashes, removing the debris and microorganisms that cause chronic inflammation."

i-Lid Cleanser is a stabilized solution comprised of 0.01% hypochlorous acid (HOCl), a microbicidal component of the innate immune system.[4] HOCl is naturally produced by neutrophils in response to pathogenic organisms, and can kill bacteria, block bacterial-derived toxins and blunt the effects of human cell-derived pro-inflammatory mediators.[5,6]

The product is packaged in a glass bottle with a pump sprayer, and can be applied to the lids via a cotton ball, cosmetic pad or gauze.

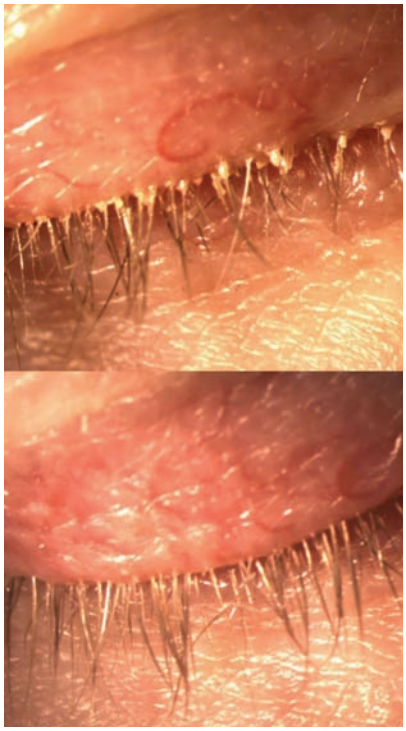

While there aren't yet any specific clinical studies demonstrating its efficacy, colleagues employing the product in their blepharitis treatment regimen have noted substantial improvement in both signs and symptoms when applied BID for just 10 days.[7] i-Lid Cleanser is sold exclusively through physicians' offices and online by the manufacturer. It retails for approximately $30 for a 40mL bottle.

Demodex Demolition

During the time that we've been writing the "Therapeutic Review" column, *Demodex* has gone from being a vague, rarely-recognized and poorly managed lid pathogen to one of the most common causes of blepharitis that we see in clinical practice. We've known for some time that it is resistant to most conventional lid cleansers and antimicrobial agents, but is highly responsive to tea tree oil.[8]

• ***Cliradex***. A recently published study identified the most potent demodicidal element in tea tree oil to be terpinen-4-ol, or 4-terpineol.[9] This chemical compound is the active ingredient in Bio-Tissue's Cliradex lid wipes. The company suggests that it is "a natural, preservative-free lid, lash and facial cleanser that helps manage symptoms associated with blepharitis, meibomian gland dysfunction, rosacea, dry eye, *Demodex*, chalazia and other lid margin diseases."

Since its release last September, Cliradex has become a mainstay treatment for our patients with demodicosis and ocular rosacea (which also seems to have a probable association with *Demodex*).[10] Also, it has eliminated the need to obtain pharmaceutically compounded agents of varying concentrations for *Demodex* infestation.



This 80-year-old woman presented with severe blepharitis secondary to *Demodex folliculorum* infestation (top). Following microblepharoexfoliation, she exhibited significant improvement (bottom).

We typically prescribe Cliradex BID for 10 days, and then QD at bedtime for another 10 days in cases of *Demodex* blepharitis, ideally after performing microblepharoexfoliation. The product is sold exclusively through physicians' offices and online, and retails for about $40 per carton, which contains 24 lid wipes.

Bio-Tissue also recently introduced the Cliradex Complete kit, which contains one carton of Cliradex lid wipes, a tube of Cliradex Advanced Care gel (a slightly more concentrated version of 4-terpineol for in-office application to the lids and lashes), a dual-sided applicator and instructions for the doctor and patient. This kit is designed for use by eye care clinicians only, and so individual providers typically will determine patient cost as a combination in-office/at-home therapeutic procedure.

Time marches on—but fortunately, each passing year brings a greater understanding of the physical maladies that plague our patients, as well as provides us with new tools to control their deleterious effects. Even something as seemingly common as blepharitis warrants consideration and intervention to help improve our patients' vision and overall quality of life.

We would also like to express our gratitude to the editors who have worked with us on this column throughout the past 10 years, including Jen Kirby, Leah Addis and especially our current editor, Mike Hoster. ■

Dr. Kabat is a paid consultant to Bio-Tissue and Alcon Laboratories. Neither he nor Dr. Sowka has any direct financial interest in the products mentioned.

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Look What the CATT Dragged In

For anti-VEGF treatment of AMD, monthly frequency and ranibizumab treatment were associated with a higher risk of geographic atrophy.

By Paul M. Karpecki, OD, and Diana L. Shechtman, OD

In attempting to treat wet age-related macular degeneration (AMD), are anti-vascular endothelial growth factor (VEGF) drugs drying the retina too much? Possibly so, according to a recent analysis of results from the Comparison of Age-related Macular Degeneration Treatment Trials (CATT).

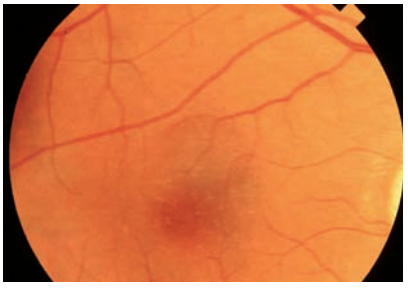
Both Avastin (bevacizumab, Genentech) and Lucentis (ranibizumab, Genentech) are equally effective at improving visual acuity in patients with choroidal neovascularization. But within two years of treatment, approximately one-fifth of patients in the CATT study developed geographic atrophy (GA), a cause of progressive visual loss often associated with the dry form of AMD.

The frequency of injections, whether monthly or as-needed, also appears to play a role in GA development.

Ranibizumab Raises Risk

To learn more about the risk of GA, the CATT researchers assessed 1,024 patients in a prospective cohort study to compare two-year treatment with either Avastin or Lucentis. The study patients had no signs of GA before treatment with either therapy—but, by two years, 127 patients developed GA.[1]

Perhaps more importantly, the type of medicine mattered. Specifically, the study found that patients who received Lucentis were 43% more likely to develop GA than those who received Avastin.



The CATT study confirmed what many clinicians already knew—Avastin is just as effective as Lucentis for the treatment of neovascular AMD, as seen in this patient.

"The differences in the incidence of GA between the two medications could be because of differences in their effects on the retinal pigment epithelium and choroid, or because eyes treated with ranibizumab had more complete resolution of fluid," the authors wrote.[1]

Nevertheless, visual acuity was about the same for subjects in either treatment group at two years—but bear in mind that GA had not yet affected the fovea in any subjects. The authors add, "the development and progression of GA may become a more visually important event with longer follow-up of CATT study patients."

The investigators also acknowledged that the two-year results from a similar study, the Alternative Treatments to Inhibit VEGF in Age-related Choroidal Neovascularization (IVAN) trial, did not show a difference between Lucentis and Avastin in the rates for developing GA (28% for Lucentis vs. 31.2% for Avastin).[2] But, this disparity between the two studies is probably because treatment was initiated in the CATT study, unlike in the IVAN trial, as soon as disease activity was noticed.

PRN Better Than Monthly

Scheduling patients for monthly injections no longer appears to be the best approach for AMD patients if a treatment goal is to lower the incidence of geographic atrophy.

The CATT investigators found that monthly injections, regardless of the type of anti-VEGF medication, were associated with a 59% increase in risk of GA development compared with injections administered on an as-needed basis. This indicates that, "greater exposure to anti-VEGF medications may have a role in the development of this condition," the researchers concluded.[1]

Another piece of evidence for the dosing risk factor: A group of patients who were switched from monthly injections in the first year of the study to an as-needed basis in the second year showed a decrease in the risk of GA development when they received either drug as-needed in year two. The GA rate in the first year was 12.7% compared to 7% in the second year. This 7% incidence rate was lower than the 8.8% incidence rate of GA in patients who received as-needed injections for both years,

suggesting that the dosing regimen affects the incidence of GA in patients on anti-VEGF for wet AMD.[1]

"Although monthly injections may result in slightly better visual outcomes at two years, the increased risk of GA development may offset this benefit long term," the investigators concluded.

How Dry is Too Dry?

Because anti-VEGF therapy is used to treat wet AMD, does excessive drying of the retina promote the development of GA? Looking into this, the CATT investigators used optical coherence tomography (OCT) to compare the relative incidence of residual fluid with the relative incidence of GA. They found that the higher the rate of residual fluid on OCT, the lower the rate of GA. "This has led some to speculate that excessive drying of the retina may promote the development of GA," the authors wrote.

In other words, the dry form of AMD may still progress even though the wet form is suppressed, according to Mark Dunbar, OD, of Bascom Palmer Eye Institute in Miami.

"The reality is that some VEGF may be needed as part of the normal retinal physiology, so when it gets completely shut down—as happens with monthly injections of Lucentis, and to a lesser extent, monthly Avastin—dry AMD may continue to progress, and may in fact be slightly accelerated," says Dr. Dunbar.

High-Risk Patients

Finally, another practical finding for optometrists is that patients with a worse baseline VA and the presence of GA in the fellow eye have the highest risk of developing GA in their remaining good eye. These high-risk patients should be sent to a retinal specialist who can provide injections on an as-needed basis.

This lower VA could indicate that more layers of the retina are involved or that a greater number of photoreceptors are damaged to begin with. Either way, this information helps us to be more proactive in the management of these patients and provide more realistic expectations. ■

1. Grunwald JE, Daniel E, Huang J, et al; CATT Research Group. Risk of geographic atrophy in the Age-related Macular Degeneration Treatment Trials. 2014 Jan;121(1):150-161.
2. Chakravarthy U, Harding SP, Rogers CA, et al; IVAN study investigators. Alternative treatments to inhibit VEGF in age-related choroidal neovascularisation: 2-year findings of the IVAN randomised controlled trial. Lancet. 2013 Oct 12;382(9900):1258-67.

Diagnostic Equipment

Automatic Retinal Imaging Camera

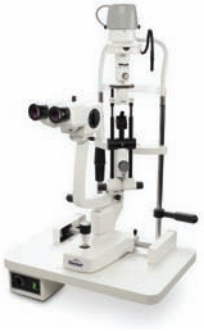
Simplify your posterior segment documentation with a new camera that offers automatic alignment, centering, focusing and capture of color retinal images: the new TRC-NW400 non-mydriatic retinal camera from Topcon Medical Systems. Once the first eye is photographed, the camera automatically repositions to take a picture of the other eye. The device is DICOM compliant for simplicity of image sharing. Save your images to a remote or electronic medical record server, or a USB drive and print them from a USB port.

The device fits against a wall or corner and can be operated from any angle with a rotating touch panel. The photographer sits in the front, behind or side of the machine.

Visit www.topconmedical.com.

New Slit Lamp Design

Reichert Technologies has released a new slit lamp, the Xcel 455, that steps up illumination and magnification of patients' eyes.



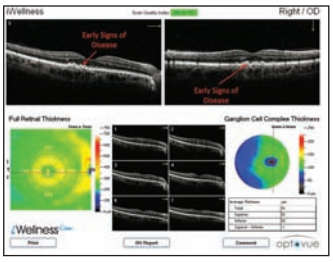
The eyepiece has a 12.5x magnification and the optics feature lenses with multi-layer optical coatings that provide bright, clear illumination, the manufacturer says. The device also boasts red-free, heat-absorbing, cobalt blue and neutral-density filters.

The Xcel 455 is currently available in Canada, Europe and various countries in the Middle East, Latin America and Southeast Asia; US availability is expected in late 2014.

Visit www.reichert.com.

Entry-level SD-OCT Model

At Vision Expo West, Optovue rolled out its newest SD-OCT device, the iScan, which performs 25,000 A-scans per second and features an image resolution of 5.0µm. Voice prompts guide the patient through the exam. Positioned for routine screening, the device generates what Optovue calls an iWellness scan, consisting of a cross-sectional retinal scan, a retinal thickness map and ganglion cell complex map. Results are compared to a normative database to gauge the risk of disease or presence of ocular anomalies.



The iScan's iWellness report.

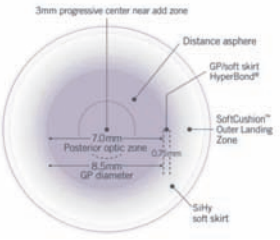
The iScan is an entry-level, more affordable cousin of the company's iVue SD-OCT. Although currently geared only for iWellness scans, the platform is upgradable, Optovue says. With the focus on screening and wellness, patients should expect to pay out of pocket for scans using the device.

Visit www.optovue.com

Contact Lenses

Presbyopic Contacts with Expanded Parameters

A new contact lens for presbyopes, the Duette Progressive from Synergeyes, features greater add powers to help patients who don't see well enough with soft multifocal contact lenses.



Practitioners can customize the lenses for each patient with a choice of three add powers (+1.00, +1.75, +2.50) and 0.1mm base curve increments for a proper fit. The lenses have 3.00mm near center aspheric add zones and aspheric distance optics for progression of powers from far to near.

The gas permeable design delivers clearer vision than soft lenses, particularly for astigmats, the company says. After establishing the GP base curve, the lens fits like a soft contact. The 84 Dk/t silicone hydrogel skirt and 130 Dk center block UV rays and allow oxygen permeability and comfort.

Visit www.synergeyes.com/professional/duette/duette-progressive.

High Cyl Correction in a Stock Lens

In a first for silicone hydrogel torics, Acuvue Oasys for Astigmatism lenses now come with a new -2.75D cylinder option that does not require a special order, says Johnson & Johnson Vision Care. Options now include -6.00 to +6.00 in 0.25D steps (cylinders: -0.75, -1.25, -1.75, -2.25, -2.75; axis: full circle in 10° steps) and from -6.50 to -9.00 in 0.50 steps (cylinders: -0.75, -1.25, -1.75, -2.25, -2.75; axis: full circle in 10° steps).

Visit www.acuvueprofessional.com. ■

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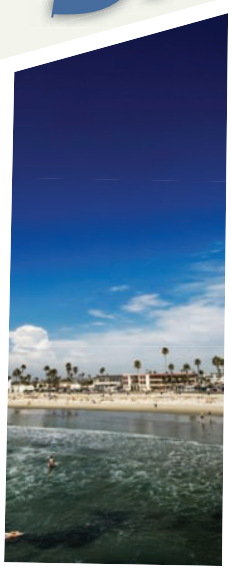

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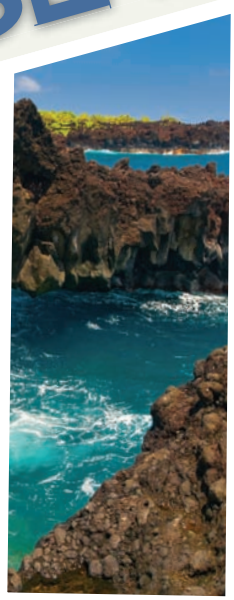

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October 2014

■ **18-19.** *Orlando Super Weekend.* Nova Southeastern University, Orlando, Fla. Hosted by: Nova Southeastern University. CE hours: 12. Key faculty: Michael Chaglasian, OD, Joseph Sowka, OD. Email Vanessa McDonald at oceaa@nova.edu or call (954) 262-4224. Visit optometry.nova.edu/ce/index.html.

■ **21-25.** *COVD 44th Annual Meeting.* Sheraton San Diego Hotel and Marina, San Diego. Hosted by: College of Optometrists in Vision Development. Email Jackie Cencer at jcencer@covd.org or call (330) 995-0718. Visit www.covd.org.

November 2014

■ **1.** *Fall Conference.* Hilton Hotel & Towers, Lafayette, LA. Hosted by: Optometry Association of Louisiana. Email Dr. Jim Sanderfur at optla@bellsouth.net or call (318) 335-0675. Visit www.optla.org.

■ **6-9.** *Monterey Symposium 2014.* Monterey Marriott Hotel, Monterey, Calif. Hosted by: California Optometric Association. CE hours: 40+. Key faculty: Melissa Barnett, OD, Jay Binkowitz, Michael Chaglasian, OD, Dickon Chan, A. Paul Chous, MA, OD, George Comer, OD, MBA. Email Rachael Van Cleave at contact@coavision.org or call (916) 441-3990. Visit www.coavision.org.

■ **10.** *AFOS/Academy 2014.* Denver Marriott City Center & Colorado Convention Center, Denver, Colo. Hosted by: Armed Forces Optometric Society & American Academy of Optometry. CE hours: 45. Email Gina Borgognoni at execdir@afos2020.org or call (214) 533-0227. Visit www.afos2020.org.

■ **11.** *Fall 2014 Educational Symposium.* Colorado Convention Center, Denver, Colo. Hosted by: Ocular Nutrition Society. CE hours: 6. Email Jeffrey Anshel at ocularnutritionsociety@gmail.com or call (800) 383-1202. Visit www.ocularnutritionsociety.org.

■ **12-15.** *Academy 2014 Denver.* Colorado Convention Center, Denver. Hosted by: American Academy of Optometry. Email Helen Viksnins at HelenV@aaoptom.org or call (321) 710-3937. Visit www.aaopt.org.

■ **13-15.** *NCSOS Fall Congress.* The Grove Park Inn, Asheville, NC. Hosted by: North Carolina State Optometric Society. CE hours: 18. Email Adrianne Drollette at adrianne@nceyes.org or call (252)237-6197. Visit www.nceyes.org.

■ **16.** *VOSH International Meeting: Embracing Traditions, Expanding Horizons.* Embassy Suites Downtown, Denver, Colo. Hosted by: Volunteer Optometric Services to Humanity (VOSH). To register, visit www.vosh.org.

December 2014

■ **6-7.** *31st Annual Cornea, Contact Lens & Contemporary Vision Care Symposium.* The Westin Memorial City. Houston, Texas. Hosted by: University of Houston College of Optometry. CE Hours: 16. Key Faculty: Ralph Stone, OD, and more to be announced. Email Amanda Johnson at ajohnson@optometry.uh.edu or call (713)743-1900.

February 2015

■ **13-15.** *54th Annual Contact Lens and Primary Care Congress.* Sheraton Kansas City Hotel at Crown Center. Kansas City, Mo. Hosted by: Heart of America Contact Lens Society. To register, go to www.hoacis.org.

■ **13-17.** *Ski Vision 2015.* Westin Snowmass Luxury Resort. Snowmass Village, Co. Hosted by: AAO and UABSO. CE hours: 20. Key faculty: Murray Fingeret, OD, Leo Semes, OD, Jack Schaeffer, OD, Jack Cioffi, MD, David Friedman, MD, PhD, and more. To register, go to http://skivision.com.

March 2015

■ **4-8.** *SECO 2015.* Georgia World Congress Center, Atlanta, Ga. Hosted by: SECO. To register, go to: www.seco2015.com

■ **20-22.** *Vision Expo East.* Jacob K. Javits Convention Center. New York, New York. Hosted by: International Vision Expo and Conference. To register, go to www.visionexpoeast.com.

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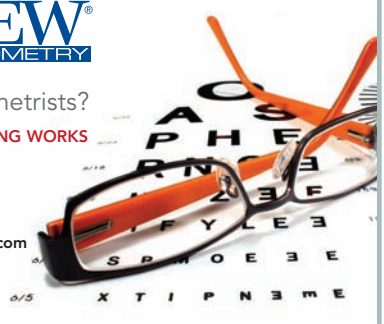
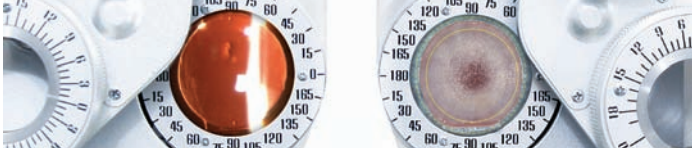
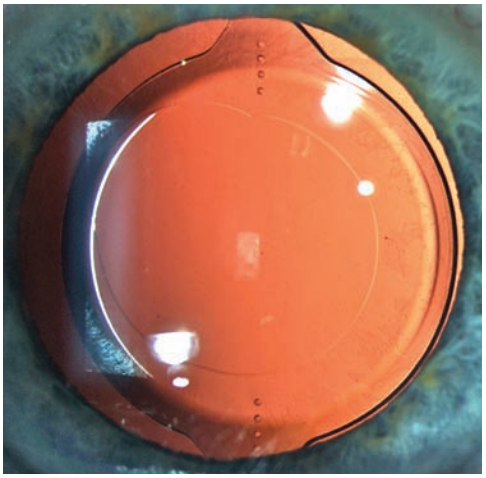




(continued from page 40)
Instead, find out each patient's goals and expectations. Here are some common patient personality types and how best to approach them:

*1. **Perfectionists.*** Patients expect perfect vision after IOL surgery. But never promise complete independence from glasses. Patients may still not be able to read up close and could experience halos and glare at nighttime, according to Dr. Karpecki. Or they may need glasses for protection against macular degeneration after surgery. Patients with astigmatism can expect to have clear vision without glasses, but may still need reading glasses. Those who like to read can benefit from multifocals, and will have clear distance vision, but need reading glasses for small print, says Dr. Karpecki. Ask the patient two questions: "Is it important for you to have clear vision? Is a low risk of halos or glare OK?"



A toric IOL situated in the eye.

*2. **Hard-to-please patients.*** "If you have a patient who's very particular—who is very difficult to please with spectacles—I'd be cautious about recommending a multifocal in this patient," says Daryl Mann, OD, chief manager of South East Eye Specialists in Chattanooga, Tenn. If the patient had multifocal glasses or contact lenses in the past, they may be a good candidate for a multifocal IOL, especially if they don't like the thought of reading glasses.

*3. **Creatures of habit.*** Patients accustomed to wearing glasses or contacts to perform certain tasks would not be good candidates for certain types of lenses, according to Dr. Waltz.

If a patient is used to monovision contact lenses before cataract surgery, chances are they'll want to continue that after cataract surgery, according to Dr. Ajamian.

If the patient is used to taking their glasses off to read, they'll balk at a multifocal or accommodating IOL, says Dr. Waltz. He puts them in a special file because they have specific needs. He typically leaves the patient plano for distance and nearsighted to allow to stay as they were.

"They're telling you they're a creature of habit, and my habit is to take off my glasses and I don't mind doing that," says Dr. Waltz. "So if you make me change my habits, I'm not a very happy creature."

Breaking the News About Out-of-Pocket Costs

The out-of-pocket costs to patients for these lenses can be steep. While that discussion is best left to the surgical practice, you should at least explain the concept of patient-shared billing so they know they'll be expected to cover what insurance does not.

*1. **Put a positive spin on it.*** It's going to allow them to see better for the rest of their lives, says Dr. Ajamian. For example, you could say, "If this is something you want, it's worth finding a way to pay for it."

*2. **Finance it.*** Recommend financing companies such as Care Credit. "It's like leasing a car," says Dr. Ajamian. If you can't pay cash for the car, you take out a loan or lease it; and isn't your vision more important than a car?"

*3. **Be transparent.*** Always tell patients there are additional costs for premium IOLs that health insurance does not cover, according to Dr. Ajamian. Have an idea of the exact costs, copays and facility fees of the surgeon. Your office staff can go over an itemized list of the additional costs if your patient is interested in a particular lens. ■

IOLs in the Pipeline

IOL technology evolves rapidly. Here's just a few interesting new ideas on the horizon.

A new category of presbyopia-correcting IOLs undergoing FDA trials would allow added near vision with fewer halos and less glare, says Dr. Stein. These are called extended depth-of-focus IOLs; investigational designs include the Symfony IOL (Abbott) and Adaptis shape-changing lenses (Hoya).

The Calhoun Light Adjustable Lens—also advancing in FDA trials—allows the surgeon to implant the lens and return to the patient later to adjust for power, cylinder and higher-order aberrations, says Dr. Stein.

Elenza, a new player in this market, is developing the Sapphire Autofocal, an IOL that lets the surgeon adjust for near, intermediate and distance vision with an "electro-active switchable element," according to its website, www.elenza.com.

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Edited by Derek N. Cunningham, OD, and Walter O. Whitley, OD, MBA

Narrow Angles, Open Minds

Optometrists are increasingly involved in recommending—and even performing—PIs. Here, an Oklahoma OD walks us through the procedure. **By Nathan Lighthizer, OD**

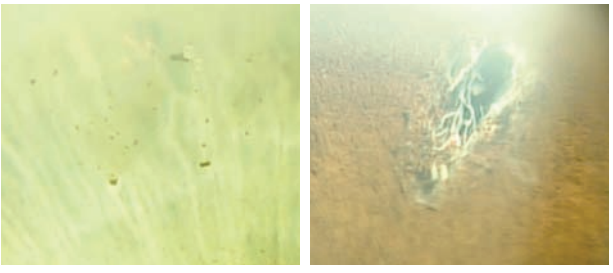
Primary angle-closure glaucoma (ACG) is a relatively uncommon condition, accounting for less than 10% of all diagnosed cases of glaucoma in the US. However, its importance as a health care issue is far greater than the relatively small number of cases would suggest. In contrast to open-angle glaucoma, in which vision loss is slow and gradual, an acute attack of angle closure glaucoma can lead to blindness within hours or days. Prompt diagnosis and correct treatment are, therefore, critical.

Accurate and timely diagnosis of the intermittent and chronic forms of primary ACG is also important, as prophylactic treatment—peripheral iridotomy (PI)—can protect the eye against acute episodes and prevent damage from repeated intermittent attacks or chronic angle closure.

Step by Step

If Van Herick angle assessment indicates narrow angles, further testing needs to be performed for confirmation, including chamber depth estimation and gonioscopy.

Gonioscopy is critical to determine the status of the angle structures that are seen (or not seen) and to confirm that the angle is narrow due to primary pupillary block, not one of the other causes of narrow angles (e.g., plateau iris, neovascular glaucoma or synechial angle closure from inflammatory glaucoma.



At left, the "pigment plume" indicates penetration. At right, the appearance of the iridotomy immediately after the procedure.

We have also recently started performing anterior segment OCT to determine a precise quantitative measurement of how narrow the angles are. An angle of 20° or less signifies a grade 1 or 2 angle and typically requires at least an assessment for laser peripheral iridotomy.

One drop each of brimonidine (Alphagan, Allergan) and pilocarpine are instilled preoperatively to control the risk of IOP spike and make the iris taut for easier penetration with the laser, respectively. The location of the PI is most often placed superiorly at 11:00 or 1:00 in an iris crypt to minimize the amount of laser energy entering the eye. Proparacaine is instilled and the Abraham iridotomy laser lens is placed on the eye with the button of the lens in the superior position.

Proper patient education is critical before and during the procedure, as the patient may experience "popping" (an acoustic sensation in their ears). This is a normal phenomenon experienced during both PIs and capsulotomies. Laser energy of 3.0mJ to 6.0mJ per pulse in a single or double shot pattern is often used to penetrate the full thickness of the iris.

The best indication that the laser has fully penetrated the iris is when the "pigment plume" is seen. Typically, enlargement of the PI hole will continue after the plume until it is about 1mm in size. Occasionally, two holes will be placed, especially if the patient has experienced a true acute angle closure with very highly elevated IOP.

One drop of Alphagan is instilled immediately post-laser to minimize risk of IOP elevation. The patient is sent home with an anti-inflammatory, often prednisolone (Pred Forte, Allergan), to be used QID for one week. At the one week post-op visit, the PI hole is observed to ensure no strands or blood vessels are running across the hole as these can encourage re-closure. Gonioscopy and OCT are repeated at the one week post-op and are the best gauges to treatment success for the laser PI.

Laser peripheral iridotomy is an effective therapy for pupillary block, narrow angles and angle closure. Prompt recognition and treatment may save your patient's vision. ■

Dr. Lighthizer is an assistant professor and the chief of the specialty care and electrodiagnostics clinics at Oklahoma College of Optometry.

To see a narrated video of peripheral iridotomy, go to www.reviewofoptometry.com or scan the QR code.

TRAVATAN Z®

(travoprost ophthalmic solution) 0.004%

BRIEF SUMMARY OF PRESCRIBING INFORMATION

INDICATIONS AND USAGE
TRAVATAN Z® (travoprost ophthalmic solution) 0.004% is indicated for the reduction of elevated intraocular pressure in patients with open-angle glaucoma or ocular hypertension.

DOSAGE AND ADMINISTRATION
The recommended dosage is one drop in the affected eye(s) once daily in the evening.
TRAVATAN Z® (travoprost ophthalmic solution) should not be administered more than once daily since it has been shown that more frequent administration of prostaglandin analogs may decrease the intraocular pressure lowering effect.

Reduction of the intraocular pressure starts approximately 2 hours after the first administration with maximum effect reached after 12 hours.

TRAVATAN Z® Solution may be used concomitantly with other topical ophthalmic drug products to lower intraocular pressure. If more than one topical ophthalmic drug is being used, the drugs should be administered at least five (5) minutes apart.

CONTRAINDICATIONS
None

WARNINGS AND PRECAUTIONS
Pigmentation
Travoprost ophthalmic solution has been reported to cause changes to pigmented tissues. The most frequently reported changes have been increased pigmentation of the iris, periorbital tissue (eyelid) and eyelashes. Pigmentation is expected to increase as long as travoprost is administered. The pigmentation change is due to increased melanin content in the melanocytes rather than to an increase in the number of melanocytes. After discontinuation of travoprost, pigmentation of the iris is likely to be permanent, while pigmentation of the periorbital tissue and eyelash changes have been reported to be reversible in some patients. Patients who receive treatment should be informed of the possibility of increased pigmentation. The long term effects of increased pigmentation are not known.

Iris color change may not be noticeable for several months to years. Typically, the brown pigmentation around the pupil spreads concentrically towards the periphery of the iris and the entire iris or parts of the iris become more brownish. Neither nevi nor freckles of the iris appear to be affected by treatment. While treatment with TRAVATAN Z® (travoprost ophthalmic solution) 0.004% can be continued in patients who develop noticeably increased iris pigmentation, these patients should be examined regularly.

Eyelash Changes
TRAVATAN Z® Solution may gradually change eyelashes and vellus hair in the treated eye. These changes include increased length, thickness, and number of lashes. Eyelash changes are usually reversible upon discontinuation of treatment.

Intraocular Inflammation
TRAVATAN Z® Solution should be used with caution in patients with active intraocular inflammation (e.g., uveitis) because the inflammation may be exacerbated.

Macular Edema
Macular edema, including cystoid macular edema, has been reported during treatment with travoprost ophthalmic solution. TRAVATAN Z® Solution should be used with caution in aphakic patients, in pseudophakic patients with a torn posterior lens capsule, or in patients with known risk factors for macular edema.

Angle-closure, Inflammatory or Neovascular Glaucoma
TRAVATAN Z® Solution has not been evaluated for the treatment of angle-closure, inflammatory or neovascular glaucoma.

Bacterial Keratitis
There have been reports of bacterial keratitis associated with the use of multiple-dose containers of topical ophthalmic products. These containers had been inadvertently contaminated by patients who, in most cases, had a concurrent corneal disease or a disruption of the ocular epithelial surface.

Use with Contact Lenses
Contact lenses should be removed prior to instillation of TRAVATAN Z® Solution and may be reinserted 15 minutes following its administration.

ADVERSE REACTIONS
Clinical Studies Experience
Because clinical studies are conducted under widely varying conditions, adverse reaction rates observed in the clinical studies of a drug cannot be directly compared to rates in the clinical studies of another drug and may not reflect the rates observed in practice. The most common adverse reaction observed in controlled clinical studies with TRAVATAN® (travoprost ophthalmic solution) 0.004% and TRAVATAN Z® (travoprost ophthalmic solution) 0.004% was ocular hyperemia which was reported in 30 to 50% of patients. Up to 3% of patients discontinued therapy due to conjunctival hyperemia. Ocular adverse reactions reported at an incidence of 5 to 10% in these clinical studies included decreased visual acuity, eye discomfort, foreign body sensation, pain and pruritus. Ocular adverse reactions reported at an incidence of 1 to 4% in clinical studies with TRAVATAN® or TRAVATAN Z® Solutions included abnormal vision, blepharitis, blurred vision, cataract, conjunctivitis, corneal staining, dry eye, iris discoloration, keratitis, lid margin crusting, ocular inflammation, photophobia, subconjunctival hemorrhage and tearing.

Nonocular adverse reactions reported at an incidence of 1 to 5% in these clinical studies were allergy, angina pectoris, anxiety, arthritis, back pain, bradycardia, bronchitis, chest pain, cold/flu syndrome, depression, dyspepsia, gastrointestinal disorder, headache, hypercholesterolemia, hypertension, hypotension, infection, pain, prostate disorder, sinusitis, urinary incontinence and urinary tract infections.

In postmarketing use with prostaglandin analogs, periorbital and lid changes including deepening of the eyelid sulcus have been observed.

USE IN SPECIFIC POPULATIONS
Pregnancy
Pregnancy Category C
Teratogenic effects: Travoprost was teratogenic in rats, at an intravenous (IV) dose up to 10 mcg/kg/day (250 times the maximal recommended human ocular dose (MRHOD), evidenced by an increase in the incidence of skeletal malformations as well as external and visceral malformations, such as fused sternebrae, domed head and hydrocephaly. Travoprost was not teratogenic in rats at IV doses up to 3 mcg/kg/day (75 times the MRHOD), or in mice at subcutaneous doses up to 1 mcg/kg/day (25 times the MRHOD). Travoprost produced an increase in post-implantation losses and a decrease in fetal viability in rats at IV doses > 3 mcg/kg/day (75 times the MRHOD) and in mice at subcutaneous doses > 0.3 mcg/kg/day (7.5 times the MRHOD).

In the offspring of female rats that received travoprost subcutaneously from Day 7 of pregnancy to lactation Day 21 at doses of ≥ 0.12 mcg/kg/day (3 times the MRHOD), the incidence of postnatal mortality was increased, and neonatal body weight gain was decreased. Neonatal development was also affected, evidenced by delayed eye opening, pinna detachment and preputial separation, and by decreased motor activity.

There are no adequate and well-controlled studies of TRAVATAN Z® (travoprost ophthalmic solution) 0.004% administration in pregnant women. Because animal reproductive studies are not always predictive of human response, TRAVATAN Z® Solution should be administered during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nursing Mothers
A study in lactating rats demonstrated that radiolabeled travoprost and/or its metabolites were excreted in milk. It is not known whether this drug or its metabolites are excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when TRAVATAN Z® Solution is administered to a nursing woman.

Pediatric Use
Use in pediatric patients below the age of 16 years is not recommended because of potential safety concerns related to increased pigmentation following long-term chronic use.

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

Hepatic and Renal Impairment
Travoprost ophthalmic solution 0.004% has been studied in patients with hepatic impairment and also in patients with renal impairment. No clinically relevant changes in hematology, blood chemistry, or urinalysis laboratory data were observed in these patients.

NONCLINICAL TOXICOLOGY
Carcinogenesis, Mutagenesis, Impairment of Fertility
Two-year carcinogenicity studies in mice and rats at subcutaneous doses of 10, 30, or 100 mcg/kg/day did not show any evidence of carcinogenic potential. However, at 100 mcg/kg/day, male rats were only treated for 82 weeks, and the maximum tolerated dose (MTD) was not reached in the mouse study. The high dose (100 mcg/kg) corresponds to exposure levels over 400 times the human exposure at the maximum recommended human ocular dose (MRHOD) of 0.04 mcg/kg, based on plasma active drug levels. Travoprost was not mutagenic in the Ames test, mouse micronucleus test or rat chromosome aberration assay. A slight increase in the mutant frequency was observed in one of two mouse lymphoma assays in the presence of rat S-9 activation enzymes.

Travoprost did not affect mating or fertility indices in male or female rats at subcutaneous doses up to 10 mcg/kg/day [250 times the maximum recommended human ocular dose of 0.04 mcg/kg/day on a mcg/kg basis (MRHOD)]. At 10 mcg/kg/day, the mean number of corpora lutea was reduced, and the post-implantation losses were increased. These effects were not observed at 3 mcg/kg/day (75 times the MRHOD).

PATIENT COUNSELING INFORMATION
Potential for Pigmentation
Patients should be advised about the potential for increased brown pigmentation of the iris, which may be permanent. Patients should also be informed about the possibility of eyelid skin darkening, which may be reversible after discontinuation of TRAVATAN Z® (travoprost ophthalmic solution) 0.004%.

Potential for Eyelash Changes
Patients should also be informed of the possibility of eyelash and vellus hair changes in the treated eye during treatment with TRAVATAN Z® Solution. These changes may result in a disparity between eyes in length, thickness, pigmentation, number of eyelashes or vellus hairs, and/or direction of eyelash growth. Eyelash changes are usually reversible upon discontinuation of treatment.

Handling the Container
Patients should be instructed to avoid allowing the tip of the dispensing container to contact the eye, surrounding structures, fingers, or any other surface in order to avoid contamination of the solution by common bacteria known to cause ocular infections. Serious damage to the eye and subsequent loss of vision may result from using contaminated solutions.

When to Seek Physician Advice
Patients should also be advised that if they develop an intercurrent ocular condition (e.g., trauma or infection), have ocular surgery, or develop any ocular reactions, particularly conjunctivitis and eyelid reactions, they should immediately seek their physician's advice concerning the continued use of TRAVATAN Z® Solution.

Use with Contact Lenses
Contact lenses should be removed prior to instillation of TRAVATAN Z® Solution and may be reinserted 15 minutes following its administration.

Use with Other Ophthalmic Drugs
If more than one topical ophthalmic drug is being used, the drugs should be administered at least five (5) minutes between applications.

Rx Only
U.S. Patent Nos. 5,631,287; 5,889,052, 6,011,062; 6,235,781; 6,503,497; and 6,849,253

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9/14 TRV14066JAD

Diagnostic **Quiz**

Is There 'Juvenile AMD?'

By Andrew S. Gurwood, OD

History

A 22-year-old white male presented with a chief complaint of decreased vision, which had progressively worsened during the past two years.

Several previous eye care providers informed the patient that he needed to see a retina specialist. Because of insurance-related complications, however, he never sought specialized retinal care.

The patient had no documented ocular history. He appeared to be in good systemic condition, and said that he didn't take any medications. Further, he reported no known allergies of any kind.

Diagnostic Data

Best-corrected visual acuity measured 20/80 OU at distance and 20/50 OU at near. External examination uncovered some central distortion on facial Amsler testing, which was confirmed on grid assessment.

We documented no evidence of afferent pupillary defect OU, but red color interpretation was unequal between the two eyes. There was no brightness desaturation. Refraction uncovered no changes OU.

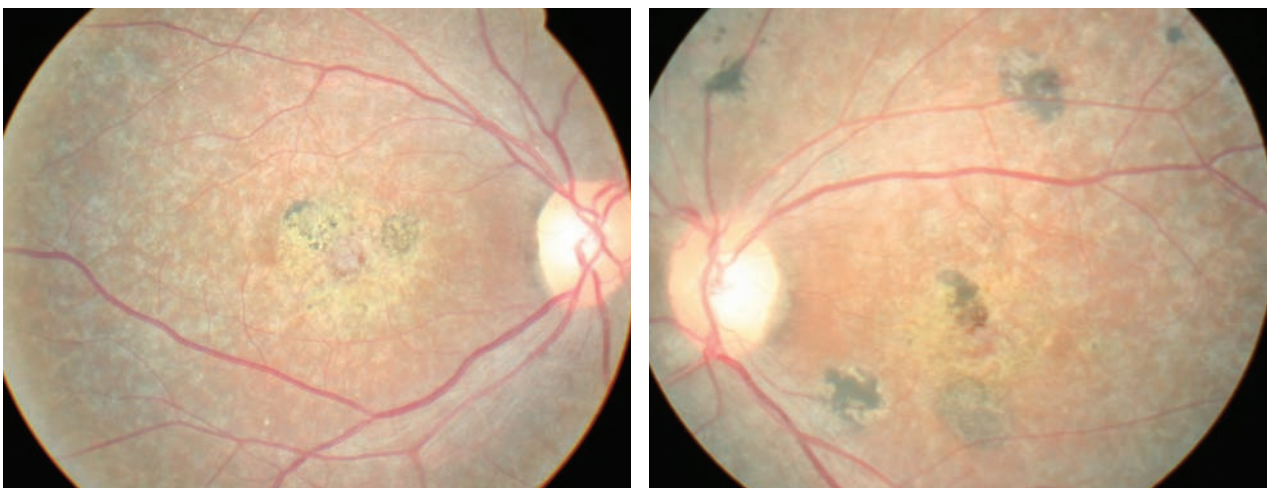
The anterior segment evaluation was normal in both eyes. Intraocular pressure measured 16mm Hg OU. The pertinent posterior segment findings are illustrated in the photographs.

Your Diagnosis

How would you approach this case? Does this patient require any additional tests? What is your diagnosis?

How would you manage this patient? What's the most likely prognosis?

To find out, please visit *Review of Optometry Online*, www.reviewofoptometry.com. Click on the cover icon, and then click "Diagnostic Quiz" under this month's table of contents. ■



This 22-year-old male presented with decreased vision in both eyes (OD left, OS right). What is the correct diagnosis?

Retina Quiz Answers *(from page 77):* 1) c; 2) c; 3) a; 4) d; 5) c.

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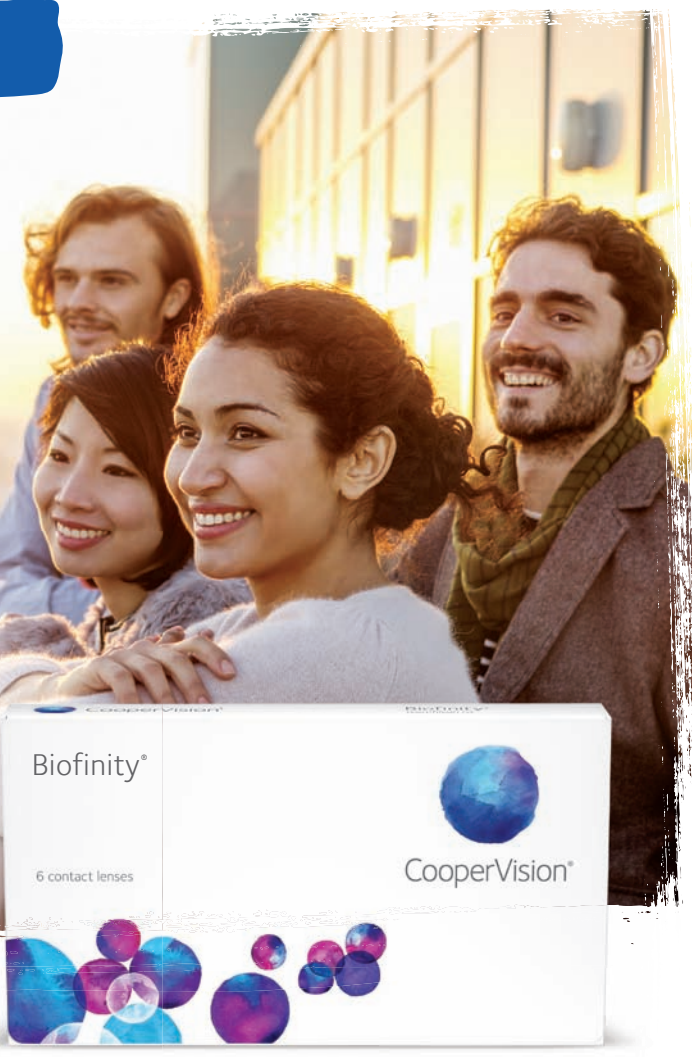

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at 12, 14, and 20 hours post-dose in a 3-month study[1,2]*

TRAVATAN Z® Solution has no FDA-approved therapeutic equivalent[3]

Help patients start strong and stay on track with the Openings Patient Support Program

INDICATIONS AND USAGE

TRAVATAN Z® (travoprost ophthalmic solution) 0.004% is indicated for the reduction of elevated intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension.

Dosage and Administration

The recommended dosage is 1 drop in the affected eye(s) once daily in the evening. TRAVATAN Z® Solution should not be administered more than once daily since it has been shown that more frequent administration of prostaglandin analogs may decrease the IOP-lowering effect.

TRAVATAN Z® Solution may be used concomitantly with other topical ophthalmic drug products to lower IOP. If more than 1 topical ophthalmic drug is being used, the drugs should be administered at least 5 minutes apart.

IMPORTANT SAFETY INFORMATION

Warnings and Precautions

Pigmentation—Travoprost ophthalmic solution has been reported to increase the pigmentation of the iris, periorbital tissue (eyelid), and eyelashes. Pigmentation is expected to increase as long as travoprost is administered. After discontinuation of travoprost, pigmentation of the iris is likely to be permanent, while pigmentation of the periorbital tissue and eyelash changes have been reported to be reversible in some patients. The long-term effects of increased pigmentation are not known. While treatment with TRAVATAN Z® Solution can be continued in patients who develop noticeably increased iris pigmentation, these patients should be examined regularly.

Eyelash Changes—TRAVATAN Z® Solution may gradually change eyelashes and vellus hair in the treated eye. These changes include increased length, thickness, and number of lashes. Eyelash changes are usually reversible upon discontinuation of treatment.

Use With Contact Lenses—Contact lenses should be removed prior to instillation of TRAVATAN Z® Solution and may be reinserted 15 minutes following its administration.

Adverse Reactions

The most common adverse reaction observed in controlled clinical studies with TRAVATAN Z® Solution was ocular hyperemia, which was reported in 30 to 50% of patients. Up to 3% of patients discontinued therapy due to conjunctival hyperemia. Ocular adverse reactions reported at an incidence of 5 to 10% in these clinical studies included decreased visual acuity, eye discomfort, foreign body sensation, pain, and pruritus. In postmarketing use with prostaglandin analogs, periorbital and lid changes including deepening of the eyelid sulcus have been observed.

Use in Specific Populations

Use in pediatric patients below the age of 16 years is not recommended because of potential safety concerns related to increased pigmentation following long-term chronic use.

For additional information about TRAVATAN Z® Solution, please see the brief summary of Prescribing Information on the adjacent page.

***Study Design:** Double-masked, randomized, parallel-group, multicenter non-inferiority comparison of the efficacy and safety of travoprost 0.004% preserved with benzalkonium chloride (BAK) to TRAVATAN Z® Solution after 3 months of treatment in patients with open-angle glaucoma or ocular hypertension. Baseline IOPs were 27.0 mm Hg (n=322), 25.5 mm Hg (n=322), and 24.8 mm Hg (n=322) at 8 AM, 10 AM, and 4 PM for TRAVATAN Z® Solution. At the end of Month 3, the TRAVATAN Z® Solution group had mean IOPs (95% CI) of 18.7 mm Hg (-0.4, 0.5), 17.7 mm Hg (-0.4, 0.6), and 17.4 mm Hg (-0.2, 0.8) at 8 AM, 10 AM, and 4 PM, respectively. Statistical equivalent reductions in IOP (95% confidence interval about the treatment differences were entirely within ±1.5 mm Hg) were demonstrated between the treatments at all study visits during the 3 months of treatment.

References: 1. Data on file, 2013. **2.** Lewis RA, Katz GJ, Weiss MJ, et al. Travoprost 0.004% with and without benzalkonium chloride: a comparison of safety and efficacy. *J Glaucoma.* 2007;16(1): 98-103. **3.** Drugs@FDA. FDA Approved Drug Products: TRAVATAN Z. www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm?fuseaction=Search.DrugDetails. Accessed July 31, 2014.

TRAVATAN Z®

(travoprost ophthalmic solution) 0.004%

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