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December 15, 2012

# REVIEW® OF OPTOMETRY

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## "NEW LOOK" OFFICE DESIGN CONTEST

# AN INSIDE LOOK AT EYE-CATCHING DESIGNS

Winning Ideas That Can Transform Your Practice., p. 27

Are We Gaining Ground on Ocular Infection?, p. 36

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VOL. 149 NO. 12 ■ DECEMBER 15, 2012

# *Review of Optometry* Mourns the Loss of Publisher Rick Bay

Industry veteran, publishing leader, business executive and friend, Mr. Bay's integrity, enthusiasm and dedication served as a model in the ophthalmic marketplace.

Ophthalmic industry veteran, ophthalmic publishing leader, dynamic business executive and mentor, Richard Bay, passed away on December 2 after a long illness. He was 67 years old.

Mr. Bay, longtime publisher of *Review of Optometry*, and, later, founder of *Review of Ophthalmology*, part of the Jobson Optical Group, was a highly visible executive in the field. To those in the industry and the professions he served, he will be remembered for his unique array of skills and dedication to exceeding the expectations of his customers, so many of whom would become fast friends.

**Rick Bay, publisher and president of the Review Group, will be remembered for his business initiative, friendliness and generosity.**

**"He will be deeply missed for so many reasons, but mostly because he was our true friend, mentor and leader."**

As Marc Ferrara, CEO of the Information Services division of Jobson Medical Information, noted, "Rick had been battling serious illness the last couple of years, but remained committed and active in his role here at JMI and the Review Group. He embodied such a rare combination of traits: business savvy, steadfast loyalty, competitive fierceness, impenetrable integrity and a personal warmth that made us all feel so very special when we were with him. He will be deeply missed for so many reasons, but mostly because he was our true friend, mentor and leader."

A lifelong resident of Philadelphia, Mr. Bay graduated from John Bartram High School in 1962. He started his career in the mailroom at Chilton Publishing Company in West Philadelphia, while attending Temple University. He also served his country as a member of the U.S. Army Reserves. He rose to the position of vice president at Chilton Publishing, at the helm of more than 40 publications. After the 1999 acquisition of the *Review*s by Jobson, Mr. Bay was named publisher and president of the Review Group.

Respected for his knowledge, loyalty and generosity, Rick was a mentor to many and will be best remembered for his devotion to his family and friends, his keen wit and sense of humor. Commented Christopher Glenn, editorial director of the *Review of Ophthalmology* Group, "Many optometrists and ophthalmologists who were served by the *Review* publications may never have crossed paths with Rick. But his respect for their skills, education and dedication to improving patients' lives was equaled by his respect for the integrity of the editorial content of the publications he managed."

Mr. Bay met the love of his life, Jeanne Kirk, while they were in high school and the couple celebrated 43 years of marriage this past June.

A life celebration is planned for a future date. The family has indicated that services will be private.

Contributions in his memory may be made to: Head and Neck Cancer Alliance, P.O. Box 21688, Charleston, SC 29413, or at HeadandNeck.org.

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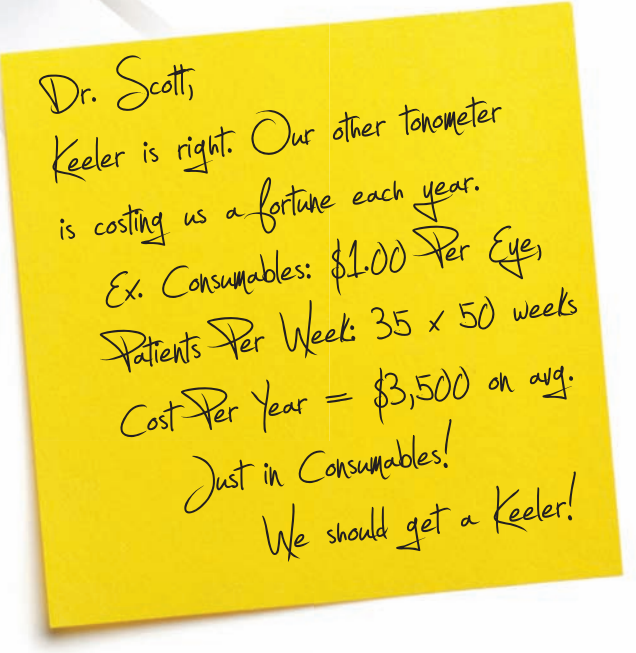


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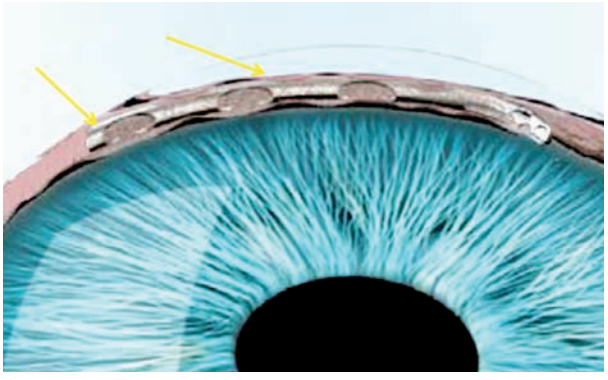
# Glaucoma Stent Could Eliminate The Need for Topical Drops

Implantation of an investigational microstent significantly reduces intraocular pressure in patients with open-angle glaucoma, according to research presented at this year's annual meeting of the American Academy of Ophthalmology in Chicago.

Preliminary clinical trial results of the Hydrus Microstent (Ivantis) indicated that the device altogether eliminated the need for topical glaucoma medications in the majority of participants.



**This stent, implanted into Schlemm's canal, eliminated the need for topical drops in more than 70% of glaucoma patients.**

The microstent, described as an "intracanalicular scaffold" by the company, is inserted into Schlemm's canal to increase outflow and reduce high IOP. It can be inserted using the same incisions as for cataract surgery. Currently, investigators are recruiting subjects for an ongoing Phase III clinical trial.[1]

In the recent study, the microstent was implanted in 69 patients with mild to moderate open-angle glaucoma. In 40 subjects, the device was implanted during cataract surgery, while the remaining 29 subjects had stent implantation without additional surgical intervention.

At six-month follow-up, patients who received both cataract surgery and stent implantation experienced a mean IOP reduction of 5.5mm Hg, from 21.1mm Hg to 15.6mm Hg. Those who had stent implantation alone experienced a mean IOP reduction of 4.7mm Hg, from 21.6mm Hg to 16.9mm Hg. No significant complications were reported.

Most impressively, 85% of combined surgery patients and 70% of stent-only patients no longer required topical glaucoma medications to control IOP levels. Further, they noted that the documented IOP reductions were sustained and consistent among all patients at one-year follow-up.

"So far, mini-stents appear to have important advantages in that they allow us to treat open-angle glaucoma at earlier stages and with lower complication risk," said Thomas W. Samuelson, M.D., a founding partner of Minnesota Eye Consultants and medical monitor of the Hydrus clinical trial. "If the devices can effectively control IOP over many years, it would be a real breakthrough in combating this blinding disease."

Crandall A. Safety and effectiveness study of the Hydrus device for lowering IOP in glaucoma patients undergoing cataract surgery. Clinical Trials identifier: NCT01539239. Available at: http://clinicaltrials.gov/ct2/show/NCT01539239. Accessed November 30, 2012.

## UAB Receives $1.9 Million for Glaucoma Screening at Walmart

The University of Alabama at Birmingham received a $1.9 million grant from the U.S. Centers for Disease Control and Prevention to initiate a glaucoma-screening program at two local Walmart locations. The initiative's primary goal is to facilitate earlier glaucoma detection in a high-risk population—namely, blacks age 40 and older.

"Our current model of eye care is simply not reaching one of the most at-risk populations for glaucoma: older African Americans," says Christopher Girkin, M.D., chair of UAB's Department of Ophthalmology and screening program director. "Historically, this is an underserved population, who are less likely to seek professional eye care services in a standard clinical setting. So, we're going to see if we can take appropriate vision care to them."

The two-year research program will install optical coherence tomography devices in independent optometry offices located alongside Walmart Vision Centers in Birmingham and Tuscaloosa. During the screening program, OCT images will be transmitted electronically to an image analysis database established at UAB's Department of Ophthalmology.

If signs of glaucoma are detected, "Patients will get their diagnosis, medicines and follow-up treatment by licensed optometrists located adjacent to the Walmart Vision Center," Dr. Girkin added. Patients with advanced glaucoma or significant concomitant ocular disease will be referred to the UAB glaucoma service, Callahan Eye Hospital Lions Eye Clinic or the Jefferson County Cooper Green Mercy Hospital Eye Clinic.

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# Study: Children's Headaches Aren't Usually Related to Eye Problems

Many parents assume that frequent headaches mean their child needs glasses, so they ask their doctor to refer their child for an eye exam. But, according to a new study, vision or eye problems are rarely the cause of recurring headaches in children, even if the headaches usually strike while the child is doing schoolwork or other visual tasks. This research was presented last month at the American Academy of Ophthalmology annual meeting in Chicago.

The researchers, pediatric ophthalmologists at Albany Medical Center in Albany, N.Y., conducted a retrospective review of the medical records of 158 children under age 18 who were seen for frequent headaches at the ophthalmology clinic from 2002 to 2011.

Although about 14% of the children reported that their headaches occurred while doing visual tasks like homework, and about 9% reported visual symptoms

**Eyeglasses don't necessarily help kids who have headaches, a study says. But does this study account for all factors?**

associated with their headaches, a need for vision correction did not appear to be the primary cause or a significant factor in any of these cases, the researchers concluded.

In addition, follow-up reports from parents showed that headaches improved in 76.4% of all study subjects, including children who did not receive new vision correction prescriptions as well as those who did. Furthermore, new prescriptions did not make children more likely to have their headaches improve.

About 30% of the children in the study had eye conditions that went beyond the need for vision correction, including strabismus, amblyopia or other, more serious conditions. But because this was a retrospective study, the researchers were unable to connect these factors with headache causes.

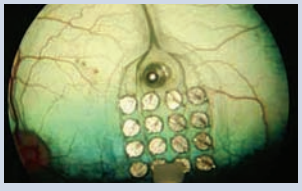
"We hope our study will help reassure parents that, in most cases, their children's headaches are not related to vision or eye problems, and that most headaches will clear up in time," said Zachary Roth, M.D., who led the research team.

But, for optometrists who see a lot of these children, this study doesn't quite hold water.

"As far as I can tell, this was a poorly done, retrospective clinical study presented as a poster, and was not published as a peer-reviewed paper in a respected journal," says Dominick Maino, O.D., M.Ed., professor of pediatrics/binocular vision at Illinois College of Optometry in Chicago. "It appears as if they did little to no assessment of the binocular vision system beyond strabismus. It also looks as there was no assessment of accommodation—which is unfortunate because most of the research published in this area suggests that accommodation plays a major role in headaches experienced by patients."

Dr. Maino says that the poster's primary value was simply to give notoriety to the American Academy of Ophthalmology. "It does all patients who suffer from headaches of a visual etiology a major disservice," he says.

## Neuroprosthetic Allows Blind to 'Read' Braille—on the Retina



For the first time, researchers have streamed braille patterns directly into a blind patient's retina, allowing him to read four-letter words accurately and quickly with an ocular neuroprosthetic device, the Argus II (Second Sight). The implant uses a grid of 60 electrodes—attached to the retina—to stimulate patterns directly onto the nerve cells. For this study, researchers used a computer to stimulate six of these points on the grid to project the braille letters. The patient was shown each letter for half a second and had up to 80% accuracy for short words.

Primarily for patients with retinitis pigmentosa, the Argus II uses a small camera mounted on a pair of glasses, a portable processor to translate the electrical signal from the camera, and a microchip with electrodes implanted directly on the retina. But for this study, researchers bypassed the camera and stimulated the retina directly.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*AIR OPTIX® AQUA Multifocal (lotrafilcon B) contact lenses: Dk/t = 138 @ -3.00D. **Based on subjective ratings of intermediate and distance vision, and vision for daytime driving, night driving, and TV viewing. †In emerging presbyopes, among those with a preference. ††Among those with a preference. ^Trademarks are the property of their respective owners.

**Important information for AIR OPTIX® AQUA Multifocal (lotrafilcon B) contact lenses:** For daily wear or extended wear up to 6 nights for near/far-sightedness and/or presbyopia. Risk of serious eye problems (i.e. corneal ulcer) is greater for extended wear. In rare cases, loss of vision may result. Side effects like discomfort, mild burning or stinging may occur.

**References: 1.** Based on third-party industry report, Alcon data on file, Jan 2010-Sep 2011. **2.** Woods J, Woods C, Fonn D. Early symptomatic presbyopes—What correction modality works best? *Eye Contact Lens.* 2009;35(5):221-226. **3.** Rappon J. Center-near multifocal innovation: optical and material enhancements lead to more satisfied presbyopic patients. *Optom Vis Science.* 2009;86:E-abstract 095557. **4.** In a randomized, subject-masked clinical study at 20 sites with 252 patients; significance demonstrated at the 0.05 level; Alcon data on file, 2009. **5.** Rappon J, Bergenske P. AIR OPTIX® AQUA Multifocal contact lenses in practice. *Contact Lens Spectrum.* 2010;25(3):S7-S9.

**See product instructions for complete wear, care, and safety information.**

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# Corneal Cells Replace Retinal Cells

Corneal cells could be adapted for use in the retina to treat blinding eye conditions, according to a recent study in the *British Journal of Ophthalmology*.

Using a mouse model, researchers in England discovered that corneal limbal stromal progenitor cells could be cultured to create functional neuronal retinal cells that could be used in the very same patient.

"We are now investigating whether these cells could be taken from the front of the eye and be used to replace diseased cells in the back of the eye in the retina," says lead author Andrew Lotery, M.D., FRCOphth, a professor of ophthalmology at the University of Southampton, U.K. "If successful, this would open up new and efficient ways of treating people who have blinding eye conditions."

Specifically, it could mean new treatments for conditions such as retinitis pigmentosa and wet AMD. By using corneal limbal stromal cells, patients would avoid complications with rejection or contamination because the cells taken from the eye would be returned back to the same patient, the authors contend.

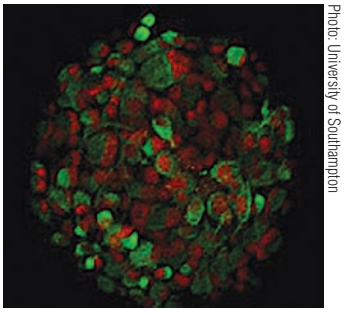

Photo: University of Southampton

**Stem cells isolated from the corneal limbus grow in culture.**

The corneal limbus is one of the most accessible regions of the eye, which means cells could be easily obtained with little risk to the patient's eyes and vision.

While the discovery is promising, Dr. Lotery says more research is needed to develop the approach before it can be used in human patients.

Chen X, Thomson H, Hossain P, Lotery A. Characterisation of mouse limbal neurosphere cells: a potential cell source of functional neurons. B J Ophthalmol. 2012 Nov;96(11):1431-7.

## Even Santa Needs His Eyes Checked

Santa Claus is comin' to town… for his annual eye exam. For the third consecutive year, Jolly Old Saint Nick is making a special visit to the Southern College of Optometry in Memphis.

"From the extensive cataract development in a pair of eyes well over 1,000 years old, to the rigors of night flying, Santa Claus has many unique stresses upon his visual system," says Daniel Taylor, O.D., who did the honors last year. "Examining Santa Claus' eyes was one of those once-in-a-lifetime privileges—a man in his position has the hopes of so many riding on his vision."

After his exam, Santa takes pictures with other patients and hands out candy canes. The event is a big hit at the clinic. The college has found it helps younger patients be more comfortable with getting their eyes checked.

After all, Santa's watching.

## Sage Advice: Rosemary Can Protect the Retina

Rosemary is good for chicken, but it's also good for…age-related macular degeneration? That's the conclusion from neurology researchers who found that carnosic acid, a component of the herb rosemary, fights free radicals to protect against retinal degeneration.

In a mouse model, the compound triggered the production of antioxidant enzymes in the cells, which in turn lowered levels of reactive oxygen and cell-damaging free radicals and peroxides. The researchers, from Sanford-Burnham Medical Research Institute in La Jolla, Calif., published these results in the November issue of *Investigative Ophthalmology & Visual Science*.

The investigators are now developing derivatives of carnosic acid and related compounds to protect the retina and other areas of the brain from degenerative conditions, including AMD and various forms of dementia.

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# For Cataract Surgery, Laser is a Bit Better

Intuitively, using a femtosecond laser for cataract surgery seems like a safer and better method than using manual instruments. But, because the technology is so new, not much data has been compiled to confirm this, or to quantify any improvement in outcomes.

At last month's annual meeting of the American Academy of Ophthalmology in Chicago, three presentations finally provided preliminary outcome measures that showed more predictable cataract surgery results with the femtosecond laser and a few signals of potential improvements for patients.

• Burkhard Dick, M.D., of Germany, reported the results of 850 cases of cataract surgery using femtosecond laser (using the Catalys system, OptiMedica). Compared to techniques using handheld surgical instruments, the femto laser creates a more precise capsulotomy size and shape, as well as less shrinkage of the capsular bag, he said.

Nearly all (99%) of the laser capsulotomies required no manual dissection to complete the capsulorhexis.

The laser also reduced effective phaco time for lens fragmentation by 96% on average—and phaco time was reduced somewhat even for the hardest lenses. Proponents of femto cataract surgery believe that reducing the eye's exposure to phaco energy will be more sparing of the corneal endothelium and may reduce the incidence, or at least the severity, of post-op cystoid macular edema.

Dr. Dick also noted that postoperative inflammation on day one was reduced by about 19%, and best-corrected visual acuity was also improved during the first two months post-op.

• Pavel Stodulka, M.D., Ph.D., of the Czech Republic, reported his experience with 1,000 consecutive cases of laser-assisted cataract surgery (using the Victus laser, by Bausch + Lomb; not approved in the U.S.). The system achieved a complete circular capsulotomy in all cases. Capsulotomy radial tear developed in 0.2% of eyes during laser phaco, compared to a rate of 0.79% to 5.6% in manual cataract surgery.

• Michael A. Lawless, M.D., of Australia, reported on 500 consecutive cases (using the LenSx system, Alcon). Of these cases, zero had posterior capsule tears, compared to his rate of 1% by manual surgery. He also reported zero posterior lens dislocations, and a 0.2% rate of anterior radial tears.

"Laser cataract surgery is safer than I can achieve with my best manual technique," Dr. Lawless said.

In regard to visual and refractive outcomes, Dr. Lawless noted only slight statistically significant improvement overall; however, a subset of patients implanted with one multifocal IOL achieved a better visual result.

Specifically, 75% of patients who received laser cataract surgery had visual acuity of 20/25 or better unaided, compared with 60% in the manual cataract surgery group. ■

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# Monthly Multifocal Pearl

## Realizing the Power of the AIR OPTIX® AQUA Multifocal Contact Lens

By Steven J. Lowinger, OD

When dealing with today's presbyopic patients, multifocal contact lenses have been monumental in building and maintaining a vital segment of this patient base. Although each case is different, certain steps we take in fitting multifocal patients are universal regardless of brand, power, or visual demand. One of the most important steps is setting realistic patient expectations. From simple fits to the more complex, setting proper expectations is the easiest route to a winning outcome with multifocal lenses. It is also important to explain that contact lens fitting is a process.

In our office, our multifocal of choice is the AIR OPTIX® AQUA Multifocal contact lens because of the good near and intermediate vision it provides while maintaining excellent distance acuity. While all patients are different, some categories of patient fits seem to present more of a challenge. Assessing and fitting patients in this category is key in expanding your base of happy multifocal contact lens wearers. The following cases do not represent the *only* type of multifocal patients you will see, but are meant to demonstrate common situations to give you a better grasp of fitting *all* types of multifocal patients.

### FROM MONOVISION TO MULTIFOCALS

One challenging scenario is when a monovision patient decides to switch to multifocal lenses—for better night vision, specific vision demands or whatever the case. On the bright side, this patient type presents the greatest reward when fit properly.

**Case #1: Chris C.**

- 56-year-old male having problems with his computer vision.
- Rx: +2.25 OD and +4.75 OS in a two-week replacement lens.
- Refraction: +2.25 – 0.25 x 006 OD and +2.50 – 0.50 x 175 OS with an add of +2.25.
- Saw reasonably well near and far, but couldn't see his computer without leaning forward. (We often see loss of intermediate vision with increased add power in monovision.)

Because AIR OPTIX® AQUA Multifocal contact lenses provide strong binocular vision at all ranges, we refit Chris C. into a +2.50 HI ADD in the OD and a +2.75 HI ADD in the OS. We explained that there would be an adjustment period while he reacquainted himself with improved near and distance vision in both eyes. We made an adjustment at the one-week follow-up visit (+3.00 HI ADD OS) to optimize his distance, near, and intermediate vision, and now he is much happier and his neck feels much better.

### GIVE A LITTLE TO GET A LOT

Garnering a reputation as being a cutting-edge multifocal contact lens fitter will enhance your practice and patient base considerably. Case in point: the patients mentioned here are more than just satisfied customers—they have become strong referral sources for our practice.

### EMERGING PRESBYOPES

Another patient type we tend to see is the emerging presbyope.

**Case #2: Kim K.**

- 44-year-old female who has never had eyewear correction
- Recently noted issues with her computer and reading vision
- Refraction: +0.25 OD and a plano OS with a +1.25 add.

After setting expectations with Kim K. and having her wear AIR OPTIX® AQUA Multifocal contact lenses for a while in the office, we were able to use the lens's adaptive minus power profile to push the plus and give her a +0.50 LO ADD OU so she could see 20/20 both far and near. After the typical adjustment period for a first-time lens wear, she let us know how happy she was with this new visual system by referring two of her friends for multifocal fits.

**Case #3: Jane D.**

- 47-year-old female; current contact lens wearer with no interest in wearing glasses.
- Rx: –3.00 OU with an add of +1.50.
- She was wearing a two-week lens with a –2.50 OU, and reported good comfort with it, but admitted to overwear and having difficulty seeing her smartphone.

While monovision may seem a compelling choice for these patients, the need for good acuity—especially good binocularity—makes multifocals the lens of choice for these patients. In fact, studies have shown that patients tend to prefer multifocal to monovision at an average rate of 3:1.[1,2] The challenge in transitioning this patient type is similar to that in the previous example, except you now have to keep them as comfortable as they were in their previous lenses.

We refit Jane D. with AIR OPTIX® AQUA Multifocal contact lenses, with a final prescription of –2.75 OU with a MED ADD in both eyes to maintain her binocular vision. We discussed monthly compliance with her and instructed her to replace her lenses on the first of every month. We chose the AIR OPTIX® AQUA Multifocal contact lens in this case because we wanted to provide good distance, near, and intermediate vision while ensuring proper compliance. Studies have shown that patients in monthly lenses have better compliance* than those in two-week disposables.[3]

*Dr. Lowinger is in private and retail practice in South Florida. He is a speaker on multiple topics and is the former chair of the leased tenant committee for the Florida Optometric Association.*

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* Compliance with manufacturer-recommended replacement frequency.

1. Benjamin WJ. Comparing multifocals and monovision. CL Spectrum. 2007 Jul. Available at: www.clspectrum.com/article.aspx?article=100637 (Accessed November 2012).
2. Richdale K, Mitchell GL, Zadnik K. Comparison of multifocal and monovision soft contact lens corrections in patients with low-astigmatic presbyopia. Optom Vis Sci. 2006;83(5):266-73.
3. Dumbleton K, Woods C, Jones L, et al. Comfort and vision with silicone hydrogel lenses: effect of compliance. Optom Vis Sci. 2010;87(6):421-425.

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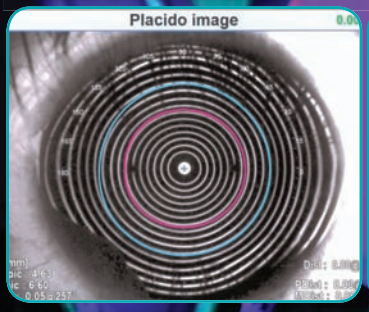



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**The TRS-5100 then completes minimal refinements or a traditional refraction (HOAs, pathologies, RX shifts from central-4mm), and patients can compare old vs. new Rx.**

# ...in a Fraction of the Time

L

| HOA [µm]: @4.00mm / Order = 4 | T.Sph | T.Coma | T.Tre | HO |
|---|---|---|---|---|
| Total: | 0.020 | 0.040 | 0.025 | 0.059 |
| Cornea: | 0.061 | 0.108 | 0.073 | 0.155 |
| Internal: | 0.041 | 0.085 | 0.091 | 0.156 |

| Refraction: VD = 13.75mm | Sph | Cyl | Axis | RMS |
|---|---|---|---|---|
| WF@4.00 | +1.00 | -0.50 | 105 | 0.07D |
| WF@5.42 | +0.75 | -0.50 | 111 | 0.19D |
| Diff | -0.25 | 0.00 | 6 | |

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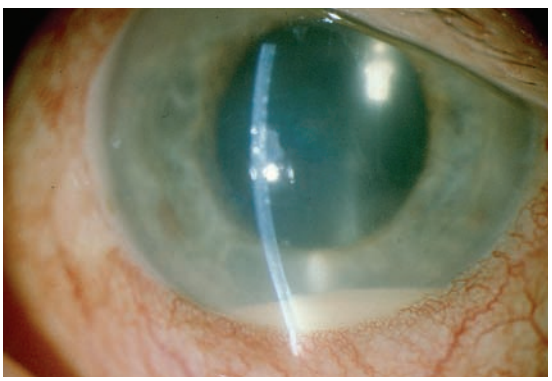



# Departments

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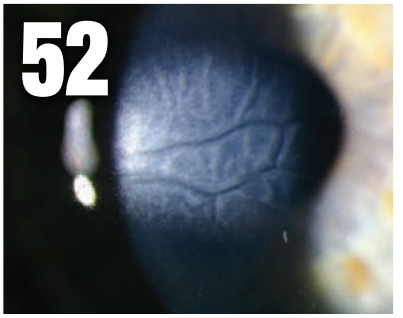


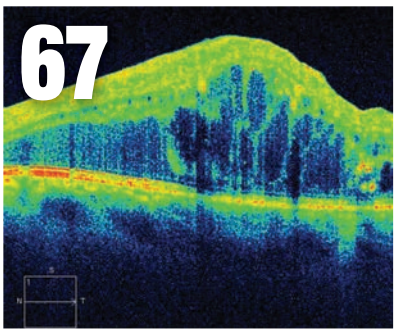


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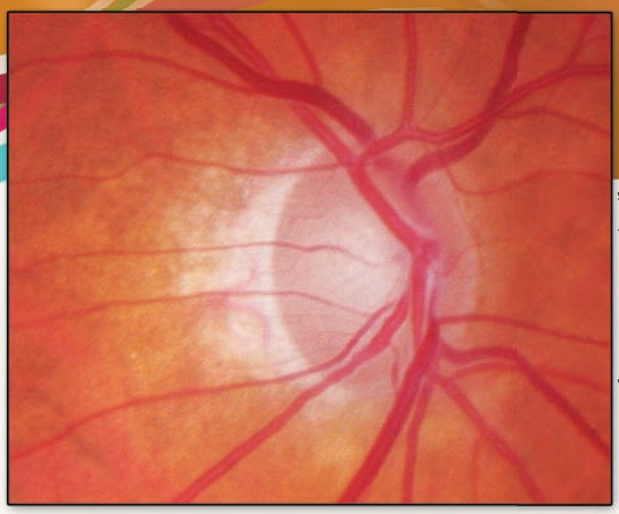

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# Letters to the Editor

*If you think that you can see just as much with a direct or monocular indirect ophthalmoscope without dilation as you can with a binocular indirect ophthalmoscope and dilation, you're deluding yourself.*

## None Shall Lack for Proper Care?

"With full deliberation, I freely and solemnly pledge that: I will practice the art and science of optometry faithfully and conscientiously and to the fullest scope of my competence … I will place the treatment of those who seek my care above personal gain and strive to see that none shall lack for proper care."

It's been a long time since I've recited those words from the "The Optometric Oath," as put forth by the American Optometric Association. All of us have pledged this oath or one similar to this at some time in our careers, usually as fledgling students or upon matriculation. How many of us remain true to our promise as we practice today?

Recently, I sat beside a young doctor for several hours of continuing education. Much of it concerned peripheral retinal disease. During a break, she told me that she practices with a company that offers free eye exams. Under the circumstances, I couldn't help but ask, "Do you dilate?" Exasperated, she replied, "There's no time for that!" I wondered if she saw the irony in sitting through a class looking at photos of conditions, such as lattice generation, that she would rarely detect in practice.

If you really want to clear a table at a continuing education luncheon, just start asking about dilation.

I remember years ago talking with a recent graduate about his work situation. He said that before he was hired, he asked his employer if he could dilate. He was told that he could do anything he wanted as long as he saw six patients an hour. That type of schedule, with no assistant, precluded dilation with any regularity.

When asked if they dilate, a number of my older colleagues simply say, "That's not why I got into optometry," or "My patients hate it." Sound familiar?

Our patients really do hate it, don't they? Years ago, I had an older gentleman who presented with symptoms of retinal detachment. He had small pupils, was petrified to drive dilated, but refused to be referred. After a lot of cajoling, he finally consented. Sure enough, a third of the temporal retina in his left eye was detached. He broke down in tears when I gave him the news. He thanked me for being persistent. We called his daughter to come and drive him immediately to a retinal surgeon. Later that afternoon, he was buckled. He hated dilation, but I think he would have hated to lose the vision in his left eye more.

I called several optometric offices today asking to schedule an eye exam. I also asked whether I would be dilated. The most common answers I received were "no" and only if I were diabetic, had glaucoma, or only if the doctor sees a problem.

"Only if the doctor sees a problem." You've got to love that answer. Ignorance is bliss.

Before optometrists were allowed to use DPAs in my state, I had a 30-year-old white female in my chair. She was asymptomatic. Best-corrected visual acuity in her right eye was 20/25. Tangent screen was normal. I couldn't see anything amiss with direct ophthalmoscopy or biomicroscopy. It would have been easy to dismiss the slightly reduced acuity. Fortunately, I referred her out. Turns out, she had a mid-peripheral choriodal melanoma that just happened to distort the macula a bit. Two years later, when I could finally use DPAs and dilate, I realized what I couldn't

# Sight Gags

**By Scott Lee, O.D.**


*"Very impressive. Can you make my dilating drops **re**appear now?"*

*Maybe it's high time those who don't want to change with the times and serve their patients fully (both visually and medically) get off their high horses and retire.*

see: My pupils dilated, too! After that, I offered dilation at every comprehensive eye exam.

Or take Bob. Bob had retired 10 years earlier and moved away. He just happened to be in the area visiting family and decided he would have his eyes examined. When I asked when he'd last had his eyes dilated, he said that it was the last time I saw him. He had been examined many times since, but the doctor he saw, "Just doesn't do that." It took a couple minutes, but I finally convinced Bob that it was a good idea to dilate after so many years. He had a mid-peripheral choroidal melanoma.

If you think that you can see just as much with a direct or monocular indirect ophthalmoscope without dilation as you can with a binocular indirect ophthalmoscope and dilation, you're deluding yourself. You will miss disease. You just won't know it.

So, I ask you, doctor: Have you practiced the art and science of optometry faithfully and conscientiously and to the fullest scope of your competence today? Have you placed the treatment of those who seek your care above personal gain and strove to see that none shall lack for proper care? In other words, have you kept the oath that you professed so many years ago? Or have you subjugated your patients' best interests to those of your own and/or to those of an employer?

*—David N. Moore, O.D. (retired)*
*Burton, Mich.*

*Editor's note: More than one-third of optometrists haven't had a complete eye examination, including dilation, in three years or more, according to* Review*'s recent Diagnostic Technology Survey.*

## Medical Model Muddle Rebuttal

As a recent 2012 graduate from Pacific University College of Optometry, I was very discouraged by Dr. Moffett's letter to the editor. ("Medical Model Muddle," September 2012.) By assuming that new graduates are "suspect regarding refraction" and have "no knowledge in fitting firm contact lenses," I think Dr. Moffett sounds as if he is the type of aging optometrist who has failed to truly continue his education since graduating in 1977.

I myself am completely comfortable fitting rigid contact lenses (bifocal, toric or spherical) as well as hybrid contact lenses. Most of my classmates feel the same.

Dr. Moffett's letter also scoffs at pharmacology. Is he unaware of how vitally important it is for an O.D. to know what medications the patient is on, what ocular side effects the patient may encounter, and what contraindications may be present? While Dr. Moffett takes issue with what new graduates are learning (or seemingly not learning) about in school, it appears to me that he doesn't care about advances in the optometry field, and he certainly appears to care less about his own patients if he is not concerned about pharmacology. Maybe he skips the medical articles in *Review of Optometry* because in his mind that would be something a junior M.D. would read, not someone who is concerned with proper patient care.

Let me point out a key phrase in the first paragraph of Dr. Moffett's letter: "We were very well qualified optometrists." Yes, refraction skills and contact lens fitting made you a qualified optometrist in 1977. If that is still only all you can do today, are you qualified? No.

In addition, with the shortage of ophthalmologists already hitting communities, who is going to manage that patient with glaucoma? Or remove the metallic foreign body from the welder's eye? Or help the amblyopic 6-year-old reach his full visual potential? Or let a patient know if he is a candidate for LASIK surgery? Or know when a dry macular degeneration patient has converted to wet and needs ophthalmologic care?

New graduates are stepping up to the plate. We are trained in all the basics, all the advances and everything in between. Maybe it's high time those who don't want to change with the times and serve their patients fully (both visually and medically) get off their high horses and retire. Vision and health go hand in hand in the eye, and you truly aren't caring for your patients unless you do both.

Now is one of the most exciting times to be entering into the optometry profession. We have the opportunity to be fantastic family clinicians dealing with a wide array of patients, or we can focus and hone our expertise on one main clinical skill such as pediatrics or neuro-optometry. And the technology is also extremely exciting! From frequency doubling technology to optical coherence tomography to topography to automatic phoropters—we are in an era where we can provide better care for our patients than ever before.

Dr. Moffett sarcastically asks, "But then, who really cares about patients anyway?" New graduates, that's who.

*—Brittany G. Schauer, O.D.*
*Mandan, N.D.*

# Unsafe at Any Speed?

When an elderly patient with impaired vision gets behind the wheel, like it or not, you ride shotgun. **By Jack Persico, Editor-in-Chief**

There's a sign on the soda machine at my office that says, "Please open bottles slowly." Every time I see it, I roll my eyes. A soda's not exactly a lethal weapon. If it fizzes a bit when I open it, I think I'll survive the ordeal.

I doubt that anyone appreciates this sort of overprotective scolding, especially about something so trivial. And yet, millions of people *do* wield a lethal weapon every day and perhaps should be warned not to, before their actions endanger themselves and innocent bystanders—namely, senior citizens who continue to drive when they probably shouldn't.

Seniors are the fastest growing segment of the driving population, according to the Department of Transportation. And this same group is, of course, increasingly developing age-related vision problems like glaucoma and macular degeneration. Those trends place an obligation on eye doctors to be ever vigilant for vision—*and* non-vision—impairments in their patients that pose a risk to safety on the roads.

A recent study found that optometrists and ophthalmologists do recognize that need, but come up short in some key ways. University of Michigan researchers surveyed 404 eye care providers about how they intervene with elderly patients who lack the capability to be safe drivers. Encouragingly, 87% said that they consider it their responsibility to counsel the patient about their aptitude for driving; however, only about two-thirds routinely do so, mostly inquiring about their confidence driving at night and reading road signs.

Fewer than 10% of eye doctors ask about specific driving activities like merging lanes, making left turns at an intersection and driving in reverse. That's a missed opportunity. As you well know, specific questions yield better information. Ask an emerging presbyope how his vision seems and you'll get a vague answer; ask him if he has any trouble reading menus in restaurants and you'll get a completely different response.

Worryingly, when an eye doctor identifies a patient with questionable driving skills, not enough is done to get the patient necessary care—or off the roads. Only 36% of the doctors in this survey refer such patients to a primary care doctor and 28% refer to a driving rehabilitation center. Not surprisingly, the reluctance stems from medicolegal concerns, with 24% worried about the consequences of taking action and 44% worried about inaction. The bottom line: You're already involved, by dint of your exam and what it reveals, so you need to see this through.

These patients must know that you're on *their* side. Stress that adherence to your care could help maintain and, in the case of AMD, restore their vision—and this may keep them independent for a bit longer. Caregivers can be an important ally. Try to get the patient and family to come to the realization on their own. Educate—don't dictate. No one likes a scolding.

Now I think I'll throw caution to the wind and go get a Diet Coke. ■

## Remembering a Role Model

With great sadness, this month we mourn the loss of a friend, a publisher and a role model. Rick Bay's contributions to this publication are innumerable. Ask anyone who worked with him how his leadership influenced them and you'll hear many stories. Here's just one.

I first met Rick nearly 20 years ago, at the start of my career. I worked on the *Review* staff in the mid-1990s, editing the special supplements. One day, I had to go to Rick with some bad news: There was a mistake printed in a supplement, and the sponsor wasn't going to like it. But another editor handled this project, so my hands were clean. I told him about the mistake, and stressed that the chain of events didn't involve me.

Rick was disappointed—not about the typo, or its consequences with the sponsor. He was disappointed in me, for only thinking about myself. He correctly saw infighting among the staff as the bigger problem. He inspired a callow youth to look beyond his own circumstances, to focus on the greater good. To him, even a setback was a chance to build unity. And as always, he led by example.

Rick wasn't just a manager; he was a mentor. I've learned and improved greatly during my time with him, as has everyone who had the pleasure of that experience. We'll miss him and will strive to honor his legacy every day.

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# The No-Show Must Go on!

Why do patients no-show? There are many valid reasons, such as "It's a nice, sunny day" or "It's too rainy to go out" or "Something's on TV." **By Montgomery Vickers, O.D.**

Since my first two patients did not show up today, let's talk about no-shows.

So, why do patients no-show? Of course, we all understand that people do, on occasion, just plain forget or the car broke down or the kid got sick or the moon was crescent or the Martians abducted the cat or the fork ran away with the spoon or the wife ran away with the mailman or there were huge unexpected expenses at the honky-tonk or the horoscope showed Capricorn rising or Elvis was sighted or papa was a rolling stone or Katie Couric had The Donald on or girls just wanna have fun and so on and so on. These are all legitimate excuses that any doctor would understand completely and we can all agree that each of these is way more important than actually seeing.

However, not everyone has such powerful reasons to no-show. Some weaker excuses:

1. "Why should I show up if the services are provided free from the government? Doesn't that mean the doctor doesn't get paid and, because we like the doctor, why not kindly leave that slot open so he or she can have a paying customer? You're welcome, doctor."
2. "I have five pairs of monthly disposables that I ordered in 2009."
3. "My left eye went blind yesterday so I will wait until it gets better, and then call."
4. "There is a recession and I just got back from two weeks at Disney."
5. "I'll just have my husband ask about this green thingy on my eye when he has his appointment next month."
6. "I can't come in. I have pink eye."
7. "I saw on TV that I can get three pairs of invisible bifocals for 13 cents."
8. "I still have that sample contact lens you gave me last year."
9. "Obama won and it's just horrible."
10. "Obama won and it's just wonderful."
11. "Who's Obama? I better Google that."
12. "It's beautiful and sunny outside and I got the kid out of school for her examination and we can spend quality time texting our respective friends. Maybe you can write an excuse, doctor?"
13. "I probably should see a guacamole specialist this year."
14. "I'll just call and reschedule again and again and again and again and again and again and again and again and again and again…"

## Saying Yes to No-Shows

Of course, there are advantages to having no-shows. It gave me time to write this potentially award-winning column so you can read it when you have a couple of no-shows. And, you can strategize for your practice so it will be easier to explain why you went broke when no one showed up.

There are, of course, a couple of ways to prevent no-shows. For example, you go to their house and force them into your car at gunpoint about 30 minutes before the appointment. That is very effective.

Or no longer make appointments. That can bring the no-show numbers way down.

Or move to Washington State where marijuana was just legalized. Your glaucoma practice will boom.

Or, instead of the patient coming to your office for the exam, you just show up at his or her house with your equipment—unless of course The Donald is on Katie. In that case, just no-show. ■

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# Rules, Rules and More Rules

Nobody loves all these guidelines and regulations—but ignorance of the rules is no excuse for breaking them. **By John Rumpakis, O.D., M.B.A., Clinical Coding Editor**

In reflecting back over this year and the changes that have come upon us in medical coding and compliance, the overwhelming theme has been about rules, more rules, and more damned rules.

Our universe of providing eye care has changed forever and will continue to be subject to innumerable rules. Health care reform has certainly added to our regulatory burden in more ways than one, and will continue to do so. Even for someone like me who lectures on medical coding and compliance issues, sometimes it seems that the amount of research and reading that I do is analogous to drinking through a fire hose to stay on top of all the subject matter.

## Get the Upper Hand

But, should this continual barrage of new rules, guidelines and regulations drive us to behave like the ostrich? I hope not, because hiding your head in the sand will not make any of these things go away. The answer lies in being proactive rather than reactive. Those practices and practitioners who adopt internal strategies and tactics focused on embracing change, rather than avoiding it, clearly have an upper hand.

Fortunately, many of you are in this camp. In my travels around the country, I see a significant groundswell in those who understand that seeking out, learning and following these rules, guidelines and regulations helps to provide better clinical care, increase revenue from eye care services and reduce risk.

Unfortunately, there are also some providers in our profession who believe that the rules don't apply to them, because they don't follow the "medical model," or that they just provide refractive care—or, worst of all, they've just thrown their hands in the air in frustration and given up.

*Should this continual barrage of new rules and regulations drive us to behave like the ostrich? Hiding your head in the sand will not make any of these things go away.*

## Make 2013 Your Year

I must get one or two phone calls or emails per week from O.D.s who are being audited by a carrier, whether medical or refractive, with a stated restitution of six figures. That was unheard of just a few years ago, but this is the reality of today. In my efforts to assist colleagues who are going through audits, one thing is clear to me: It is the rare exception when a provider intentionally tries to defraud a carrier. In my experience, most optometrists caught in this situation simply don't know the rules surrounding medical charting and the subsequent CPT coding and billing for professional services and materials.

To illustrate a common example of this, most O.D.s were taught to perform one kind of eye examination—a comprehensive exam—even if the patient's presentation doesn't justify it. However, in the health care system of today, it's important that you perform an exam that's commensurate with the presentation of your patient. So, if you're following a patient with a specific disease state, perform an examination that focuses on the ocular elements of that disease. (This is one of the true benefits of using the 992XX E&M codes rather than the 920XX codes—they allow you to tailor the examination for the specific structures of the eye that are pertinent to the disease state, rather than just automatically performing a comprehensive exam without appropriate justification in the record.)

So, as 2012 comes to an end, here's my simple message to all of you: Make 2013 *your* year to embrace the ongoing changes in health care. Make 2013 *your* year to use modern, up-to-date resources to stay informed. Make 2013 *your* year to make a plan to integrate and implement these changes into your practice. And most importantly, make 2013 *your best year ever*—as we come to realize that the most reliable constant that we have in life…is change. ■

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

# Office Design Contest




These winning design concepts can help transform your practice.

**By Colleen Mullarkey, Senior Editor/Web Editor**

With the New Year right around the corner, now is the perfect time to think about what changes you'd like to see in your practice in the coming year. Maybe you'd like to streamline the layout of your exam rooms, or perhaps you just want to freshen up the office walls with a new color palette.

Whether you're planning a complete renovation or you simply want to incorporate a few new design elements, our 2012 'New Look' Office Design Contest winners can give you some inspiration. These featured practices had the winning combination of style, function and efficiency that our judges were looking for.

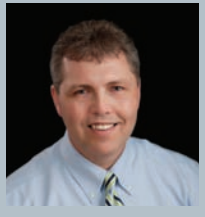
So, how did we pick just three winners from dozens of impressive entries? The competition was tough. Since our last office design contest in 2010, we took a year off to do a redesign of our own. We revamped the competition with new categories, a new expert panel of judges and more in-depth judging criteria.

We divided the contest into two main categories—*renovation of an existing office* and *new office/expansion*. To level the playing field, we broke those categories down into *small offices* (gross revenue <$400,000) and *large offices* (gross revenue >$400,000). This gave us a total of four potential winners (we received no entries from small practices who completed a renovation of an existing office).

To judge these entries fairly, we wanted to select peers in the field who know the business and also have an eye for design. Who better to judge than the O.D.s who took home the highest scores in our last office design contest? Our judges scored the entries based on several pictures and detailed entry forms from applicants, which explained how each practice design improved functionality, incorporated optometric equipment, considered ergonomics in the layout and achieved an aesthetically pleasing new look.

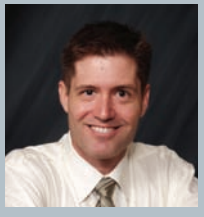
So without further ado, here are the winners.

## Meet the Judges



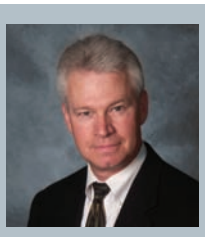
**Barry R. Basden, O.D.**
*2010 Office Design Contest Winner*

Dr. Basden is the owner of Florence Eye Center, a five-optometrist practice with three locations in Northwest Alabama.



**Michael Johnson, O.D.**
*2010 Office Design Contest Winner*

Dr. Johnson is the owner of Eagle Vision Eye Care Optometric Group, a private practice in Sacramento, Calif.

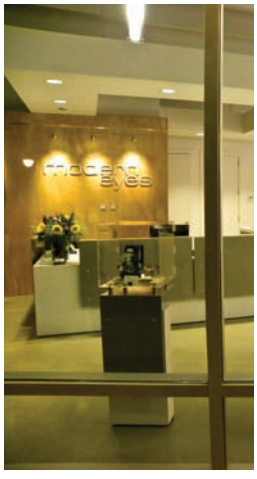


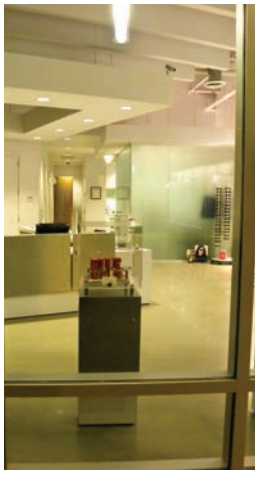
**C. Douglas Stine, O.D.**
*2010 Office Design Contest Runner Up*

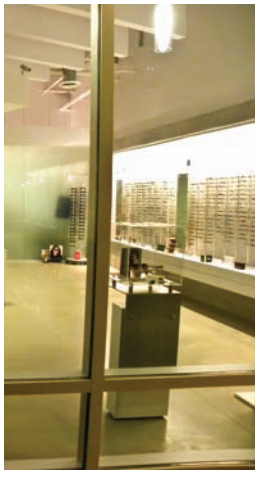
Dr. Stine is the owner of Stine Eye Center, a private practice in Weston, Wis., that serves the greater Central Wisconsin area.

# New Office/Expansion (Small Practice)









*Sonja Franklin, O.D.*
*Austin, Texas*

With a large central desk situated between the entry, dispensary and pretest areas, the open floor plan of this new 2,000-square-foot office facilitates visibility, communication and circulation. The location of the front desk allows staff to have eye contact with patients upon arrival, as well as quick access to the lab and the pretest area.

"Close proximity to these major

*"I really like the use of metal in the displays and check-in area—unique, modern and functional."*

### A Design True to its Name

With a patient base composed primarily of university students and staff, the office has a modern aesthetic that matches the practice's business plan: Providing state-of-the-art eye care using the latest technology in a clean and contemporary environment. Professional building designer Mark Lind, Dr. Franklin's husband, used an intentionally simple palette of materials to achieve the modern look.

Aside from the carpeted exam rooms, exposed concrete flooring runs throughout the office. Raised steel panels bolted to white cabinetry form both the desk and the front window displays. Plywood paneling and a lime green accent color add warmth behind the desk and the luxury frame area. It also contrasts with the frameless, cube-shaped etched glass enclosure that defines the private and light-filled pretest area.

A 44-foot-long concrete stucco wall runs from the dispensary to the contact lens area, providing a neutral, textured backdrop to house the frame collections. "Patients and reps alike frequently compliment the design and layout of the office," Dr. Franklin says. "Our staff takes pride in working in such a unique optometric environment."

# Modern Eyes

office functions means fewer steps and more efficient staff time," says owner Sonja Franklin, O.D. "The designer (my husband) incorporated shelving into the wood-paneled walls to hold job trays so that staff doesn't need to leave the desk area to retrieve completed orders. This increases efficiency by reducing frequent trips to the lab."

Maintaining the open feel of the office as well as acoustical and visual privacy for patients, the glass-encased pretest area has plenty of room for the practice's testing equipment, plus room for additional devices as this young practice grows. The office has recently added retinal imaging to its basic package of pretest equipment and plans to acquire additional instrumentation in the future.

The exam rooms and doctor's office are located at the end of the hallway to ensure privacy. Exam rooms are equipped with new phoropters and digital, flat-panel acuity monitors for efficient patient encounters, and the EHR system reduces waste and the need for storage space for paper records. "Compact, all-in-one computers keep the front desk, pretest area and exam rooms clean and clutter-free," Dr. Franklin says. "The minimal detailing and simple, planar surfaces of the office require less time on the part of the staff to keep things clean and organized."


# Pine Creek Vision Clinic

*Tom Wilson, O.D.*
*Colorado Springs, Colo.*


Boasting a 200-square-foot deck with comfortable furniture and spectacular views of the mountains and local golf course, Pine Creek Vision Clinic doesn't look like your typical optometry office. Inside, solid wood floors in the reception area complement the wooden cabinetry and granite surfaces, and a wall of 10-foot windows allows patients to enjoy panoramic views of Colorado Springs.

The interior design is mountain-themed with oil paintings, fossils in stone and unique photographs; music and fresh-cut flowers provide the finishing touches in this brand-new 4,400 square-foot practice.

Owner Tom Wilson, O.D., wanted to create a relaxing atmosphere for patients and staff members alike. "We have a large break room for meetings with reps and Internet access so the staff can have a comfortable place to relax during breaks and lunch," he says. "A couple of staff members arrive early to have breakfast, because it 'is just a nice place to be.'"

But function and ergonomics were also major considerations in the stylish design. A wraparound desk overlooks the entry and the optical, easy accessible to patients and staff. "Being a one-doctor optometric practice sometimes requires strategic placement of the front desk so that one person can be the receptionist and the optician at the same time," Dr. Wilson says. The contact lens area is right next to the doctor's office so that questions can be resolved quickly.

Tinted windows in the reception area and soft, low-gloss colors reduce glare. Also, padded laminate flooring in the lab area provides proper support for staff members who are frequently on their feet. With rolling ergonomic workstations, technicians can sit or stand with their laptops during pretesting and special testing. Full-spectrum lighting, large high-resolution screens and ergonomic keyboards reduce eyestrain and risk of repetitive injury.

### Technology That Saves Time

In order to save time and reduce manual error, Dr. Wilson purchased an automated refraction system that is fully integrated with his cloud-based EHR software. "With the push of a button, we can download all of our pretesting and refractive data into our EHR," he says. "We also have our OCT system, fields, retinal camera and [retinal imaging device] integrated with our exam rooms for a comprehensive overview of the patient's visual status."

All of the exam lanes are wheelchair accessible to accommodate the large number of handicapped patients who come to Pine Creek Vision. Dr. Wilson also sees many autistic children and patients with stroke and head injuries, so he invested in smart charts to help them fixate during their eye exams. The charts have videos that patients can watch during retinoscopy, as well as multiple options for acuities and binocular testing.

## Renovation of Existing Office (Large Practice)


# Valley Vision Optometry

*Shaun Golemba, O.D.*
*Port Alberni, British Columbia*


With an extensive redesign, Valley Vision Optometry enhanced its visibility in the community, giving patients a whole new perspective on the practice. "Our previous building was nondescript. Even though our building had been here since 1991, there are people who have lived here their whole lives who did not know we were an optometry office," says owner Shaun Golemba, O.D. "There has been an increase in patients who have come in simply because they now know we are here!"

The practice's revenue per patient is higher and now stocks higher-end frame lines that "just wouldn't have made sense in the old space." With four workstations, as opposed to the two they


### Ergonomically Sound Practice

In the exam rooms, a single monitor is attached to a wall-mounted swivel so that the doctor or scribe can use it. A single computer controls the letter chart, EHR, interactive patient education software and Internet.

"Dual keyboards enable the doctor and the scribe to input material, allowing the doctor to face the patient most of the exam and verbalize what needs to be written down," Dr. Golemba says.

New drawers in the exam rooms improve ease of access to equipment and make it easier to keep the space tidy:

- The first drawer holds pretest tools.
- The second contains the doctor's tools.
- Trial frames are found in the third drawer, which is positioned at arm's length when standing, so the doctor doesn't have to bend to access them.
- Brochures and other information materials are located in the fourth drawer.

The business office comfortably holds five workstations and an overhead projector for business meetings and distance-education webinars.

used to have, the spacious optical allows more patients to be served. A separate workstation for troubleshooting is located near the lab, providing staff with easy access to adjustment tools and reducing distractions from new presentations in the eyewear gallery.

The circular design of the 3,850-square-foot office creates a smooth flow from the warm welcome at check-in to the fond farewell at checkout. The doctor's business office sits right next to the two exam rooms, reducing travel time between the three rooms. A new pretest room was created closer to the front desk to accommodate the instruments for comprehensive evaluations. Specialty equipment in the second pretest room includes a preferential hyperacuity perimeter and OCT—an optical pigment density measurement tool and corneal topographer may be added in the future. The third pretest room houses the retinal imaging station.

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# Are We Gaining Ground on Ocular Infection?

The newer-generation topical fluoroquinolones are some of the most effective antibiotics we've ever seen. But, increased bactericidal resistance remains a concern.

**By Elizabeth D. Muckley, O.D.**

The management of bacterial eye infections was revolutionized by the development of topical fluoroquinolones. All fluoroquinolones have an FDA indication for the treatment of bacterial conjunctivitis. In 2004, Iquix (1.5% levofloxacin, Vistakon), a third-generation agent, received an additional FDA approval for the treatment of bacterial corneal ulcers. Since then, fourth-generation fluoroquinolones evolved with varying concentrations and dosing (*see "Commonly Prescribed Topical Fluoroquinolones," page 37*).

Nonetheless, all newer generation fluoroquinolones are used off-label for numerous conditions from ulcerative keratitis to infection prevention in pre- and post-surgical care. Looking back over the last 20 years, we must ask if these drugs are living up to their promise and what will the future of ocular infection management and prevention look like? Regardless, our biggest concern going forward is the development of emerging resistance patterns to topical fluoroquinolones.

## Mechanism of Action

Topical fluoroquinolones are antibiotic agents that block bacterial DNA synthesis by inhibiting the topoisomerase enzymes. Older-generation topical fluoroquinolones (ciprofloxacin, ofloxacin and levofloxacin) specifically target the DNA enzyme topoisomerase IV, which is more susceptible in gram-negative bacteria.[1,2] However, the fourth-generation fluoroquinolones (moxifloxacin, gatifloxacin) contain a substitution of a methoxy group at position eight of the quinolone ring, which additionally facilitates topoisomerase II (DNA gyrase) inhibition in gram-positive organisms.

This dual mechanism of action promotes increased bactericidal activity against gram-positive organisms without sacrificing the gram-negative coverage provided by older-generation fluoroquinolones.[3] Most importantly, targeting both topoisomerase II and IV likely reduces resistance because concomitant mutations in both genes are much less likely to occur than a single mutation in one gene.[4,5]

## Drug Penetration and Tissue Concentration

For topical fluoroquinolones to be effective in the treatment of ocular infections, they must exhibit satisfactory minimum inhibitory concentration (MIC) scores, high penetration rates into ocular tissues/aqueous and broad susceptibility profiles, as well as posess the ability to thwart resistance.

The MIC is defined as the lowest possible concentration of an antibiotic that is able to prevent overnight micro-organism growth in a tissue culture. Typically, $MIC_{90}$ (the MIC score required to inhibit bacterial growth in at least 90% of targeted strains) is the standard measure of bactericidal efficacy for topical anti-infective agents. Note that the lower the $MIC_{90}$ value, the more potent

the agent is against a given isolate.

The ocular surface poses a challenge to drug administration and pharmacokinetics. Tears act as a drug-delivery barrier, effectively diluting the agent and facilitating drainage via the nasolacrimal system upon rapid blinking following instillation.[6] Therefore, MIC scores derived from in vitro laboratory testing may not accurately reflect on-eye MIC values. Delivering the drug to the target tissue, as well as remaining there long enough to be effective in vivo, is of equal importance. Compared to their systemic counterparts, topical antibiotics often must be dosed at higher concentrations to increase drug penetration and sustain effective therapeutic levels.

The fourth-generation fluoroquinolones offer the best penetration profile; in particular, moxifloxacin and 1.5% levofloxacin fared well in corneal penetration studies.[7-9, 15-18]

**Commonly Prescribed Topical Fluoroquinolones**

| Generic Name | Brand Name and Approval Date | Manufacturer | Classification | Indication |
|---|---|---|---|---|
| 0.3% Ciprofloxacin | Ciloxan, December 1990 | Alcon, generic | 2nd Generation | Bacterial Conjunctivitis |
| 0.3% Ofloxacin | Ocuflox, July 1993 | Allergan, generic | 2nd Generation | Bacterial Conjunctivitis |
| 0.5% Levofloxacin | Quixin, August 2000 | Vistakon | 3rd Generation | Bacterial Conjunctivitis |
| 0.3% Gatifloxacin | Zymar, March 2003 | Allergan | 4th Generation | Bacterial Conjunctivitis |
| 0.5% Moxifloxacin | Vigamox, April 2003 | Alcon | 4th Generation | Bacterial Conjunctivitis |
| 1.5% Levofloxacin | Iquix, March 2004 | Vistakon | 3rd Generation | Bacterial Corneal Ulcers |
| 0.6% Besifloxacin | Besivance, May 2009 | Bausch + Lomb | Novel (no systemic equivalent) | Bacterial Conjunctivitis |
| 0.5% Gatifloxacin | Zymaxid, May 2010 | Allergan | 4th Generation | Bacterial Conjunctivitis |
| 0.5% Moxifloxacin | Moxeza, November 2010 | Alcon | 4th Generation | Bacterial Conjunctivitis |

## Drug Enhancements

In an effort to amplify antibiotic concentration on the ocular surface and improve penetration, many ocular pharmaceutical companies developed enhanced or reformulated versions of existing fluoroquinolones during the last eight years. For example, Vistakon released Iquix in 2004, which contained more than double the concentration of levofloxacin in Quixin.[10] Also, in May 2010, Allergan brought Zymaxid to the market, which contained 0.2% more gatifloxacin than Zymar.[11]

Then, in November 2010, Alcon released Moxeza as a successor to Vigamox. In this instance, the concentration of moxifloxacin was not increased. Instead, the company reformulated Vigamox with a new delivery vehicle, xanthan gum. In clinical trials, the xanthan gum facilitated increased corneal penetration of moxifloxacin. Most significantly, the increased drug penetration of Moxeza permitted b.i.d. dosing vs. t.i.d. dosing for Vigamox.[12]

Bausch + Lomb's release of Besivance (besifloxacin) in 2009 was a significant development in ocular antibiotics. Besifloxacin was developed for the sole purpose of ophthalmic use, and has no systemic counterpart.[13] This unique aspect could potentially help minimize resistance to the drug over the long term. The drug features a unique chlorine group located at position eight of the quinolone ring, as well as an aminoazepinyl component at the C-7 location, which may enhance activity against gram-positive bacteria.[14] Additionally, Besivance uses the DuraSite vehicle (InSite Vision), which prolongs the drug's contact time on the ocular surface and enhances corneal penetration. Finally, it is important to note that Besivance just received an additional FDA indication for the treatment of conjunctivitis associated with *Pseudomonas aeruginosa* in September 2012.

## The Effect of BAK

For many years, researchers have debated the potential benefits and limitations of the preservative benzalkonium chloride (BAK) in topical antibiotics. In topical medications that are commonly used long-term, such as glaucoma agents, the presence of BAK has been shown to cause ocular surface inflammation and corneal damage.[15] However, it has been suggested that, because BAK disrupts the ocular surface, it

actually may enhance corneal penetration of the drug. Furthermore, BAK has been shown to increase epithelial permeability and transscleral drug delivery.[16] Currently, Vigamox, Moxeza and Iquix are the few topical fluoroquinolones that do not contain BAK.

Interestingly, some studies indicated that BAK-preserved Zymar is more effective at targeting methicillin-resistant *Staphylococcus aureus* (MRSA) than BAK-free Vigamox in vitro.[17] Other in vitro research suggested that, while BAK may enhance an antibiotic's effect, it is cleared by the tears rapidly.[18] More specifically, the study author noted that the concentration of BAK in the tears is undetectable five minutes after installation.[18]

## Bactericidal Resistance

In addition to corneal penetration, pharmacodynamics (e.g., kill rates, resistance patterns and susceptibility profiles) is another crucial aspect of topical fluoroquinolones. Studies suggest that MICs for fourth-generation fluoroquinolones are lower (better) than second-generation fluoroquinolones for all gram-positive organisms.[19,20] The $MIC_{90}$ for ciprofloxacin was lower in gram-negative bacteria compared to the newer-generation fluoroquinolones, and was the most effective against *Pseudomonas* among all topical fluoroquinolones tested.[19,20]

Bactericidal resistance is a result of many factors, including overprescribing and negligent prescribing of antibiotics (e.g., errant use of antibiotics for a viral condition), improper dosing (including patient non-compliance), and widespread use of antibiotics in the livestock industry. Infection by drug-resistant organisms such as MRSA and methicillin-resistant *Staphylococcus epidermidis* (MRSE) is a growing concern in the ophthalmic community. According to the Centers for Disease Control and Prevention, 1.5% of the population (4 million Americans) are MRSA carriers.[21] Patients in nursing care facilities, health care workers, and those who live in communities where skin-to-skin contact is prevalent are at higher risk for MRSA infections.[21]

**This patient presented with a pronounced *Pseudomonas* ulcer. What is the most effective treatment strategy?**

The Antibiotic Resistance Monitoring in Ocular Microorganisms (ARMOR) study was designed to monitor antibiotic susceptibility trends in ocular isolates.[22] The results indicated that 39% of *S. aureus* ocular isolates were methicillin resistant and 38% were fluoroquinolone resistant. Among the coagulase-negative staphylococci isolates sampled from ocular infections, 53% were methicillin resistant and 43% were fluoroquinolone resistant.[22] This is similar to the original data collected by The Surveillance Network (TSN) from 2001 to 2006, which revealed multidrug-resistant MRSA in ocular isolates.[23] Of interest, TSN researchers noted that trimethoprim was the most effective agent against MRSA.[23]

Currently, the Ocular Tracking Resistance in the United States Today (TRUST) program is the largest annual, longitudinal, nationwide surveillance of antibiotic resistance. Since the program's launch in 2005, Ocular TRUST researchers have evaluated the in vitro susceptibility of *Staph.*, *Strep.*, and *Haemophilus* ocular isolates to numerous antibiotics.[24] The most recent data from Ocular TRUST suggests that just 15% to 30% of MRSA isolates are susceptible to currently available topical fluoroquinolones (Besivance was not evaluated, because it was not yet FDA approved at study initiation).[24]

The combined results from ARMOR, TSN and Ocular TRUST show that resistance to multiple antibiotics is prevalent among ocular bacterial pathogens. Again, keep in mind that in vitro resistance does not necessarily equate to in vivo resistance. Still, eye care clinicians must consider the potential danger associated with such expanding resistance patterns.

## Use in Surgical Prophylaxis

Topical antibiotics are used routinely for infection prevention in all forms of ocular surgery. The discussion about appropriate use of prophylactic antibiotics is a hot topic among eye care professionals due to increased resistance patterns. Some studies have reported increased endophthalmitis rates since 2000 despite prophylactic antibiotic use.[25]

There are several possible reasons why endophthalmitis is on the rise. For example, more surgeons perform cataract surgery using sutureless, clear corneal incisions, which are more prone to leakage. Additionally, intravitreal anti-VEGF and steroidal injections are being administered more frequently for the treatment of macular degeneration and diabetic eye disease.

Most cases of postoperative endophthalmitis are due to *S. epidermidis*, followed by *S. aureus*.[26] Further, epidemiologic evidence

## Recommendations for Fluoroquinolone Use

• ***Don't underdose an active infection.*** Antibiotics with the lowest MIC values and the highest delivery concentration are best suited to eradicate ocular infections. For active infections, dose antibiotics at their recommended frequency to eliminate the bacteria quickly. The greatest risk for the development of antibiotic resistance comes from sustained sub-therapeutic dosing, which doesn't eradicate the infection but potentially affords it time to mutate.

• ***Be judicious in prophylactic use.*** When used for surgical prophylaxis, antibiotics can be discontinued sooner than in cases of active infection. A recent study found that repeated fluoroquinolone use after intravitreal injection led to increased rates of resistance.[30] So, instead of using prophylactic antibiotics, many retinal specialists now are using facemasks and iodine/aseptic techniques during injection to minimize the risks of infection. For infection prevention in cataract surgery, good wound architecture is critical. Today, with femtosecond laser-assisted surgery, wound leaks and consequent endophthalmitis risks may be less likely.

• ***Avoid overprescribing.*** Improper diagnosis of red eye is a specific instance when topical antibiotics frequently are overprescribed. Too often, pediatricians, urgent care physicians and even optometrists/ophthalmologists prescribe antibiotics for conditions other than bacterial conjunctivitis, when the diagnosis is not clear. Overprescribing propagates bactericidal resistance, so exercise good clinical judgment when using an antibiotic.

• ***Choose an appropriate antibiotic.*** Consider reserving a "big gun" antibiotic, such as a fourth-generation fluoroquinolone, for the most serious infectious cases. Second-generation fluoroquinolones, aminoglycosides or azithromycin (Azasite, Merck) are alternative antibiotic choices for infections that are not sight threatening. Such alternatives may be effective, and choosing them could potentially limit fourth-generation antibiotic resistance. Also, review the FDA drug safety classification for children and pregnant patients. For example, Azasite may be a good choice for pregnant or nursing mothers because it is a Category B drug.

• ***When in doubt, culture.*** Smears and cultures are recommended in cases that involve a large infiltrate (>3mm); are chronic in nature or appear unresponsive to broad-spectrum antibiotic therapy; or that exhibit atypical clinical features indicative of fungal, amoebic or *Mycobacterium* keratitis. The sensitivities from cultures can help guide appropriate antibiotic selection.

In cases of suspected bacterial keratitis, fourth-generation fluoroquinolones routinely are used off-label and are widely accepted as first-line therapy. Depending on its location and severity, microbial keratitis can be a sight-threatening condition. For central or severe keratitis, a loading dose (q15m for the first hour) followed by frequent applications (q1h around the clock) is recommended.

For drug-resistant pathogens, such as MRSA or MRSE, fluoroquinolones may not prove effective. If a bacterial infection is not clinically responsive to aggressive treatment with a fluoroquinolone, suspect MRSA/MRSE. Consider treatment with fortified vancomycin, trimethoprim or sulfacetamide.[31] In these instances, be certain to obtain cultures in an effort to select the most effective antibiotic. Additional therapeutic options that may be effective against MRSA/MRSE include bacitracin ointment, cefazolin injection and oral linezolid. Concurrent use of oral rifampin and linezolid have been shown to be more effective in the treatment of preseptal cellulitis/cutaneous infections than intravenous vancomycin.[32]

• ***Be wary of* Mycobacterium.** Regarding refractive surgery, infection rates fortunately are low. But, if an infection occurs, atypical *Mycobacterium* infiltrates may be of greatest concern. Although rare, *Mycobacterium* are found in ultrasound water baths used for instrument processing or in surgical field moisture. In any confirmed case of *Mycobacterium chelonae* infection, researchers at Johns Hopkins recommend 500mg clarithromycin b.i.d., topical tobramycin and a fourth-generation fluoroquinolone.[33]

• ***Consider the cost.*** Because of rising medication prices, patients are sometimes forced to use generic antibiotics in lieu of branded medications. Newer-generation fluoroquinolones have the broadest antimicrobial spectrum. But, if patients cannot afford these, which generic agent is best? To date, no studies offer a real solution to this question, and practitioners are faced with the ongoing dilemma of cost vs. efficacy.

However, generic trimethoprim-polymyxin B should be considered when there is a risk of MRSA. Despite being an older drug, more than 90% of MRSA isolates were susceptible to trimethoprim in vitro.[28] Also, the second-generation fluoroquinolones are cost effective, and have a broad spectrum of coverage. They are a good choice if a generic is needed. Regardless, educate patients about the potential risks associated with having to choose between the lower cost of generic medications and the therapeutic superiority of branded drugs.

suggests that MRSA is responsible for approximately 3% of all endophthalmitis cases.[26]

The overall rate of endophthalmitis after uncomplicated cataract surgery in patients who received prophylactic treatment with gatifloxacin and moxifloxacin was 0.07%.[26] Another study found a similar endophthalmitis rate for those who received gatifloxacin and moxifloxacin (0.056%), but a higher incidence in patients who were treated with ciprofloxacin and ofloxacin (0.197%).[27]

These data suggest that the fourth-generation fluoroquinolones are more effective against gram-positive organisms and may be the superior choice for surgical endophthalmitis prevention. Fortunately, the risk of post-surgical infection is extremely rare. And ultimately, the low rates of endophthalmitis

also make it exceedingly difficult to compare the prophylactic efficacy of different antibiotics exhaustively.

During the last few years, intracameral antibiotics have been evaluated for use in ocular surgery. A recent study by the European Society of Cataract & Refractive Surgeons (ESCRS) showed that cefuroxime injection can reduce endophthalmitis risk in cataract surgery.[28] Further, intracameral injections have the potential to help reduce postoperative patient noncompliance/drop confusion, and could be more cost effective than topical anti-infective use.

The primary barrier to wider adoption of intracameral antibiotic administration in the United States is the lack of a commercially available drug. Cefuroxime, for example, must be compounded manually, which exposes the patient to bacterial contamination and toxic anterior segment syndrome.

In lieu of cefuroxime, some American cataract surgeons are using intracameral administration of moxifloxacin and vancomycin to reduce or eliminate postoperative antibiotic drops.[29] However, we must be cautious in recommending this practice—especially considering that, in the ESCRS study, patients still used levofloxacin postoperatively for one week.[28]

Newer-generation fluoroquinolones have become the topical antibiotic of choice in the prevention and treatment of ocular infections due to their high tissue concentrations, low MIC rates and broad spectrum of coverage. Nonetheless, eye care providers must be educated about the rising rates of increased fluoroquinolone resistance in certain pathogens, including MRSA.

We should make every effort to ensure an accurate diagnosis of bacterial infections to avoid unnecessary overuse of antibiotics. In cases where topical antibiotics are indicated, use them aggressively for a defined period. For infections that do not respond, perform cultures.

Today, we are fortunate to have several extremely effective antibiotic agents in our armamentarium. But, to prevail in the battle against ocular infection, we must use these drugs in a judicious capacity to limit further bactericidal resistance. ■

*Dr. Muckley is the director of optometric services at Northeast Ohio Eye Surgeons in Kent and Stow, Ohio. She has no financial interest in any of the products mentioned. She can be contacted at 330-678-0201 or* DrEDM1@aol.com.

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Dispensary Report

# How to Throw a Trunk Show

Do you think a trunk show is about as fun as a visit to the dentist? Here's how to make it fun—and profitable. By Nathan Bonilla-Warford, O.D., A.B.O.C.

The first trunk show I ever saw was a disaster. During my first year of optometry school, I was working as an optician at an older optical in the Chicago Loop. With very minimal marketing to announce the event, the rep of an obscure frame line came to the office at 10:00 a.m. and proceeded to sit in the corner with her frame trays. She nibbled on some food with the staff and then packed up her cart early and left without a single frame being sold.

Unfortunately, this awkward and non-productive exercise is exactly what a lot of optometrists think of when they hear the words "trunk show." Well, it doesn't have to be that way. Trunk shows can be exciting events that both the patients and the staff look forward to having. And more importantly, they can be very profitable.

Don't be confined by the mental image of a "trunk show." There are many ways to have a trunk show. Feel free to make your event as big or crazy as you want, as long as it is consistent with your office mission statement and your event goal.

What is your event goal? Okay, first step back and think of the big picture. What are you trying to accomplish with the event beyond simply selling frames?

As with any event, planning is crucial. Yes, we all get busy, but a show that is thrown together the week before will not be successful. "The key things to keep in mind, like any marketing-related project, are planning and goals," says Gary Gerber, O.D., of the consulting firm The Power Practice. "Set the goal of what you hope to achieve, and then plan and budget carefully to maximize the odds of hitting those goals." In fact, planning is so important that some optometrists hire an event planner or public relations firm to help.

You must get the staff excited! They are on the front lines with patients. When they help plan, their enthusiasm will be infectious. Not only will they come up with great ideas, but they also will be more willing to execute them on the big day. Ensure there are people in the office by booking a full schedule of exams; if not as many people attend the show as you initially anticipated, there will still be patients around to fill the room. It also helps to book more optical patients that day while limiting the typical contact lens and medical follow-ups.

Ideally, you want to begin getting the word out about the

### Top Reasons to Hold a Trunk Show

- Increase revenue.
- Promote special products.
- Kick off a new frame line.
- Have fun.
- Commemorate a grand opening or anniversary celebration.
- Show patient appreciation.

event at least a month before it happens—which means that you actually need to begin planning three to four months ahead of time. Ask yourself: When is the best time to hold the trunk show? How are you going to brand this event? What kind of budget are you working with? The answers to all of these questions will depend on two factors: your past experiences and your patient base. For example, holding a sunglass show in the spring is a good idea, but holding it during the local school spring break may not be such a good idea.


**If you're having a show, then put on a show! Make your office look festive with balloons, music or flowers—whatever will create a nice, relaxed, fun mood that's a little different from the usual.**

## Partnering With Vendors

Fortunately, you have partners who can help in many ways. When you work with a frame rep to organize the event, you have access to more ideas and resources than you may have on your own. Any seasoned rep has attended both good and bad trunk shows, and has an incentive to make yours a good one.

"One of the main things when doing a trunk show is to get vendor support," says Kevin Whaley, office manager of The Eye Doctors, in New Tampa, Fla. "Ask your best-selling product vendors if they can provide items you can raffle off or free giveaways like hats, T-shirts, lip balm and pens for a gift with purchase."

Optometrist Sam Teske, also of The Eye Doctors, agrees. "We used to pay for goodie bags and food. Now we ask the vendors for their support and you'll be surprised how much they help out," he says.

Similarly, work with your neighboring businesses by asking them to donate door prizes or offer services. Patients love supporting local small businesses, and the businesses will help spread the word about your event. Everyone wins.

## Get the Word Out

You hold a trunk show to benefit your office, but it won't be successful unless you can make it genuinely appealing to your patients. Think about what they want to get out of it. Sometimes you may want to target "A+ patients" who are loyal and who have spent money on glasses in the past. Other times you may want to target patients who haven't purchased in a while and are likely to need glasses now.

The easiest patients to reach are the ones who are already in your office. Internal advertising is the most direct and cost effective approach. Start by placing flyers and signage at highly visible spots in the office. Also develop a short script that staff can say as patients are scheduling appointments or checking out.

In order to reach as many people as possible and hopefully ensure that your target audience sees the message multiple times, promote the show through multiple channels. While adapting marketing pieces to each channel, try to stay consistent with the theme and feel of show.

• ***Print ads and postcards.*** If local print advertising has been effective in the past, consider newspaper or magazine ads. Similarly, direct

### Why Do Patients Want to Go to a Trunk Show?

- For the "exclusivity" of the event.
- To get a good deal (offering 25% off frames & lenses, or buy-one/get-one-half-off are great incentives).
- To see more options (colors, sizes, styles).
- To try on a lot of different styles.
- Because they like you and want to support you.

**Don't simply put out displays and hope for the best. Be prepared to answer questions and quote prices on the spot. Have vital information at hand and create price list "cheat sheets" ahead of time.**

mail items, such as postcards and newsletters, are often effective. If you want to supplement your current patient base, address lists are available for purchase to very targeted demographics. With all of these, remember to leave enough lead time for both printing and delivery before the show.

We have found that postcards work well when targeted to women between the ages of 20 and 60 who have visited the practice within the last three years. Many people actually bring the postcard with them to the show. Others tell us that it reminded them to make an appointment, even if they couldn't come to the show. Extra postcards are also great to hand out or bring to networking events. Usually our budget for postcards is less than $500, depending on the reach we are targeting.

• ***Social networking***. Definitely promote the upcoming show online and email patients as well. Feature the announcement prominently on both your website and your online appointment request system. Drop hints and teases, and follow up with the full invitation on the social networks you use (e.g., Facebook and Twitter). In my office, the blog is truly the core of the online marketing effort, so I always have at least one blog post about the show, including a short YouTube video, with an open invitation to attend.

• ***Face-to-face networking***. While social networking is valuable, don't forget good old-fashioned networking. If you are part of any local business associations, Chambers of Commerce or networking groups, invite them to attend and also see if they want to participate in some way.

Additionally, let friends, family, church groups, moms groups, or any other groups of people know about the event. Invite all of the office staff's family and friends. Having more people always makes a more exciting environment, thereby making it more profitable.

## During The Show

Make the place look festive with balloons, music or flowers—whatever will create a nice, relaxed, fun mood that's a little different from the usual office atmosphere. Providing food isn't an essential part of the trunk show experience, although coffee and bottled water seem to be well accepted by patients. Because we're in Florida, we've also found that if we have a crowd of people in our office, it gets warm. Adjust the heating or air conditioning appropriately ahead of time.

## Ebb and Flow of a Trunk Show

At times, the event will be busy; other times, it will be dead. Your staff should have a plan for the busy time—to take orders quickly, have enough available computers and help patients with their selections. Use your rep to help show frames, but leave the lens selection to the staff. Also have a plan for the slow times—process earlier orders, clean up and rotate staff breaks.

Have vital information prepared ahead of time: How do you price frames that you've never carried in stock? How do you calculate a discounted price quickly? Make up cheat sheets! Sometimes the frame rep can send price lists ahead of time, and you can make up a spreadsheet with wholesale, retail and discounted prices. Also make up a cheat sheet for quick pricing of lenses.

Remember, patients usually won't be able to take home the frame from the rep's case (some exceptions for sunglasses), so frames will need to be ordered

**Ideas to Make a Trunk Show More Fun**

- Contest or raffle drawing.
- Pop a balloon for a discount.
- Photo display of patients trying on interesting frames.
- Photo display of staff and patients having fun.
- Live music.
- Online updates and pictures of a full house.

after the event. Consider having the rep provide goodie bags so patients can leave with *something* to take home!

## Continue the Success

Just because everyone has gone home and you've cleaned up the cups and plates around the office, it doesn't mean that you're all done. You don't want to spoil the success of the event by having something go wrong with your patient's order—so have a plan. Your staff will (hopefully) be ordering a lot of frames, and mistakes can happen. It helps to have frames drop-shipped from the manufacturer to the lab, but your staff will need to be organized and work with the frame rep to ensure this happens correctly.

Continue promoting the event even after it's over. Have doctors and staff talk up what a good time it was, and how the local businesses and vendors all participated. Make online announcements about the winners of the contests. And, most importantly, share the best pictures of the evening.

Finally, start planning your next event. Have at least the date and theme of your next event and start promoting it soon! ■

*Dr. Bonilla-Warford is in private practice in Tampa, Fla., specializing in vision therapy and orthokeratology. He frequently lectures and writes about social media in eye care. Find ways to connect at [http://about.me/NateBW](http://about.me/NateBW).*

Case Report

# Vision Screening Reveals Missing Irides

This teenage patient presented with reduced acuity and photosensitivity O.U. Upon examination, we diagnosed her with hereditary aniridia. By Michael C. Radoiu, O.D.

Aniridia is a rare congenital ocular disorder highlighted by a variable hypoplasia or total absence of the iris.[1] As a result of mutation or deletion, individuals with aniridia typically lose functionality of the gene that is linked to ocular development.[2,3] Patients frequently present with accompanying nystagmus, photophobia and decreased vision. Often associated with concurrent ocular disorders, aniridia can herald more serious systemic complications secondary to the genetic abnormality.

The early onset and progressive vision loss seen in these patients typically consists of foveal hypoplasia, followed by late-onset keratopathy, glaucoma and cataracts. Further, the diagnosis of aniridia can be indicative of WAGR syndrome—a rare genetic condition that predisposes individuals to the development of pediatric nephroblastoma (Wilms' tumor), genitourinary anomalies and mental retardation.

Early diagnosis of aniridia requires a careful ophthalmic evaluation, followed by a prompt referral to rule out WAGR syndrome. Generally, an extensive multidisciplinary approach involving pediatric, imaging, audiology and internal medical subspecialties is indicated.

Available treatment options for aniridia are intended to address associated visual dysfunction and ocular pathology. Intervention varies widely, depending on the condition's severity. Primary treatment options include corrective and/or tinted lenses as well as low vision aids to enhance visual function.

The treatment of secondary glaucoma and keratitis sicca includes topical, systemic, implantable and surgical modalities. Cataract surgery, while of dubious benefit in mild to moderate cases, is indicated when cataracts are dense and visually obstructive.[1,4]

Here, we review the case of a young patient who presented with bilateral hereditary aniridia.

## History

A 16-year-old Asian female presented to a local vision-screening clinic in a developing nation. She reported a long-standing history of "poor vision, light sensitivity and uncontrollable eye movement." Despite this, the patient said that she was able to attend school and manage her daily activities with help from family and friends.

Her mother reported that the girl had no significant medical history and was not currently taking any medications. Further, we were unable to determine whether another eye care provider or a general healthcare practitioner had evaluated her previously.

## Diagnostic Data

Her uncorrected entering visual acuity measured 20/100 O.U. We documented no improvement upon pinhole testing.

The slit lamp evaluation revealed the presence of immature iris root buds in both eyes. Additionally, we noted the presence of clear corneas, normal anterior chambers, mild congenital cataracts, quiet conjunctivae, and healthy lids and lashes O.U.

Oculomotor function testing was significant for bilateral nystagmus (jerk variety) with mild head tilt (torticollis).

Dilated fundus examination uncovered foveal hypoplasia (no macular reflex), macular hypopigmentation, normal optic nerve (cup-to-disc ratio of 0.4 x 0.4) and no apparent peripheral retinal lesions O.U. Her intraocular pressure measured 20mm Hg O.U.

## Diagnosis

The diagnosis in this case is hereditary bilateral aniridia.

## Discussion

Aniridia is a congenital panocular disorder highlighted by a variable degree of hypoplasia or total absence of an iris.[1-4,5] It is a rare condition, with a reported incidence ranging between one in 40,000 to one in 100,000 in the general population.[1,6,7] Usually, it is accompanied by multiple ocular changes that either occur at birth or develop at varying degrees during adolescence. Although there have been some rare reports of aniridia secondary to trauma, most cases are congenital in nature and fall into two categories: hereditary (66%) or sporadic (33%).[2]

- ***Hereditary aniridia*** typically is transmitted in an autosomal dominant manner with high penetrance. The offspring of these patients have a 50% chance of genetic inheritance.[1,2]
- ***Sporadic aniridia*** involves the deletion or mutation of the WT1 gene, which is located on one of the short arms of chromosome 11.[1,2,8] The WT1 gene is located with the PAX6 gene, which has an important role in ocular development. Patients with

**Gross inspection of our 16-year-old patient reveals the presence of bilateral anirida.**

sporadic aniridia often exhibit early development of Wilms' tumor (a pediatric nephroblastoma), as well as other associated visual and systemic abnormalities. Ninety percent of sporatic aniridia cases have been found to have a compromised copy of the PAX6 gene.[1,7]

A major diagnostic feature of aniridia is a congenital absence or near absence of the iris, which controls the pupillary size. Foveal hypolasia (absence of a foveal reflex and macular hypo-pigmentation) with reduced vision and an associated nystagmus almost always is present.[4,5,9] This infantile variety of nystagmus begins pendular in nature—slow phase movement quickly followed by a quick recovery phase—with the eventual development of the jerk variety between six and 12 months of age.

Patients often will present with a compensatory head tilt (torticollis) in an attempt to find a "null point" that mitigates the severity and amplitude of the involuntary eye movements. Generally, these patients present with vision in the 20/100 to 20/200 O.U. range, and often complain of photophobia.[1] Although a majority of cases are documented within a few months of birth, some have manifested later in childhood or even early adolescence. Further, aniridia infrequently presents in infancy as buphthalmos (large corneal diameter and edema).[3]

Progressive, sight-threatening complications include the gradual development of polar opacities, which are found in up to 85% of aniridics.[1] Other lens findings have included tunica vasculosa lentis (fetal vascularization of the anterior lens capsule), and—in rare occasions—lens subluxation.[1] More commonly, up to 50% of aniridics develop glaucoma.[1,4,8,10]

Other late findings include pancorneal vascularization (pannus), opacification and the eventual keratinization of the cornea secondary to chronic keratitis sicca. This occurs as a consequence of stem cell immaturity and eventual failure. Approximately, 10% of patients have exhibited optic nerve hypoplasia.[5,9] Refractive

errors (myopia, hypermetropia, anisometropia and astigmatism) also are common in these patients.[5,9,11]

A diagnosis of aniridia typically is not isolated, but rather accompanied by both significant ocular and systemic pathologies. Among the latter findings are various forms of sensory and neurological defects. These include reduced olfaction due to abnormalities of the olfactory bulb, hearing deficits that arise as a result of abnormal inter-hemispheric transfer, and intracranial abnormalities.[1] Despite neuroimaging studies that reveal abnormalities of the cerebellum, temporal and occipital lobes and corpus callosum, cognitive development usually is normal; behavioral difficulties and developmental delays are uncommon.[1] Any diagnosis of aniridia in a pediatric patient should prompt immediate auditory, otolaryngology and neurologic consults—particularly for cases with demonstrated visual impairment.

WAGR syndrome (and, in turn, Wilms' tumor, genitourinary anomalies and mental retardation) has been noted in cases of sporadic aniridia that arise from the deletion of the PAX6 and WT1 genes. The PAX6 and WT1 genes are both located on one of the small arms of chromosome 11. It is believed that the accompanying ocular symptoms seen in aniridia cases (e.g., glaucoma, foveal hypoplasia, cataracts, etc.) are due to a compromised PAX6 gene that helps to regulate various ocular functions.[1] In these cases, the presence of aniridia is the most consistent symptom.[1]

Hereditary aniridia presents with familial, intragenic mutations that exhibit a high degree of penetrance.[1,5,7] These cases typically don't present with the morbidity seen in sporadic cases. If Wilms' tumor is present, a variety of genitourinary anomalies also can be seen, including cryptorchidism, ambiguous genitalia and gonadoblastomas. Other accompanying findings include mental retardation (up to 70% of cases), dysmorphic features, obesity and behavioral abnormalities.[1,7,8] In these cases, it is important to assess family history as well as consider genetic counseling as part of the treatment plan.

Wilms' tumor generally presents by the third birthday, but almost never after the age of eight.[1] Approximately 500 new cases are diagnosed per year; 75% occur in normal children, while the

remaining are associated with developmental abnormalities.[1,7] A majority (95%) are unilateral presentations that respect the abdominal midline and typically metastasize into the lung over time.[12] Diagnostic testing to rule out Wilms' tumor includes neuroimaging (abdominal ultrasound, X-ray or CT scan), as well as a battery of laboratory tests, such as a urinalysis, complete blood count and creatinine clearance.[1]

In cases where the tumor is diagnosed early and hasn't metastasized, the majority of patients will respond favorably to treatment (surgical excision, radiation therapy or chemotherapy).

• ***Management strategies.*** The eye care provider's first responsibility is to assure that a diagnosis of aniridia doesn't involve the presence of WAGR syndrome. Therefore, prompt referral to a multidisciplinary team of pediatricians, oncologists and internal medicine (nephrology) is indicated.

A confirmed WT1 deletion at chromosome 11 requires follow-up renal ultrasound examinations every three months until the age of eight to rule out the development of Wilms' tumor. Cases of genitourinary abnormalities require monitoring and treatment.[1] Baseline audiograms also need to be performed to rule out associated hearing problems.

After a thorough systemic workup, any visual problems (e.g., blurred vision or photophobia) must be addressed using appropriate corrective lenses, low vision aids (e.g., closed-caption television), aniridic contact lenses, or IOLs when the crystalline lenses have been removed due to cataracts and/or photochromic lenses. Measuring visual acuity in infants is a difficult, but necessary, step to determine the extent of iris tissue loss and the presence of both foveal and optic nerve hypoplasia. At the same time, corneal pathology, glaucoma and cataracts also must be ruled out. When accompanied by anisometropia or strabismus, occlusion therapy may be recommended.

If glaucoma is detected, standard medical and surgical treatment is indicated.[13] Keratitis sicca, due to a chronically damaged or malformed corneal epithelium, can be addressed using lubrication therapy, punctal occlusion or mycolytics. Limbal stem cell transplantation can be considered in truly recalcitrant cases.[2]

• ***Surgical intervention.*** Cataract extraction surgery is indicated when lens opacities become clinically significant and the prognosis of performing surgery is good. Generally, this is reserved for severe cases, because mild to moderate cataracts often do not respond well to surgical intervention.[4] In cases meriting surgery, black diaphragm intraocular lenses have been used to diminish glare and photophobia.[1,13]

• ***Genetic considerations.*** Given the strong evidence of familial link in aniridia, genetic counseling is highly encouraged and must involve the whole family.

## Follow-up

Our patient was referred to a multidisciplinary clinic, which included pediatric, imaging and internal medicine consultation, to rule out WAGR syndrome, Wilms' tumor (nephroblastoma), genitourinary anomalies and mental retardation. Additionally, we recommended a follow-up ophthalmic evaluation to include low vision testing, UV-blocking sun lenses and genetic counseling at a local eye hospital.

Unfortunately, a follow-up plan never was implemented because the patient was lost to referral.

A diagnosis of aniridia (especially in a child) should prompt an eye care provider to rule out accompanying systemic complications. Although aniridia cases can present simultaneously with various visual and ophthalmic problems, early diagnosis and proper care can help improve the visual and systemic prognosis. Timely referral to a diagnostic medical team, as well as immediate treatment of accompanying systemic complications, can mitigate future problems and enhance a patient's lifestyle. ■

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# See Something? Say Something!

If you see a patient with diffuse, hazy rays on the cornea, be sure to consider this rare but deadly disease. **Edited by Paul C. Ajamian, O.D.**

**Q I just saw a patient with a whorled pattern on the corneal epithelium. What is my differential diagnosis?**

A "First, ask about medications that can cause corneal whorling. These include amiodarone, tamoxifen, chloroquine, indomethacin, meperidine and chlorpromazine," says Albert M. Morier, M.A., O.D., Associate Clinical Professor of Ophthalmology at Albany Medical College, in Albany, N.Y. Rule out these drugs first because they are the most likely etiology of corneal whorling.

But there's another etiology you must consider: Fabry disease. Corneal whorling is a telltale sign of this rare, debilitating and eventually fatal lysosomal storage disorder, Dr. Morier says.

Fabry disease causes lipids to accumulate in the various organs of the body. One of the earliest and most common signs are opacities that appear as the characteristic verticillata (a whorl-like pattern of lines) on the cornea. These whorls are thin, located at Bowman's layer and do not affect visual acuity. But, they should not be overlooked just because they seem benign and don't affect vision.

Other ocular signs include tortuosity of blood vessels in both the conjunctiva and the retina, and two types of cataracts that are associated with the disease: a "propeller cataract" that radiates from the periphery of the lens and a "Fabry cataract," which is a faint, thin, linear cataract (best seen by retroillumination).

Systemic signs and symptoms include a history of not perspiring (anhidrosis), gastrointestinal distress (such as explosive, spontaneous diarrhea and cramps), extreme pain in hands and feet at certain times of year (acroparesthesia) and telangiectatic cutaneous lesions (angiokeratomas).

As the patient ages and the disease progresses, the accumulation of lipids within the body eventually leads to kidney disease and necrosis, thickening of the left ventrical wall of the heart, transient ischemic attack and stroke. Although this is a sex-linked disease, females can demonstrate some if not all of the characteristics of the disease as males.

Unfortunately, the disease is often misdiagnosed at first because of the nonspecific initial symptoms. For instance, a child who presents to the pediatrician with acroparesthesia is often dismissed as having growing pains, Dr. Morier says.

"However, optometrists can use the ocular signs to get on the right track to considering Fabry's disease," he says. "Optometry is without question the profession in the most crucial position to find Fabry at an early stage."

Corneal verticillata can show up in a first-grader's first eye exam, for example.

"It's apparent that the sooner that you can stop the accumulation of lipids in different parts of the body, the less damage can occur," he says. "So, a timely referral to a geneticist or a metabolic specialist is very important."

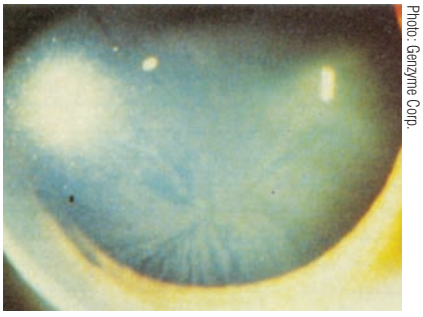


Photo: Genzyme Corp.

**Corneal whorling suggests Fabry disease.**

Such a specialist can start the patient on the only approved treatment—enzyme replacement therapy—to limit and hopefully reverse the damage of accumulated lipids in the organs.

However, if you must send the patient to his or her primary care physician, be dutiful and write a letter, Dr. Morier says. "Because of the rarity of the disease, the PCP may not give your diagnosis due consideration unless it's entered into the medical record as a letter."

An additional warning for optometrists: If you see a patient who is on amiodarone and has corneal whorling, don't assume that the amiodarone is causing it. The patient could still have Fabry disease. "Yes, amiodarone does cause corneal whorling, but amiodarone is an antiarrhythmic that may be prescribed to treat Fabry disease," Dr. Morier says.

In short, "We have a chance to save people's lives and increase their quality of life," he says. ■

# DLK Adds Insult to Injury

Diffuse lamellar keratitis can crop up in post-LASIK patients, even years after the surgery.

**Edited by Joseph P. Shovlin, O.D.**

**Q I recently saw a patient who presented with a significant full-thickness, central corneal abrasion. He had LASIK surgery about four years ago with a laser-cut flap. Despite topical antibiotic use, the patient experienced significant diffuse lamellar keratitis (DLK) a few days later. What's the mechanism that caused such a response years after LASIK? Is there a rationale for topical steroid use in any patient who has had LASIK and experiences a corneal abrasion?**

A "DLK can occur with even trivial trauma at any time following LASIK, even many years out from the original surgery," says Thomas S. Boland, M.D., of Northeastern Eye Institute in Scranton, Pa. DLK is a non-infectious inflammatory reaction to an interface insult, and one of the more common interface complications after LASIK.

In response to trauma, white blood cells accumulate in the interface between the corneal flap and the underlying stroma. "Once the white blood cells are in place, they release proteolytic enzymes (in an attempt to eliminate or repair the injury caused by the abrasion)—which can lead to loss of tissue and permanent alteration in the corneal shape and clarity," Dr. Boland says.

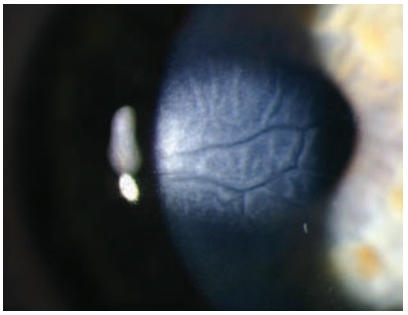
Severe, vision-threatening DLK may occur in one in 5,000 cases, while very mild cases may be as frequent as one in 50 cases.[1] In mild cases, DLK rarely affects vision and is easily treatable. Left untreated, it can cause permanent damage, including reduction in visual acuity, scarring and stromal melt.

Typically, DLK occurs within the first week after surgery, but late-onset cases have been reported as late as 12 years post-LASIK.[1,2] "The most severe cases of DLK that I have seen in clinical practice have followed corneal abrasion years after the original LASIK surgery," Dr. Boland says. "Because of this, it is my recommendation that any corneal abrasion after LASIK should be treated with topical steroids in addition to prophylactic antibiotics."

His typical regimen includes a topical fluoroquinolone and prednisolone acetate 1% q.i.d., and continuing treatment for approximately 48 hours after complete re-epithelialization. However, if a patient presents with significant DLK, topical steroids are often dosed every hour for the first day or two. "If it's started promptly after injury, this potentially vision-threatening complication can be averted," Dr. Boland says.

In more serious cases, a refractive surgeon may need to irrigate and reposition the flap. This technique is used to "wash out" cells and is commonly employed along with frequent topical steroids. Oral steroids can also be useful in some cases before lifting the flap.

Because DLK typically occurs during the immediate postoperative period, some eye care providers may incorrectly assume the interface inflammation is due to infectious keratitis. While interface inflammation can present in either condition, the treatment protocols are completely different, so a definitive diagnosis is crucial.[2]



**A very severe case of DLK.**

To that end, carefully examine the infiltrate—an accumulation of white blood cells at the interface indicates DLK, whereas a focused infiltrate is characteristic of infectious keratitis. Watch closely for signs of infection, such as increased pain, anterior chamber reaction and mucopurulent discharge.

A corneal masquerade can present when high pressure results from a steroid response. Unlike in DLK, an atypical or peculiar interface change can result from the pressure being high. The cornea looks different than it might when there's edema from high pressure due to the interface created following surgery. Of course, the time frames are different—topical steroid responses occur later than a DLK response in the interface. ■

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# Can High Pressure Be Helpful?

A patient with pseudotumor cerebri learns that she also has a strong family history of glaucoma. Is there a link? And, what do you tell her? **By James L. Fanelli, O.D.**

In 2009, a 41-year-old white female presented as a new patient with complaints of transient blurred vision (O.S. > O.D.) and transient headaches that had persisted for the previous two months. She reported that the visual blur tended to wax and wane throughout the day, but would generally affect her vision for a period of four to five days, then clear for as long as two to three days at a time.

During the episodes of visual blur, the patient also noted some periocular headaches that tended to be worse in the mornings; these too waxed and waned, and did not always coincide with the blurred vision.

Two months prior to this visit, she had seen her primary care provider who had diagnosed her with sinusitis and sinus-related headaches following a CT scan. After several trials of medications to alleviate both, she eventually found that Claritin (loratadine, Schering-Plough) seemed to give her the most relief with her headaches and also seemed to reduce the frequency of visual blur.

Then her headaches and blurred vision began to worsen in frequency and intensity. She also reported feeling "lightheaded." Given the progressive symptoms, her primary care physician referred her to me for an evaluation.

## Diagnostic Data

Her medications included Claritin and Ortho Tri-Cyclen (norgestimate/ethinyl estradiol, Ortho-McNeil-Janssen Pharmaceuticals). She reported no known allergies to medications.

Best-corrected visual acuity was 20/20 O.D. and O.S. Pupils were equal, round and reactive to light and accommodation with no afferent defect O.U. Extraocular motilities were full in all positions of gaze and Amsler grid testing was negative O.U. Color vision was normal. Threshold visual fields demonstrated a completely normal field O.D., and a slightly enlarged blind spot O.S.

Slit lamp examination of her anterior segments was unremarkable. Anterior chamber angles appeared grade IV open. Intraocular pressure measured 14mm Hg O.D. and 15mm Hg O.S.

Upon dilated examination, her crystalline lenses were clear. Stereoscopic examination of her optic discs revealed bilateral elevated disc margins, as well as a disc hemorrhage O.D. at one o'clock. Otherwise, her retinas appeared normal.

Given her apparently clear CT scan (except for the sinusitis) just one month earlier, a space-occupying lesion was not the likely cause of her symptoms. I considered several differentials, including venous sinus thrombosis and pseudotumor cerebri (PTC), given that she was mildly obese.

Consequently, we ordered an MRI, MRA and MRV, which were all found to be normal. The MRI demonstrated an empty sella. Lumbar puncture demonstrated elevated opening pressures.

## Diagnosis and Management

Ultimately, I diagnosed the patient with PTC—now termed idiopathic intracranial hypertension—because she met the Modified Dandy Criteria.[1,2] (Recall that these criteria include signs and symptoms of increased intracranial pressure as well as elevated cerebrospinal fluid pressure, among others.)

Subsequently, she successfully managed the condition with weight loss, exercise and acetazolamide on a titrated scale.

But recently, during a regular follow-up visit in September 2012, she reported that her mother and both of her siblings had been diagnosed with glaucoma, and she was concerned that glaucoma would pose a threat to her vision, too.

So, how do you counsel such a patient? Given there is no clear evidence that she has glaucoma—nor even that she is a suspect—glaucoma is not a relevant issue for her at this time.

But, is there a link between the development of glaucoma and intracranial pressure?

## Discussion

In the past few years, research has looked more closely at the relationship between intracranial pressure, as measured by cerebrospinal fluid pressure (CSFp), and the development of glaucoma. One of the newer terms that has been articulated and used more regularly

is the so-called translaminar pressure gradient (TLPG). As its name implies, TLPG is the pressure differential across the lamina cribrosa between the intraocular pressure and the CSFp in the optic nerve subarachnoid space.

Interestingly, several cases of bilateral disc edema in astronauts returning from prolonged visits to the International Space Station has brought greater attention to TLPG.[3] Also, some researchers have opined that the role of CSFp and its relationship to IOP may have a more direct role in the development of glaucoma than previously thought.[4]

From an anatomical perspective, remember that the optic nerve travels through two separate pressurized anatomical regions. First, we all know about the IOP's effect

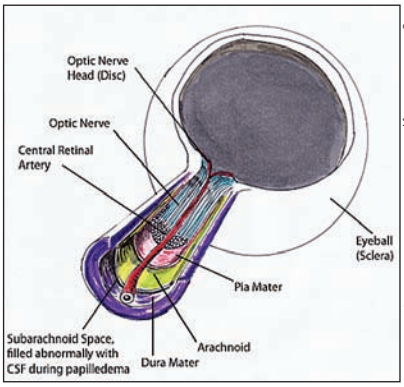


Image: Intracranial Hypertension Research Foundation, www.ihrfoundation.org

**IOP isn't the only pressure to consider. Cerebrospinal fluid pressure also exerts force on the optic nerve and the posterior lamina cribrosa.**

on the intraocular portion of the optic nerve. But we also need to keep in mind that the retrolaminar portion of the optic nerve (that part of the optic nerve posterior to the lamina cribrosa in the orbit and suprasellar cistern) is enclosed in meninges through which CSF travels. So, not only is part of the optic nerve affected by IOP in the globe, but a larger and longer portion of the optic nerve is surrounded by CSF—a portion called the optic nerve subarachnoid space (ONSAS).

Keep in mind that the lamina cribrosa is essentially sandwiched between the IOP (anteriorly) and the ONSAS (posteriorly). So, it makes sense that a substantial pressure differential between the IOP anteriorly and the CSFp posteriorly can have a significant effect on the optic nerve in the laminar region. A relatively low CSFp at the level of the ONSAS may likely predispose a person to develop glaucoma,

because the relatively higher IOP can push against the lamina with little posterior "support." If this is true, then it also stands to reason that a slightly elevated CSFp in the ONSAS may help protect against glaucomatous optic nerve damage.

But several questions remain. If the most readily and traditionally used measure of CSFp is through a lumbar puncture, then does lumbar puncture entering pressure equate to CSFp in the optic nerve? That's a fair question, and while measuring CSFp in the ONSAS is difficult, visualization of the ONSAS is relatively easy with high-resolution MR techniques.

So, researchers recently looked at the width of the optic nerve subarachnoid space (ONSASW) as a substitute for measuring CSFp in the ONSAS—particularly in terms of the relationship between glaucoma and the orbital optic nerve CSFp.[5] Specifically, they looked at the ONSASW in groups of POAG patients with normal and elevated IOP, as well as in a control group. Interestingly, they found that in the normal-pressure POAG group, the ONSASW was significantly narrower than in patients with high-pressure POAG as well as those in the control group. They concluded that a narrower ONSASW is consistent with a lower CSFp in the ONSAS, and that this lower CSFp in the ONSAS may correlate with a higher likelihood of normal-pressure glaucoma.

Many questions still need to be answered, but it does appear that CSFp—or at least the orbital portion of the CSFp—may very well play a role in the likelihood of developing glaucoma, and perhaps more so in those with normal pressure glaucoma.

So, what about our patient with PTC? She had asked whether she should be concerned about developing glaucoma. Will a simple answer—"No, there's no problem with glaucoma in your case"—be enough for her? Probably so.

But is that enough of an answer for us as providers of glaucoma care? No, it's not, because we have yet to understand the full relationship between CSFp and IOP. ■

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Advertorial

# Infiltrative Keratitis and Gram-Negative Bacterial Resistance to PQ-Aldox Lens Care Products

The rate of infiltrative keratitis especially with daily wear silicone hydrogel lenses has been reported with greater frequency.[1-4] Infiltrative keratitis is associated with several factors[1-8] including lens care solutions,[9,10] lens type,[1,3] smoking,[5] and bacterial bioburden.[5-8] Contact lens associated infiltrative keratitis (CLAIK) has been reported at higher rates in particular with polyquaternium (PQ)-Aldox (myristamidopropyl dimethylamine) based Multi-Purpose Solutions (MPS).[1-4,9]

Notably, CLAIK has repeatedly been associated with one PQ-Aldox MPS, OPTI-FREE RepleniSH in independent studies.[1-4] In one report, this solution was being used in 71% of CLAIK cases.[3] Importantly, there has been no demonstrated correlation between transient, solution related corneal staining and inflammatory keratitis.[11]

Low levels of lens case contamination may occur with any MPS or peroxide system in asymptomatic patients, but gram-negative contamination was reported highest with OPTI-FREE RepleniSH.[12] Recent scientific findings in patients using lens care solutions with CLAIK, demonstrate case contamination with certain gram-negative clinical isolates, the predominant species being *Stenotrophomonas maltophilia* and *Achromobacter*.[13] These gram-negative bacteria have also been cultured in the lens cases of patients using PQ-Aldox MPS.[12,14] Additional research has shown that these clinical isolates are resistant to a PQ-Aldox MPS and can re-grow during storage in PQ-Aldox MPS in as few as 6 days.[14-16] Non-Aldox PQ-based MPS, such as those containing PHMB, and peroxide lens care solutions have demonstrated excellent biocidal efficacy against these same clinical isolates.[14-17] Table 1 presents biocidal efficacy against clinical isolates of *Achromobacter* and *Stenotrophomonas* when exposed to PQ-Aldox MPSs and a PHMB-PQ MPS.[18] Lens care solutions that are ineffective against these clinical isolates may be prone to case contamination and CLAIK may result directly from these bacteria and/or their endotoxins being repeatedly exposed to the ocular surface.[14]

| Log Unit reduction | | |
|---|---|---|
| | Achromobacter* | Stenotrophomonas* |
| Biotrue® MPS (PHMB-PQ) | 2.9 | 3.5 |
| OPTI-FREE PureMoist (PQ-Aldox) | 0.1 | 1.2 |
| OPTI-FREE RepleniSH (PQ-Aldox) | 0.0 | 1.3 |
| OPTI-FREE Express (PQ-Aldox) | 0.2 | 1.2 |

***Table 1. MPS Biocidal Efficacy Against Achromobacter and Stenotrophomonas Clinical Isolates Associated with CLAIK[18]***

Further investigation is warranted to understand the causality between infiltrative keratitis events and the use of PQ-Aldox MPS products. The inefficacy of PQ-Aldox MPS against clinical isolates cultured from CLAIK patients should be considered by eye care practitioners in recommending lens care systems for their patients.

CLAIK has the potential of creating a significant economic burden on patients[19] and may contribute to patients choosing to stop wearing lenses. Switching patients to MPS products with broad antimicrobial efficacy and proven biocompatibility, along with recommending appropriate lens and lens case cleaning regimens,[6] may help to prevent CLAIK, minimize risk for future recurrence[20] or contact lens drop out.

Biotrue® MPS from Bausch + Lomb has proven biocompatibility and also demonstrates excellent disinfection efficacy compared to competitive multipurpose solutions,[21,22] even against clinical isolates such as *Stenotrophomonas* and *Achromobacter*, which are known to be associated with corneal infiltrative keratitis.


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# A Familiar Problem?

Our patient presented with transient blurry vision. We had not evaluated her in four years. Did a previous condition resurface? **By Mark T. Dunbar, O.D.**

A 35-year-old black female presented for an annual eye examination. The patient reported that she experienced transient blurry vision at distance and near, which lasted for a few minutes at a time. Her last eye exam was four years ago, and she did not wear glasses. Her medical history was unremarkable.

On examination, her entering visual acuity measured 20/20 O.U. Confrontation visual fields were full to careful finger counting O.U. Her pupils were equally round and reactive, without evidence of afferent defect. Extraocular motility testing was normal. The anterior segment examination of both eyes was unremarkable. Intraocular pressure measured 14mm Hg O.U.

On dilated fundus examination, the vitreous was clear in both eyes (*figures 1 and 2*). The macula, vessels and periphery were normal. Additionally, we obtained a spectral domain optical coherence tomography (SD-OCT) scan of both eyes (*figures 3 and 4*).

## Take the Retina Quiz

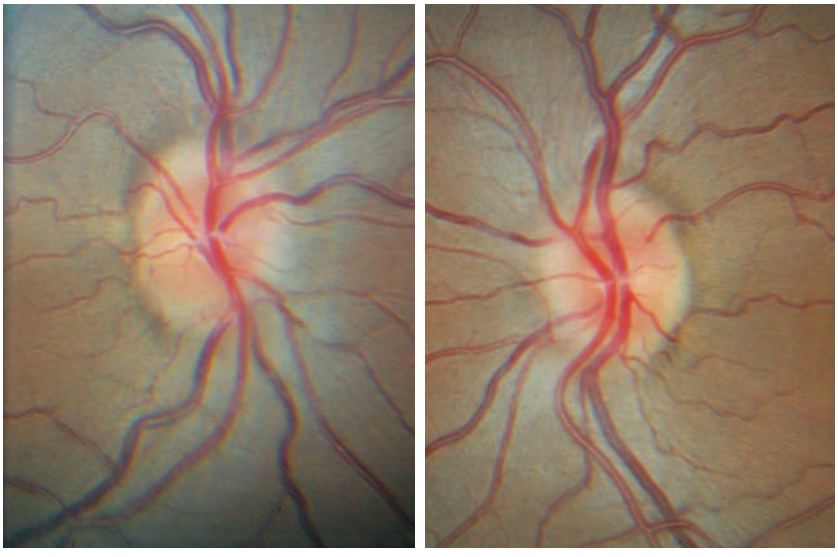
1. How would you characterize the findings in her optic nerves?
   a. Normal.
   b. Pseudopapilledema.
   c. Generalized disc swelling.
   d. Hypoplastic.

2. What additional testing is necessary?
   a. No additional testing is necessary.
   b. Automated visual fields.
   c. MRI and lumbar puncture (LP).
   d. Both b and c.

3. Based on the clinical findings and SD-OCT scan, what is the most likely diagnosis?
   a. Optic nerve head drusen.
   b. Papilledema.
   c. Optic nerve hypoplasia.
   d. Idiopathic intracranial hypertension (IIH).

4. How should this patient be managed?
   a. Observation.
   b. Periodic visual fields.
   c. Refer for possible MRI and LP.
   d. Optic nerve sheath fenestration.

*For answers, go to page 82.*



**1, 2. Fundus photographs of our patient (O.D. left, O.S. right). Look closely at both optic nerves. What do you notice?**

## Discussion

Our patient has bilateral optic nerve swelling (O.D. > O.S.). On clinical examination, the optic nerve clearly was elevated and the margins were blurred. We confirmed this finding on SD-OCT, where the retinal nerve fiber layer was thickened beyond what is observed in the normative database. This was highly evident on the 3D topographic OCT image. We documented no flame hemorrhages or pattern lines, which are often present in severe cases of optic nerve edema.

So, what's wrong with our patient? After careful evaluation, we determined that she had IIH. Based on the patent history provided at this visit, it would be almost impossible to make a diagnosis of

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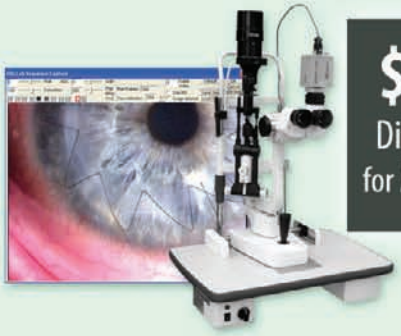

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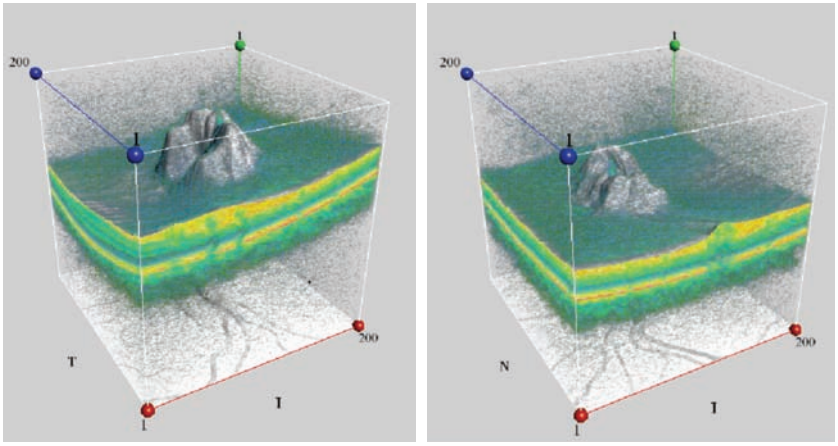


**3, 4. Three-dimensional macular cube scans of our patient's optic nerves on spectral domain optical coherence tomography (O.D. left, O.S. right).**

IIH in the absence of an MRI and an LP. Fortunately, we had a previous history to rely on.

At her last eye examination four years earlier, she was under the care of a neuro-ophthalmologist for IIH. At that time, she presented with ringing tinnitus and swollen optic nerves. She had the typical physical profile of a patient with IIH, with a height of 5 feet 6 inches and a weight of 180 pounds.

At that visit, an MRI and LP were ordered. The MRI was normal. However, the LP revealed opening pressures of 330mm $H_2O$ (the normal range is 70mm $H_2O$ to 180mm $H_2O$). Additionally, we obtained serial visual fields, which showed generalized constriction with limited reliability.

Previously, we had prescribed 1,000mg of acetazolamide per day to lower her intracranial pressure. She also received counseling on the health benefits of weight loss. But subsequently, she was lost to follow-up.

IIH develops secondary to chronically elevated intracranial pressure. Over the years, increased intracranial pressure has been described by several different terms—most commonly pseudotumor cerebri and benign intracranial hypertension (BIH).[1] Today, IIH is the preferred term.

The most significant neurologic complication caused by IIH is papilledema. If untreated, papilledema may lead to progressive optic atrophy and blindness. Other neurologc symptoms of IIP include severe headaches, ringing in the ears, blurred vision and diplopia (which may result from a cranial VI palsy).[1]

IIH predominately affects obese women of childbearing age.[1] There is no known etiology; however, there are several risk factors for the disease, including exposure to or withdrawal from certain exogenous substances (e.g., pharmaceutical agents, such as tetracycline), a wide variety of systemic diseases (e.g., Lyme disease, anemia, lupus and sarcoidosis), numerous endocrine or metabolic disorders, and disruption of cerebral venous flow.[1,2]

The treatment for IIH is multifaceted. Weight loss is considered to be the best long-term management objective for this condition, but often proves to be difficult. But, even slight weight reductions can make a significant difference. In one study, for example, just a 5% to 10% decrease in overall body mass yielded a reduction in intracranial pressure and facilitated papilledema resolution.[2,3] Nonetheless, referral to a dietitian may be appropriate to help formalize this process.

The most effective pharmacologic treatment for IIH is acetazolamide. The initial dosage is 500mg to 1,000mg/day (e.g., 500mg Diamox Sequels [acetazolamide, Duramed Pharmaceuticals] b.i.d.).[1] Unfortunately, many patients become intolerant due to the side effects of the medication, including paresthesias in the extremities, fatigue, metallic taste from carbonated beverages, and decreased libido.

For patients who report visual function decline, surgical management may be warranted. Appropriate interventions include optic nerve sheath fenestration, lumboperitoneal/ventriculoperitoneal shunt implantation to divert cerebrospinal fluid, and venous sinus stenting.[1,2]

Our patient seemed to be doing well, despite not undergoing an examination in four years. Even though there was generalized swelling of both optic nerves, their color still appeared healthy. Color vision testing also was normal, and visual field results were stable compared with those obtained on previous evaluations.

The patient was referred to a neuro-ophthalmologist a few weeks later, and acetazolamide was restarted. We instructed her to return in four months for follow-up. ■

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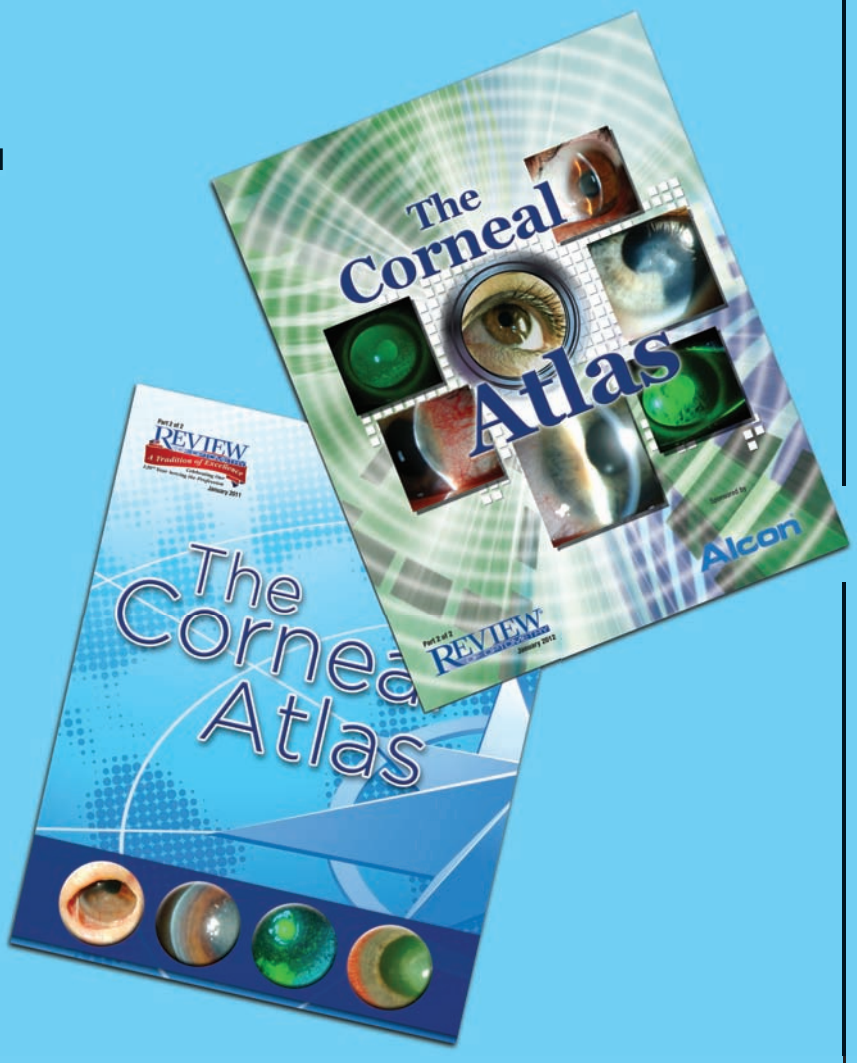


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# Is NVT Ready for Prime Time?

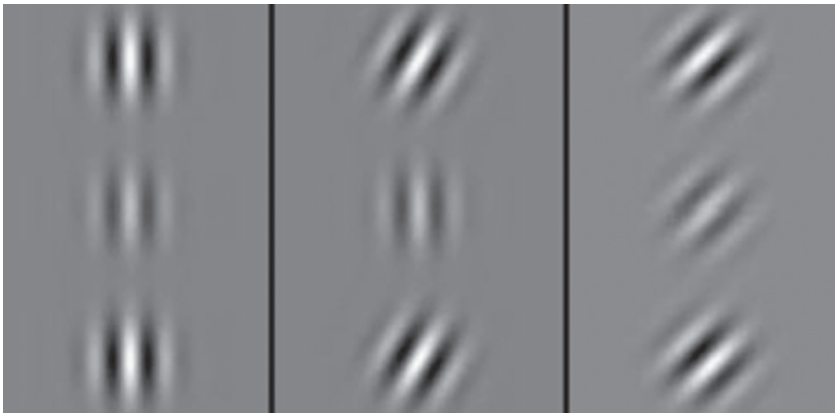
The latest neural visual therapy software seeks to offer an organic solution to amblyopia, and possibly even refractive error and presbyopia.

By Alan G. Kabat, O.D., and Joseph W. Sowka, O.D.

The goal of "Therapeutic Review" always has been to enhance our colleagues' understanding of ocular disorders and their clinical management. Typically, we discuss a particular pathological entity, such as macular degeneration or bacterial keratitis, and the current or emerging therapies available to combat the given condition.

Generally, we have steered clear of visual disorders like amblyopia, myopia and presbyopia in this column—frankly, because most optometrists no longer consider these areas to be within the realm of therapeutics. Over time, ocular conditions that typically are managed with lenses and prisms have become dissociated from those that are treated with medications. Nonetheless, these fundamental areas of vision care remain at the core of optometry and indeed represent a significant portion of our day-to-day activity in clinical practice.

With that in mind, we were highly interested to learn of a new technology that seeks to address visual concerns with an unconventional approach—the RevitalVision Training System. Based in Lawrence, Kans., RevitalVision provides a unique product intended to enhance vision in a variety of conditions without the use of lenses, medications or surgery. Instead, this technology employs computer-based, neural visual therapy (NVT) in an attempt to improve functional visual performance for patients who desire an alternative to spectacles or refractive surgery.



**Examples of Gabor patches, which are used in the RevitalVision programs.**

## Show Me the Data!

The science behind RevitalVision is quite intriguing and dates back more than 20 years.[1,2] It relies on the visual and cortical impact of Gabor patches, which are sinusoidal gratings located within a Gaussian envelope that are often used as psychophysical stimuli. RevitalVision uses a series of grouped Gabor patches presented in succession at specific, individually designed frequencies, spatial arrangements, contrast levels, orientations and exposure durations to stimulate the visual centers within the cortex.

Potential applications for this type of treatment include incipient presbyopia, low myopia, post-surgical (e.g., LASIK or cataract extraction) residual refractive error and sports vision, according to the company. But, at this time, adult amblyopia is the only clinical entity for which this technology has FDA approval.[3]

In the most widely referenced study using the device, researchers evaluated 54 adult amblyopic patients who were randomized to receive either NVT or placebo vision training.[3] Each participant underwent two to four weekly treatment sessions that lasted approximately 30 minutes each (mean of 45 +/-15 sessions). At the study's conclusion, visual acuity improved by an average of 2.5 lines (to 20/30) in the treatment group.[3] No improvement was observed in the control group. Similarly, a commensurate increase in contrast sensitivity function was observed in treatment group participants. Encouragingly, the improvements in acuity and contrast sensitivity were sustained after 12 months.[4]

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Additional publications have documented visual improvement in patients with low myopia and early presbyopia who used RevitalVision's NVT techniques.[5-8] Although none of these studies had particularly large patient populations, the results were notable. Subjects achieved between one and three lines of increased uncorrected visual acuity (logMAR scale) at both distance and near after using NVT.[5-7]

While refractive error remained essentially unchanged in these subjects, visual performance—including contrast sensitivity—demonstrated significant enhancement. The authors suggested that this form of therapy might be a desirable option for patients who are dissatisfied with their uncorrected acuity following refractive surgery.[7,8] Likewise, they suggested that RevitalVision may appeal to emerging presbyopes who are discouraged by the thought of spectacle correction.[7,8]

## How Does it Work?

The RevitalVision Training System is designed for in-home use on a patient's personal computer. Each program is customized to match the patient's pace and visual ability.

Depending upon the product selected, sessions are completed three to four times per week, and are monitored remotely by the company. Each of the 20 sessions takes an average of 20 to 30 minutes to complete for myopia or presbyopia training. The amblyopia package is a bit more intensive, however, consisting of 40 sessions that last approximately 40 minutes each.

Throughout the training sessions, users are presented with a series of visual tasks designed to improve efficiency and visual processing. Software measures the contrast threshold of a Gabor target with the presence of flankers (e.g., Gabor patches on either side of a target Gabor). After exposure to two short, successive visual displays, the patient identifies which display contains three Gabors.

Specialized algorithms analyze and continuously adjust the training sessions. The eye care provider measures contrast sensitivity and uncorrected visual acuity (both distance and near) at the initial consultation. This information is then entered into the system's database, and a brief trial session serves to further identify the patient's neural inefficiencies.

Once the preliminary program is generated, the patient downloads the RevitalVision software on his or her computer, and then may begin using the system at home. Then, upon completion of the treatment program, the prescribing eye care provider performs a final examination.

## First Impressions

As you might expect, this new technology has been extremely polarizing. Conventional thinking suggests that refractive blur cannot be overcome without lenses or surgery. Likewise, we were all taught that amblyopia only could be effectively treated in childhood, before the visual system loses its inherent plasticity.

Some well-respected individuals in optometry, ophthalmology and vision science have embraced this new technology after witnessing its results first-hand. According to RevitalVision's website, some early advocates include Richard L. Lindstrom, M.D., (Minneapolis, Minn.), John D. Hunkeler, M.D., Daniel S. Durrie, M.D., and Kelly F. Grosdidier, O.D. (all of Overland Park, Kans.).

A number of surgical practices now offer RevitalVision as an "alternative" option to spectacles, contact lenses, refractive surgery or surgical enhancements following LASIK.

Vision training has a checkered history in our profession. Will optometrists embrace this new concept? If the positive early results are borne out by additional data demonstrating long-term persistence of a therapeutic effect, it could offer a viable intervention for a group of patients whose needs might otherwise go unmet.

When managing patients' visual needs, it's important to remember that not everyone fits into our conventional treatment algorithms. Emerging technology continues to explore new avenues and opportunities. We owe it to our patients to remain open to possibilities beyond the tried-and-true, while also taking care to manage patient expectations appropriately. ■

*Drs. Kabat and Sowka have no direct financial interest in any of the products mentioned.*

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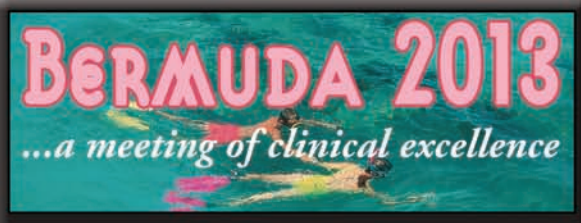


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# Eylea Snares Second Approval

The latest anti-VEGF agent now provides another option for patients with macular edema secondary to CRVO. **Edited by Diana L. Shechtman, O.D., and Paul M. Karpecki, O.D.**

In November 2011, the anti-VEGF agent Eylea (aflibercept, Regeneron) initially received FDA approval for the treatment of neovascular age-related macular degeneration (AMD). In September 2012, the drug secured approval for a second indication: the treatment of macular edema associated with central retinal vein occlusion (CRVO).

Like Lucentis (ranibizumab, Genentech/Roche)—the only other drug approved to treat both wet AMD and macular edema secondary to retinal vein occlusion—Eylea is administered via intravitreal injection. However, when used to treat wet AMD, Eylea may be dosed every eight weeks vs. every four weeks for Lucentis. Clearly, this injection frequency is appealing to both patients and treating physicians.

Eylea's reduced dosing frequency likely is associated with the active ingredient's longer half-life. (It should be noted, however, that the recommended dosing frequency for the treatment of macular edema associated with retinal vein occlusion is every four weeks for both Eylea and Lucentis.)

Eylea also exhibits a higher binding affinity to VEGF-A than Lucentis.[1,2] This suggests that Eylea potentially could yield a more potent therapeutic effect than that rendered by other intravitreal anti-VEGF therapies.

## Eylea for Macular Edema in Patients with CRVO

The use of anti-VEGF therapy for the treatment of macular edema secondary to CRVO demonstrated both structural and functional vision improvement in two key clinical trials—COPERNICUS and GALILEO.[3,4] Both studies evaluated the safety and efficacy of Eylea for macular edema in CRVO patients, and ultimately helped to secure FDA approval for the drug's second indication.

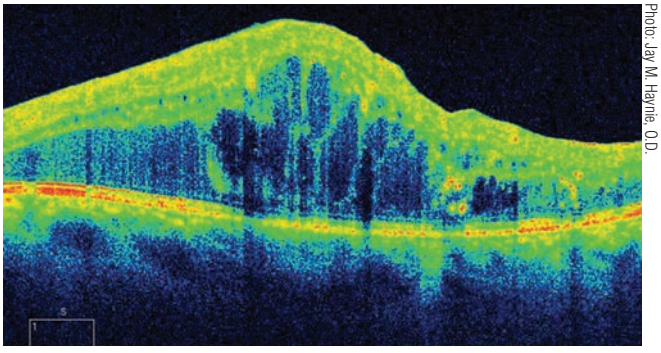

Photo: Jay M. Haynie, O.D.

**Pronounced cystoid macular edema documented in a patient with CRVO. Could he benefit from Eylea therapy?**

The study authors evaluated the long-term effects of Eylea over both six- and 12-month treatment intervals. In both studies, the primary endpoint was to achieve a visual gain of 15 or more ETDRS letters (equivalent to a three-line gain on the Snellen chart).[5]

A total of 358 patients were enrolled in COPERNICUS and GALILEO. Of these, 217 were dosed with Eylea and the remaining 141 subjects received sham injections. In both studies, 2mg Eylea injections were administered monthly for the first six months and then as needed for the subsequent six months. The same was true for the sham treatment group in COPERNICUS; however, subjects in the sham arm of GALILEO received monthly injections for an entire year.

At the six-month follow-up in COPERNICUS, 56.1% of patients who received Eylea gained at least 15 ETDRS letters from baseline acuity compared to just 12.3% of patients who had sham injections.[3,5] Patients who were treated with Eylea gained an average of 17.3 ETDRS letters, which correlated with decreased macular thickness.[3,5] Additionally, just 3.5% of patients who received Eylea experienced adverse events (e.g., conjunctival hemorrhage, reduced visual acuity and ocular pain) vs. 13.5% of patients who received sham injections.[3]

Patients in GALILEO experienced similar results. After six months, 60.2% of patients who were treated with Eylea gained 15 ETDRS letters versus 22% of patients who received sham injections.[5] Further, patients in the treatment group achieved an average visual acuity gain of 18 ETDRS letters.[5]

At the one-year follow-up, patients in both studies who received Eylea exhibited comparable visual improvement levels to those documented at six months. However, approximately 30% of patients in both studies who received sham

injections achieved a 15-letter gain after one year of placebo therapy.[6]

## Fewer Doses for Patients with CRVO?

One of the greatest hopes for Eylea is that, eventually, it safely could be dosed every other month for the treatment of macular edema associated with CRVO. Much like those who receive Eylea for wet AMD, this reduced dosing frequency could lower the physical, psychological and financial burdens on CRVO patients with macular edema. However, further studies will be required to determine the safest and most effective dosing schedule.

For now, Eylea remains the latest "wonder drug" in the realm of retinal vascular disease. Currently, Phase 3 clinical trials are evaluating the effect of Eylea for other retinal complications, including diabetic macular edema.[7] Only time will tell if the drug truly can live up to its promise and clinical expectations. ■

*Thanks to Jeffry D. Gerson, O.D., of Shawnee, Kans., for contributing this article.*

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## Diagnostic Imaging

### Multicolor Retinal Imaging

Heidelberg Engineering received FDA clearance for multicolor scanning laser imaging in all Spectralis models. Using infrared, green and blue reflectance images, the multicolor module can display different retinal structures within a single exam.

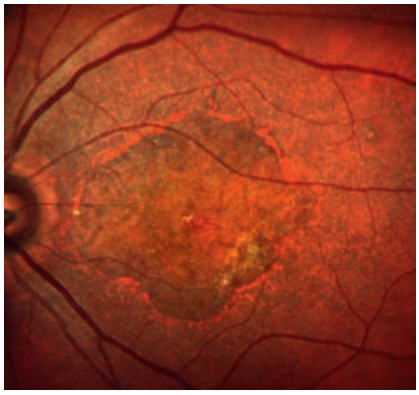

Photo: Sebastian Wolf, M.D., Bern, Switzerland

**An image taken with the new multicolor scanning laser imaging modality for the Spectralis.**

The module allows users to view images of the individual colors as well as the composite multicolor image, highlighting structural detail from different depths within the retina and providing additional diagnostic power, the company says.

Spectralis multicolor imaging delivers high-contrast, detailed images—even in difficult patients, including those with cataracts or nystagmus. According to Heidelberg, users have commented that the increased detail and contrast in the multicolor images has helped them identify pathologies that were difficult to see in the corresponding color fundus images.

Visit www.spectralis-multicolor.com.

## Contact Lenses

### Acuvue Oasys 24-pack

Vistakon's Acuvue Oasys contact lenses with Hydraclear Plus technology are now available in a 24-pack. New data has shown that wearers with more contact lenses on hand had a significantly better wearing experience and were more likely to recommend their eye care practitioner to friends and family, according to Vistakon.

Indicated for daily wear vision correction, Acuvue Oasys lenses also may be worn overnight (up to one week), as recommended by an eye care professional. Made from senofilcon A, this lens features a tear-attracting polymer in the silicone hydrogel material

## Optic Sunglasses

### EnChroma

EnChroma recently unveiled a line of advanced optic sunglasses that enhance color vision. The lens selectively filters light that reaches the eye and blocks the specific shades that are most responsible for color confusion.

By removing this interference, the lenses are designed to allow people with color vision deficiency (CVD) and normal vision to see colors more vividly, the company says.

Four styles are available in three frame styles (pictured):

- ***EnChroma Cx.D*** is for wearers who have difficulty differentiating colors due to deuteranomalous CVD.
- ***EnChroma Cx.PT*** is for those who have decreased red sensitivity because of protanomalous CVD.
- ***EnChroma Cx.NRG*** boosts the appearance of all colors for individuals with normal color vision.
- ***EnChroma Cx.UV450*** offers comprehensive protection from solar UV and short-wavelength blue light. The company says it's ideal for individuals who are routinely exposed to high-intensity sunlight (such as those in aviation, marine and alpine environments), those with photosensitivity, at-risk patients who seek extra protection from blue-light radiation, or patients with low vision disorders.

Visit www.enchroma.com.


itself with the goal of improving patient comfort and increasing wear time, the company says.

Acuvue Oasys is available in base curves of 8.4mm and 8.8mm at parameters of -0.50D to -6.00D and +0.50D to +6.00D in 0.25D increments, and from -6.50D to -12.00D to +6.50D to +8.00D in 0.50D increments.

Visit www.acuvueprofessional.com.

## Mobile Apps

### OD Mobility App

OD Mobility recently introduced a mobile application that provides optometrists with the opportunity to create a customized mobile app for their own businesses, featuring their unique practice name and logo.

The OD Mobility app offers several ways to help

## Frames

### Calvin Klein Eyewear

Marchon introduces the Calvin Klein Eyewear Men's and Women's Fall/Winter 2012 collection, with cat-eye shapes and classic silhouettes that are modernized to create a bold and youthful, yet sophisticated, look. In addition to a number of sunglasses, the eyewear line includes a variety of ophthalmic frames:

- ***ck5730***. This cat-eye shape features vibrant-colored temples, matched with havana-colored frame fronts. Temples are adorned with a subtle "ck" logo and three decorative stones. Available colors include black, vintage havana, havana pink, havana blue and havana green.
- ***ck5733***. A retro-inspired, soft square frame that features the "ck" logo in silver and gold colors on the sculpted temples. It is available in a range of dual-color options, such as black/petrol, havana/green, havana/violet and havana/ivory.
- ***ck5352***. Plastic temples featuring the "ck" logo complement the modified rectangle shape. This zyl-metal combination is available in silver, gun, bronze and rose.
- ***ck5767***. Havana colors enhance this unisex, geometric-shaped frame, which features a subtle and clean "ck" logo on the thin, zyl temples. Minimal styling is accented with solid and gradient colors, such as black, fog, havana ochre, havana/black, striped blue and striped khaki.
- ***ck5768***. This feminine frame echoes a vintage style, with a delicate, thin temple design that showcases the "ck" logo in silver and gold colors. Translucent fronts are complemented with solid temples in feminine colors, such as black, champagne, havana/black, azure, purple and bordeaux.
- ***ck5769***. This vintage-inspired, deep rectangle frame features translucent colors with solid temple colors. It's available in black, havana/black, petrol, havana/green, antique rose and bordeaux.
- ***ck5770***. This soft, narrow rectangle has a feminine style, with the "ck" logo in silver and gold colors on the temples. It's offered in black, champagne, havana/black and orchid.

Visit www.marchon.com.


ck5730


ck5733


ck5352


ck5767


ck5768


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• ***News/Social Media*** allows optometrists to keep patients updated on practice promotions, important news, links to social media pages and surveys.

This mobile app is available for purchase from the iPhone app store and the Android market. In addition, OD Mobility offers Eye-Connections—an educational program that provides tools for mobile marketing and social media strategies via monthly webinars.

Visit www.odmobility.com.

### Integrity iPad App

Integrity Digital Solutions launched an iPad app to complement its cloud-based EMR software, Integrity EMR for Eyes. It allows users to retrieve relevant patient information without being connected to a computer workstation.

Using the Integrity iPad app, eye care providers can access past clinic notes, impressions and plans with an easy-to-use interface. The app syncs with Integrity EMR for Eyes in real-time, so iPad users can immediately see what has been entered into the EMR from anywhere.

Visit www.integrityEMR.com. ■

# Meetings + Conferences

## January 2013

■ **11-13.** *AZOA 2013 Bronstein Contact Lens and Cornea Seminar.* Doubletree Paradise Valley Resort, Scottsdale, Ariz. Hosted by: Arizona Optometric Association. CE hours: 16. Contact Kate Diedrickson at kate@azoa.org or (602) 279-0055. Visit www.azoa.org.

■ **12.** *2013 Glaucoma Symposium.* Willows Lodge, Woodinville, Wash. Chaired by: Howard Barneby, M.D., and Murray Fingeret, O.D. Visit www.pacificu.edu/optometry/ce.

■ **12-14.** *24th Annual Berkeley Practicum.* DoubleTree Hotel, Berkeley Marina, Berkeley, Calif. Hosted by: University of California, Berkeley, School of Optometry. CE hours: 20. Email optoCE@berkeley.edu or call (800) 827-2163. Visit http://optometry.berkeley.edu/ce/berkeley-practicum.

■ **18-19.** *High Performance Vision/Sports Vision Consulting Weekend.* Hollywood Beach Marriott, Hollywood, Fla. Contact Donald Teig, O.D., at contact@ultimateeventsllc.com or (203) 312-3123. Visit www.ultimateeventsllc.com.

■ **19-20.** *Gold Coast Educational Retreat.* Hyatt Regency Pier 66, Ft. Lauderdale, Fla. Hosted by: Broward County Optometric Association. CE hours: 17. Email browardeyes@gmail.com or visit www.browardeyes.org.

■ **20-26.** *30th Annual Island Eyes Conference.* Hyatt Regency Maui, Hawaii. Hosted by: Pacific University College of Optometry. CE hours: 25. Contact Jeanne Oliver at jeanne@pacificu.edu or (503) 352-2740. Visit www.pacificu.edu/optometry/ce.

■ **26-28.** *58th Annual Kraskin Invitational Skeffington Symposium on Vision.* Hyatt Regency Bethesda, Bethesda, Md. Hosted by: The Institute for Behavioral Optometry. Contact Chairman Jeffrey Kraskin, O.D., at jkraskin@rcn.com or (202) 363-4450. Visit http://skeffingtonsymposium.org.

■ **30-31.** *Seeing is Believing 2013.* Virtual Conference. Time: 2 p.m.–10 p.m. (EST). Faculty: Alan Glazier, O.D., Gary Gerber, O.D., Neil Gailmard, O.D., Nate Bonilla-Warford, O.D., Cheryl Murphy, O.D., and more. Contact Michael Porat at (347) 618-0784 or michael@sibconference.com. Visit www.sib2013.com.

## February 2013

■ **6.** *IOA Winter Seminar.* Ritz Charles, Carmel, Ind. Hosted by: Indiana Optometric Association. Email blsims@ioa.org or call (317) 237-3560. Visit www.ioa.org.

■ **6-7.** *MOA Winter Seminar.* Kellogg Hotel & Conference Center, East Lansing, Mich. Hosted by: Michigan Optometric Association. Contact Amy Possavino at amy@themoa.org or (517) 482-0616. Visit www.themoa.org.

■ **8-10.** *3rd Annual Final Eyes CE.* Baptist Hospital Conference Center, Jacksonville, Fla. CE hours: 16. Contact Valerie Fernandez at valerie.fernandez@bmcjax.com or call (904) 202-2080. Visit FinalEyesCE.com.

■ **12-14.** *The Eye Show London 2013.* London ExCeL International Exhibition Centre, United Kingdom. Hosted by: Emergexpo plc. CE hours: 18. Email conference@theeyeshow.com or visit www.theeyeshow.com.

■ **15-17.** *52nd Annual Heart of America Contact Lens Society Contact Lens and Primary Care Congress.* Sheraton Kansas City Hotel and Crown Center, Kansas City, Mo. E-mail registration@thehoacls.org or call (918) 341-8211. Visit www.hoacls.org.

■ **16-20.** *SkiVision 2013.* Viceroy Snowmass Luxury Mountain Resort, Snowmass Village, Colo. CE hours: 23. Email questions@skivision.com or call (888) SKI-2530. Visit www.skivision.com.

■ **21.** *7th Central Jersey Optometric Seminar.* CentraState Medical Center, Freehold, N.J. Time: 7:00 p.m.–10:30 p.m. CE hours: 4. Contact William Potter, O.D., at eyedoc2180@aol.com or (609) 947-8545. Visit http://optometryonwest44th.webs.com.

■ **27-March 3.** *SECO International 2013.* Building A, Georgia World Congress Center, Atlanta. CE hours: 300+. Contact Bonny Fripp at bfripp@secostaff.com or (770) 451-8206, ext. 13. Visit www.seco2013.com.

■ **28-March 2.** *MOA Big Sky Conference.* Huntley Lodge, Big Sky Conference Center, Big Sky, Mont. Hosted by: Montana Optometric Association. Contact Executive Director Sue Weingartner at sweingartner@rmsmanagement.com or (406) 443-1160. Visit www.mteyes.com.

## March 2013

■ **3-8.** *27th Annual Eye Ski Conference.* The Lodge at Mountain Village, Park City, Utah. CE hours: 20. Contact Tim Kime, O.D., at tandbkime@buckeye-express.com. Visit www.eyeskiutah.com.

■ **10.** *6th Annual Evidence Based Care in Optometry Conference.* BWI Marriott, Linthicum Heights, Md. Hosted by: Maryland Optometric Association and the Wilmer Eye Institute. Email moa@assnhqtrs.com or call (410) 727-7800. Visit www.marylandeyes.com.

■ **14-17.** *International Vision Expo & Conference East 2013.* Jacob K. Javits Convention Center, New York, N.Y. CE hours: 350. Visit www.visionexpoeast.com.

■ **16-17.** *7th Annual Conference on Comprehensive Eye Care.* The Sheraton Hotel, Niagara Falls, N.Y. Hosted by: PSS EyeCare. Featured speakers: Ron Melton, O.D., Randall Thomas, O.D., Paul Karpecki, O.D., and Deepak Gupta, O.D. CE hours: 18. Email education@psseyecare.com or call (203) 415-3087. Visit www.psseyecare.com.

## April 2013

■ **12-13.** *OAOP Annual Spring Congress 2013.* Embassy Suites & Conference Center, Norman, Okla. Hosted by: Oklahoma Association of Optometric Physicians. Visit www.oaop.org.

■ **13-14.** *5th Annual Symposium on Ocular Disease.* Crowne Plaza, Tyson's Corner, Va. Hosted by: PSS EyeCare. Featured speakers: Deepak Gupta, O.D., and Kimberly Reed, O.D. CE hours: 18. Email education@psseyecare.com or call (203) 415-3087. Visit www.psseyecare.com.

■ **19-21.** *WFOA Spring Seminar 2013.* Hilton Sandestin Beach Golf Resort & Spa, Destin, Fla. Hosted by: West Florida Optometric Association. Contact Jennifer Major, O.D., at wfoatreasurer@gmail.com. Visit www.wfoameeting.com.

■ **26-28.** *28th Annual Morgan/Sarver Symposium.* DoubleTree Hotel, Berkeley Marina, Berkeley, Calif. Hosted by: University of California, Berkeley, School of Optometry. CE hours: 20. Email optoCE@berkeley.edu or call (800) 827-2163. Visit http://optometry.berkeley.edu/ce/morgan-sarver-symposium.

## May 2013

■ **1-4.** *2013 Annual Educational Conference & Exposition.* Hilton Garden Inn, Missoula, Mont. Hosted by: Montana Optometric Association. Contact Executive Director Sue Weingartner at sweingartner@rmsmanagement.com or (406) 443-1160. Visit www.mteyes.com.

■ **2-4.** *MWCO Annual Congress.* Caesar's Palace, Las Vegas. Hosted by: Mountain West Council of Optometrists. Contact Tracy Abel, CMP, at tracyabel@earthlink.net or call (888) 376-6926. Visit www.mwco.org.

■ **9-10.** *117th Annual Meeting and Spring Seminar.* DeVos Place, Grand Rapids, Mich. Hosted by: Michigan Optometric Association. Contact Amy Possavino, at amy@themoa.org or call (517) 482-0616. Visit www.themoa.org.

■ **17-19.** *2013 AZOA Spring Congress.* Hilton Tuscon El Conquistador Golf & Tennis Resort, Tucson, Ariz. Hosted by: Arizona Optometric Association. Contact Kate Diedrickson, at kate@azoa.org or call (602) 279-0055. Visit www.azoa.org.

## June 2013

■ **7-9.** *Ocular Symposium: Pearls in Ocular Diagnosis.* Holiday Inn Golden Gateway, San Francisco. CE hours: 24. Contact Lorraine Geary at ocularsymp@aol.com or call (415) 278-9940.

■ **13-16.** *Maui 2013.* Wailea Beach Marriott Resort & Spa, Maui, Hawaii. Hosted by: *Review of Optometry*. Meeting chair: Paul Karpecki, O.D. CE hours: 14. Contact Lois DiDomenico at ReviewMeetings@Jobson.com or (866) 658-1772. For more information, visit www.revoptom.com/conferences.

## July 2013

■ **19-22.** *Bermuda 2013.* Fairmont Hamilton Princess, Bermuda. Hosted by: *Review of Optometry*. Meeting chair: Paul Karpecki, O.D. CE hours: 14. Contact Lois DiDomenico at ReviewMeetings@Jobson.com or (866) 658-1772. For more information, visit www.revoptom.com/conferences. ■

**To list your meeting, contact:**
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REVIEW OF OPTOMETRY

# EXPAND YOUR KNOWLEDGE

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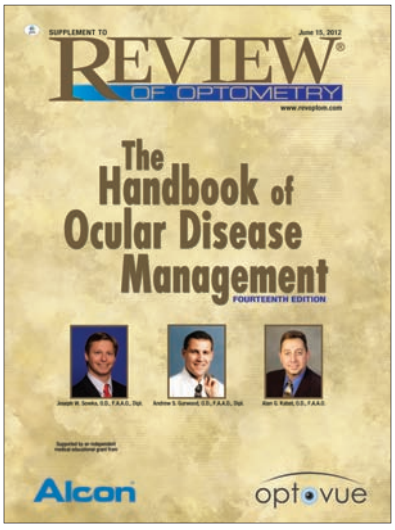


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# PRK's Still Got Game

Technological and procedural advances have allowed photorefractive keratectomy to remain a viable procedure for nearly 20 years.

By Derek N. Cunningham, O.D., and Walter O. Whitley, O.D., M.B.A.

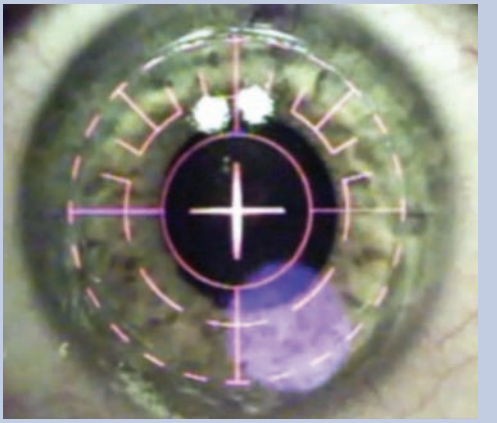

**Photo at right: While the patient fixates on a central light, a flying spot pattern is used to minimize tissue heating and to increase accuracy.**

Photo/video courtesy of Steven Dell, M.D.

**Go to www.revoptom.com or scan the QR code at left to see video footage of the procedure.**

**On The Web ›› View a narrated video of a photorefractive keratectomy procedure.**

Although photorefractive keratectomy has been overshadowed by LASIK, PRK still is performed routinely today. In the 18 years since its FDA approval, PRK has been improved by use of larger treatment zones, smoother ablations and immunomodulatory drugs. Such upgrades have yielded increased accuracy. In fact, PRK has stood the test of time so well that many surgeons now refer to it as "advanced surface ablation."

Ironically, the benefit of PRK can also sometimes be its biggest deterrent. If, for example, patients have epithelial or anterior stromal irregularities—such as epithelial basement membrane dystrophy or anterior stromal scars from ulcers—the diseased tissue is removed during the procedure. (LASIK, by contrast, would preserve these defects.) Unfortunately, however, the epithelial regrowth phase may last several days or weeks, resulting in a prolonged post-op period of reduced visual acuity.

Usually, surgeons choose to loosen the epithelium with alcohol. This is accomplished by first creating a well in the corneal tissue, which is then filled with an alcohol solution. The loose epithelium is gently removed with a sterile surgical spear, permitting direct laser access to the stroma, which is then cleaned and gently polished with a blade.

During the ablation, the patient fixates on a central light. A flying spot pattern is used to prevent tissue overheating and to increase accuracy. Typically, the surgeon will apply a sponge soaked with mitomycin C to the cornea for a specified duration to decrease the risk of postoperative haze. The eye is then rinsed with buffered saline to remove any residual debris. Finally, the cornea is covered with a bandage lens. Postoperatively, patients are usually seen the next day to ensure that the bandage contact lens remained in place. A large epithelial defect will be visible at this follow-up.

The patient should then be scheduled for a second follow-up five to seven days after surgery. Typically, re-epithelialization will be complete within a week. At this time, the bandage contact lens may be removed. If any loose or incomplete epithelium remains, the lens may be left in place for several additional days. During the subsequent month, patients should taper postoperative steroid drops while enjoying progressively better vision.

When counseling patients, optometrists should:

- Emphasize the extended visual recovery period compared to LASIK, and reassure the patient while he or she is healing. No matter how adequately prepared you believe patients are for slow visual recovery, they can become extraordinarily concerned when they do not see well after a short time.
- Prepare patients for photophobia, discomfort and pain. Discomfort typically persists for just two days after surgery. Again, forewarned is forearmed. With the routine use of topical NSAIDs and bandage lenses, very few will report significant pain. Having no way to predict which patients will or will not experience significant pain, we always prescribe a three-day course of oral narcotics. ■


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Diagnostic **Quiz**

# Cut the Crying!

**By Andrew S. Gurwood, O.D.**

## History

A 57-year-old white female presented with a chief complaint of excessive tearing in her left eye. She reported that the tears were running overtop of her lower lid for approximately three months. Her systemic and ocular histories were unremarkable, and she denied exposure to chemicals or allergens of any kind.

## Diagnostic Data

Best-corrected entering visual acuity measured 20/20 O.U. at distance and near. Her external examination was normal, with no evidence of afferent pupillary defect. Goldmann applanation tonometry measured 15mm Hg O.U.

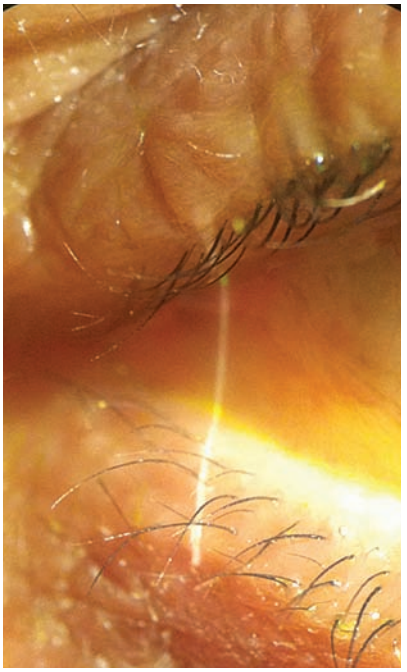
The dilated fundus findings were normal—both peripherally and centrally—with healthy nerves and maculae O.U. The biomicroscopic examination of the anterior segment is illustrated in the photograph.

## 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 likely prognosis?

To find out, please visit www.revoptom.com. Click on the cover icon for this month's issue, and then click "Diagnostic Quiz" under the table of contents. ■

*Thanks to Todd R. Dimmick, O.D., of Philadelphia and Marc Otto, B.S., a fourth-year optometry student at Salus University in Elkins Park, Pa., for contributing to this case.*



**Biomicroscopic view of our 57-year-old patient's left eye. What do you notice?**

**Retina Quiz Answers** *(from page 58):* 1) c; 2) b; 3) d; 4) b.

## Next Month in the Mag

Our January issue features the 14th Annual Dry Eye Report, which will include:

- *Prescription Therapies for Dry Eye: The Next Wave*
- *A Lifetime of Dry Eye: Learn to Navigate Age-Related Changes*

Also in January:

- *Optometric Study Center: See What You've Been Missing Without Fundus Autofluorescence* (earn 2 CE credits)
- *Management Strategies for Recurrent Corneal Erosion*
- *Sharpen Your Visual Field Interpretation Skills*
- *How Will the Sunshine Act Affect You?*

## And...

- Don't miss the January/February issue of *Review of Cornea & Contact Lenses!*

## Feedback

*Review of Optometry* welcomes questions and comments. E-mail Jack Persico, editor-in-chief, jpersico@jobson.com, with "Letter to the Editor" as the subject line.

Or, write to *Review of Optometry*, 11 Campus Blvd., Suite 100, Newtown Square, PA 19073.

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**References: 1.** Based on third party industry report MAT June 2012, based on unit sales, Alcon data on file. **2.** Based on typical rebates and compliance with manufacturer-recommended lens replacement for DAILIES® AquaComfort Plus® and ACUVUE^ OASYS^, and lens care for ACUVUE^ OASYS^; Alcon data on file, 2012. **3.** Dumbleton K, Woods C, Jones L, et al. Patient and practitioner compliance with silicone hydrogel and daily disposable lens replacement in the United States. *Eye Contact Lens.* 2009;35(4):161-174. **4.** Alcon data on file, 2012.

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