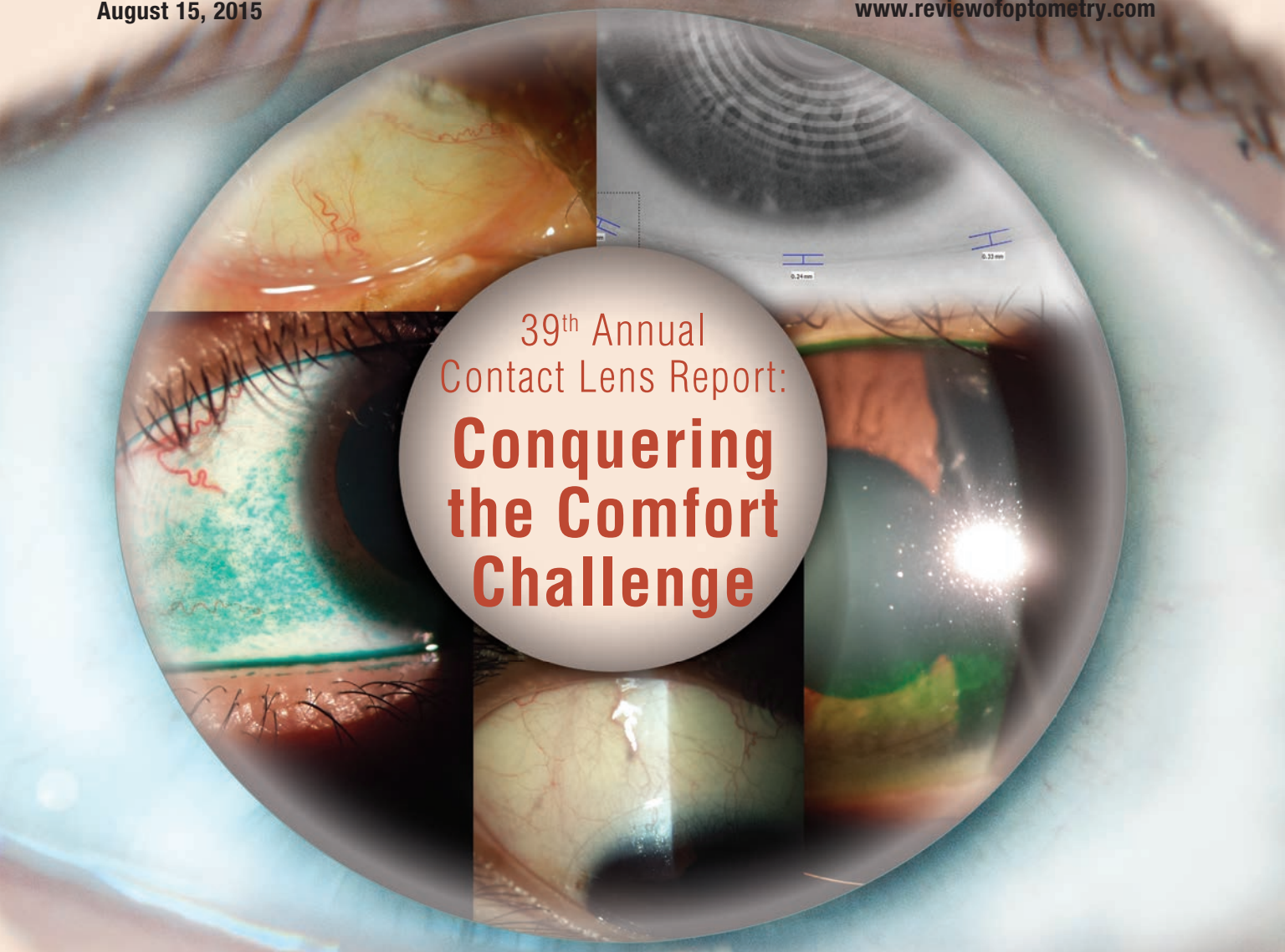
Earn 2 CE Credits — Anterior Uveitis: The *Un*usual Suspects, **P. 66**

REVIEW® OF OPTOMETRY

August 15, 2015

www.reviewofoptometry.com



39th Annual Contact Lens Report: Conquering the Comfort Challenge

Introducing the newly expanded family of products

The #1 prescribed daily disposable around the world **now satisfies a broader range of patients**

ACUVUE® Brand Contact Lenses are indicated for vision correction. As with any contact lens, eye problems, including corneal ulcers, can develop. Some wearers may experience mild irritation, itching or discomfort. Lenses should not be prescribed if patients have any eye infection, or experience eye discomfort, excessive tearing, vision changes, redness or other eye problems. Consult the package insert for complete information. Complete information is also available by visiting www.acuvueprofessional.com or by calling 1-800-843-2020.

built on the proven 1-DAY ACUVUE® MOIST Platform

Every brand built on the **1-DAY ACUVUE® MOIST Platform** offers dual action technology, which helps keep Moisture In and Irritation Out. In addition, their **EYE-INSPIRED™ Designs** address specific patient needs

1-DAY ACUVUE® MOIST Brand for ASTIGMATISM utilizes BLINK STABILIZED™ Design to harness the natural power of a blinking eye, delivering exceptional stability and clear vision for astigmatic patients

NEW **1-DAY ACUVUE® MOIST Brand MULTIFOCAL** is the first and only multifocal lens that uniquely optimizes the optical design according to age and refractive power for a superior vision experience for presbyopic patients

NEW **1-DAY ACUVUE® DEFINE® Brand** helps eyes look whiter and brighter with an iris-inspired design for patients who want to enhance the natural beauty of their eyes

1-DAY ACUVUE® MOIST Brand MULTIFOCAL Contact Lenses

1-DAY ACUVUE® MOIST Brand Contact Lenses

1-DAY ACUVUE® MOIST BRAND CONTACT LENSES

VOL. 152 NO. 8 ■ AUGUST 15, 2015

IN THE NEWS

The sulfa-based compound **ethoxzolamide**, found in many **glaucoma medications**, may also be **effective against tuberculosis (TB),** scientists from Michigan State University have discovered. The study, recently published in the journal *Antimicrobial Agents and Chemotherapy*, found the compound thwarts the TB bacterium's ability to evade the immune system.

The researchers believe the discovery may also **shorten TB treatment**, thus overcoming drug resistance.

Researchers at Utrecht University in the Netherlands used prisms and MRI to find the point in the human brain in which **the transformation to a cyclopean view of the world takes place**. The transition takes place very early in image processing in the visual cortex, and researchers hope a better understanding of this process will help ongoing research on vision problems such as **amblyopia**.

The study findings were recently published in *Current Biology*.

A study recently published in *The Gerontologist* found that **seniors** living in subsidized housing have a **higher rate of vision impairment**. Researchers screened residents 60 years and older in 14 federally subsidized senior housing facilities in Jefferson County, Ala., and discovered **40% failed distance vision screenings** (worse than 20/40 in either eye), and 58% failed near vision screenings. The usual rate of impairment in patients older than age 60 in the general population is **10% to 20%**, the study states. The study's patient population was predominately African American (75%).

The Dangers of Eyelid Tattooing

New research suggests it induces meibomian gland loss and tear film instability.

By Rebecca Hepp, Senior Associate Editor

A new study found patients with eyelid tattoos had shortened tear break-up time (TBUT) and induced meibomian gland loss, suggesting eyelid tattoos could be another risk factor for ocular surface disease.

Researchers from the Hallym University College of Medicine in Seoul, Republic of Korea, and the Seoul National University Bundang Hospital in Seongnam, Republic of Korea, looked at 10 women with eyelid tattoos and 30 women without as controls. They studied TBUT, corneal erosion and meibomian gland loss in relation to a tattoo score given to each subject based on the distance between the tattoo and the eyelid margin. They found the TBUT in the tattoo group was shorter than that in the control group, and the TBUT significantly correlated with the total tattoo score.

Fluorescein staining showed that corneal erosion was more severe in the tattoo group than in the control group, and meibography revealed meibomian gland loss was more severe in the tattoo group than in the control group.

"This study may have some clinical implications for a small subset of our patients who inquire about, or have had, the procedure, certainly regarding more robust patient education, but also regarding more vigilant dry eye/MGD treatment in those with eyelid tattoos," says Sara Weidmayer, OD.

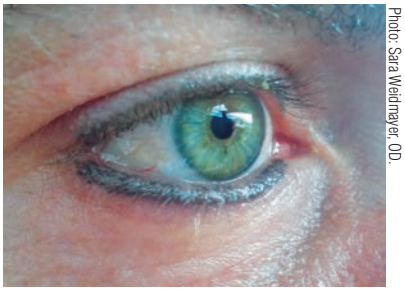


Photo: Sara Weidmayer, OD.

Eyelid tattooing is becoming an increasingly popular aesthetic procedure.

However, Dr. Weidmayer notes the study was small and was more observational rather than clearly defined as a prospective cohort study. Also, "in a 40- to 50-year-old female cohort, many likely had pre-existing dry eye or MGD and the mean follow up was relatively short," she says. Dr. Weidmayer recommends optometrists remain aware of new research, but remember, "pathologic meibomian gland changes observed over time after eyelid tattooing should be further investigated before firm conclusions are drawn from this single small study."

Lee YB, Kim JJ, Hyon JY, et al. Eyelid tattooing induces meibomian gland loss and tear film instability. Cornea. 2015 Jul;34(7):750-5.

Trade Up To Keeler

Trade-in your hand-held slit lamp & get $600 towards Keeler's Advanced PSL Classic!

Powerful & Portable!

- Now with LED technology
- Precision machined aluminum chassis
- Advanced optics, x10 & x16 magnification
- Controllable illumination from maximum to zero
- Most Apertures and filters along with 1.mm square light patch for assessing a/c flare

Trade-in & Special Bonus
FREE Carrying Case. Only Portable Slitlamps that have a binocular microscope allowed as trade-in.
Offer expires September 30, 2015.

Buy Online!
keelerusa.com

Keeler
OPTICS

Keeler Instruments, Inc. • 456 Parkway • Broomall, PA 19008 • Tel: (800) 523-5620 • Fax: (610) 353-7814 • email: keeler@keelerusa.com

Brien Holden, Vision Pioneer, Passes

Brien Holden, PhD, OAM, CEO of Brien Holden Vision Institute, and a professor at the School of Optometry and Vision Science at the University of New South Wales (UNSW) Australia, died July 27 in Sydney. He was 73.

Dr. Holden was described as the most influential optometrist of our generation when receiving his honorary doctorate in humane letters at the University of Houston. His career was spent inspiring scientists and health care professionals around the world with his dream of "vision for everyone, everywhere,"a Brien Holden Vision Institute press release says.

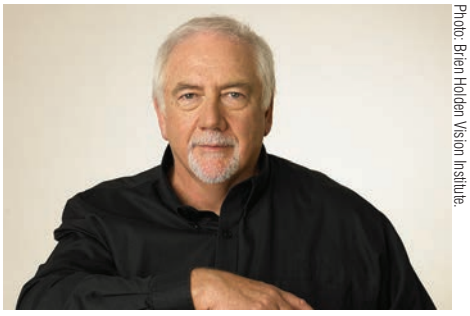


Photo: Brien Holden Vision Institute.

Dr. Holden began his career after completing his optometry training at Melbourne University in 1964, and his contributions extend across research, education, public health and humanitarian efforts. Over the course of his career, Dr. Holden received over 30 awards from organizations around the world for his contributions to research, eye care and health. He delivered more than 90 keynote addresses and authored more than 220 papers, 26 book chapters and 380 abstracts, according to the Brien Holden Vision Institute.

"Brien may be the most highly skilled, exceedingly capable person I have ever known," said Joseph Shovlin, OD, of Northeastern Eye Institute. "He is the 'Giant among the Giants' as a visionary in so many realms. Brien Holden will be hailed as a wonderful educator, productive researcher, creative inventor and passionate humanitarian," says Dr. Shovlin. "He will be sorely missed by so many."

Gene Therapy Helps Visual Processing

New research from the Perelman School of Medicine at the University of Pennsylvania and The Children's Hospital of Philadelphia (CHOP) suggests gene therapy that often leads to sight restoration also strengthens the brain's visual pathways.

Study participants received the gene therapy in their worse-seeing eye, and the investigators saw a significant difference between the side of the brain connected to the treated eye and the side connected to the untreated eye, even though they imaged the brains only two years later.

They studied 10 patients diagnosed with Leber's congenital amaurosis Type 2 (LCA2), a rare disease that causes the retina to degenerate slowly. Patients typically have limited visual function at birth, experience progressive loss of vision and are often completely blind by mid-life.

Study participants commonly went from being blind or near blind to being partially sighted and able to navigate almost normally. Researchers then sought to better understand how, or even if, the pathways in the brain recovered. Using advanced MRI, they discovered that the untreated eyes had weaker connectivity with the brain than the treated eyes, suggesting gene therapy was helping to improve that connection.

"That was what we expected to see—the more the treated eye sees the world and interacts with the environment, the more it stimulates the pathway and the stronger the connecting pathway becomes between the retina and the brain," said lead author Manzar Ashtari, PhD, a director at the Center for Advanced Retinal and Ocular Therapeutics in the Department of Ophthalmology at Penn.

Dr. Ashtari and colleagues are continuing their research through a larger Phase III clinical trial and hope the FDA will review the results next year.

Ashtari M, Zhang H, Cook PA, et al. Plasticity of the human visual system after retinal gene therapy in patients with Leber's congenital amaurosis. Science Translational Medicine. 2015;7(296):296ra110.

Looking deeper
Exploring innovation

Shire's Vision for Ophthalmics

At Shire, we're a leading biotech with a global track record for our work in rare diseases and specialty conditions.

Now we're expanding our vision and bringing the same commitment to ophthalmics. Pursuing the promise of new therapies in ophthalmics to address patients' unmet needs.

Just watch.

Visit **Shire-Eyes.com**

Shire

Eye Drops: The Future of Cataract Treatment?

Researchers recently discovered that the molecule lanosterol can dissolve the lens protein buildup that causes cataracts.

"Cataract surgery is the most common operation performed in the United States," says Eric Donnenfeld, MD, the national medical director of TLC Laser Eye Centers. "The only treatment for this common disorder is surgery, but for years scientists have been looking for a medical therapy to either prevent or treat cataracts."

This new finding by Ling Zhao, PhD, and colleagues holds promise for just such a therapy. They found treatment with lanosterol "significantly decreased preformed protein aggregates both *in vitro* and in cell-transfection experiments" and "could reduce cataract severity and increase transparency in dissected rabbit cataractous lenses *in vitro* and cataract severity *in vivo* in dogs," the researchers write in the journal *Nature*.

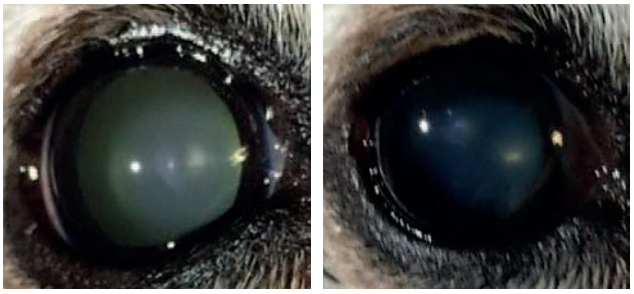
They came across the discovery while studying a family in which three of four children have cataracts, although neither parent does. They found the children with cataracts had a mutated version of a gene that's involved in the production of lanosterol. The researchers then conducted several tests with lanosterol, ultimately uncovering its ability to inhibit lens protein aggregation and reduce cataract formation.

The next step in the research process is designing human trials. The researchers expect the use of lanosterol in humans to have little toxic effect, considering it is a molecule produced naturally by the human body. And while a commercially available treatment is likely far in the future, the finding holds promise for the growing cataract population.

"Our study identifies lanosterol as a key molecule in the prevention of lens protein aggregation and points to a novel strategy for cataract prevention and treatment," the authors conclude.

"This paper offers a promising new therapy in the treatment of cataracts," Dr. Donnenfeld says. But "our enthusiasm should be tempered by the knowledge that other compounds have been tried in the past and have not been effective. I look forward to further research in this area and remain hopeful that a medical therapy will emerge that will help millions of patients." ■

Photos: Zhao, et al.



At left, a cataractous dog lens. At right, the same lens treated with lanosterol with increased lens clarity.

Ling Zhao L, Chen XJ, Zhu J, et al. Lanosterol reverses protein aggregation in cataracts. Nature. 2015.

REVIEW® OF OPTOMETRY

BUSINESS OFFICES
11 Campus Blvd., Suite 100
Newtown Square, PA 19073

CEO, INFORMATION SERVICES GROUP
Marc Ferrara
(212) 274-7062 • mferrara@jobson.com

PUBLISHER
James Henne
(610) 492-1017 • jhenne@jobson.com

REGIONAL SALES MANAGER
Michele Barrett
(610) 492-1014 • mbarrett@jobson.com

REGIONAL SALES MANAGER
Michael Hoster
(610) 492-1028 • mhoster@jobson.com

VICE PRESIDENT, OPERATIONS
Casey Foster
(610) 492-1007 • cfoster@jobson.com

VICE PRESIDENT, CLINICAL CONTENT
Paul M. Karpecki, OD, FAAO
pkarpecki@jobson.com

PRODUCTION MANAGER
Scott Tobin
(610) 492-1011 • stobin@jobson.com

SENIOR CIRCULATION MANAGER
Hamilton Maher
(212) 219-7870 • hmaher@jhihealth.com

CLASSIFIED ADVERTISING
(888) 498-1460

SUBSCRIPTIONS
$56 a year, $88 (US) in Canada,
$209 (US) in all other countries.

SUBSCRIPTION INQUIRIES
(877) 529-1746 (US only);
outside US, call (847) 763-9630

CIRCULATION
PO Box 2025
Skokie, IL 60076
Tel: (toll free) 1-877-529-1746
Outside US: (847)763-9630
Fax: (847)763-9631

jmi

CEO, INFORMATION SERVICES GROUP
Marc Ferrara

SENIOR VICE PRESIDENT, OPERATIONS
Jeff Levitz

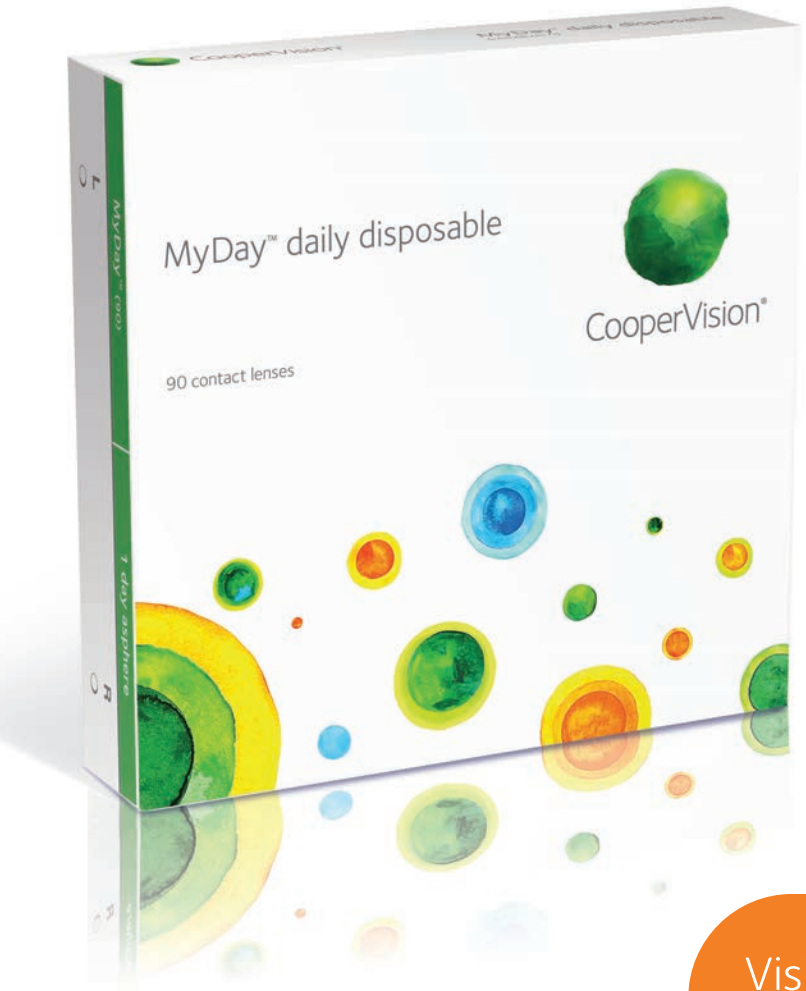
SENIOR VICE PRESIDENT, HUMAN RESOURCES
Lorraine Orlando

VICE PRESIDENT, CREATIVE SERVICES & PRODUCTION
Monica Tettamanzi

VICE PRESIDENT, CIRCULATION
Emelda Barea

Simply smarter chemistry:

Introducing **MyDay**®
daily disposable featuring
Smart Silicone™



Now joining the world's most complete portfolio of **silicone hydrogel** lenses

Visit coopervision.com/mydaypreview for a special preview

CooperVision®

Visit us at Vision Expo West September 17-19 Booth #MS7059

YOUR EXAM... ONLY BETTER!

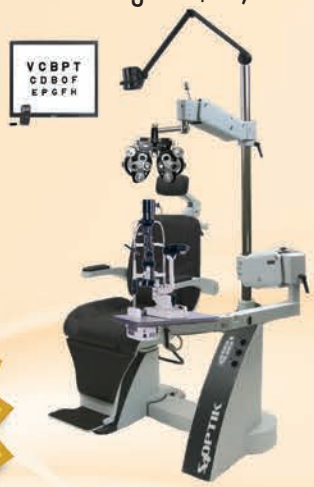
The Veatch Digital Refraction System eliminates costly inefficiencies, enhances your practice, and makes the exam process more enjoyable for you and your patients.

FREE Visual Acuity System* with purchase of Digital Refractor

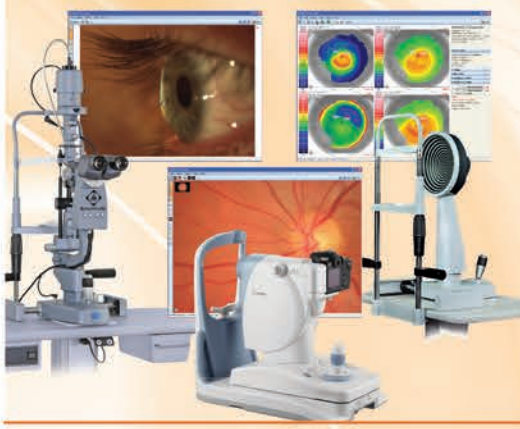
- Increased efficiency • Combat reductions in reimbursements
- Enhanced practice image • EMR integration • Patient referrals
- Increased optical sales • Competitive advantage
- Eliminate back and shoulder pain and bursitis

ADDITIONAL OFFERS FROM VEATCH

Exam Lane Packages
Starting at $12,995



ReSeeVit™
- Anterior Segment Imaging
- Retinal Imaging
- Corneal Wavefront Topography



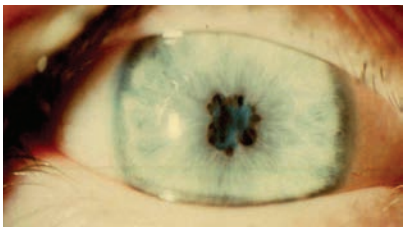
Insight Visual Acuity System
ONLY $1,295

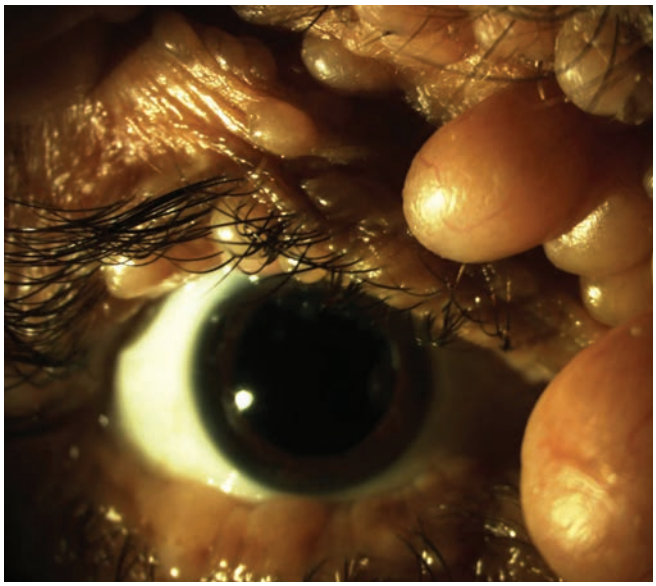
VEATCH OPHTHALMIC INSTRUMENTS

TOLL FREE: 800.447.7511 E-MAIL: ad@voi2020.com www.voi2020.com

Contents

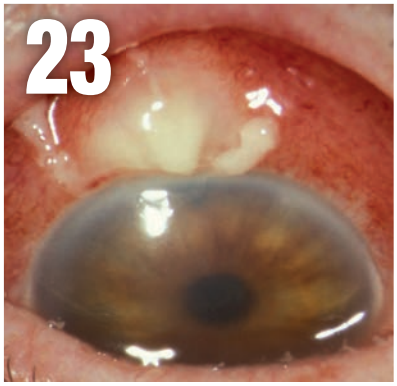
Review of Optometry August 2015

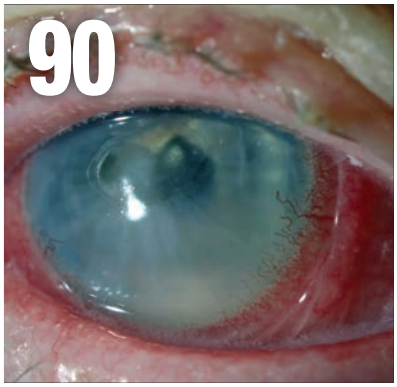


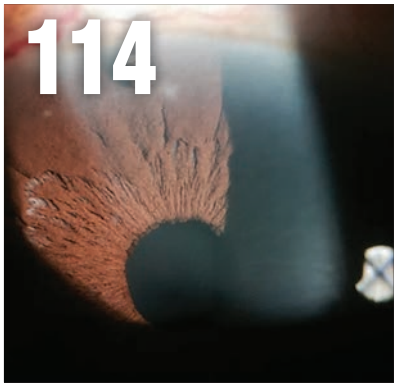


Departments

Review of Optometry August 2015







On The Web »
and more

Check out our multimedia and continuing education online at: *www.reviewofoptometry.com*

Digital Edition

Left your copy of *Review of Optometry* at the office? No problem! Access *Review* on your computer or mobile device!

Go to www.reviewofoptometry.com and click on the digimag link for the current issue.

Facebook and Twitter

For daily updates, "Like" our page on Facebook or "Follow" us on Twitter!

- www.facebook.com/revoptom
- http://twitter.com/#!/revoptom

Look for augmented content and special offers from *Review* and our advertisers. Specified pages work in conjunction with your smartphone or other mobile device to enhance the experience. With Layar, interactive content leaps off the page!

Step1: Download the free Layar app for iPhone or Android.

Step 2: Look for pages with the Layar Logo. layar INTERACTIVE PRINT

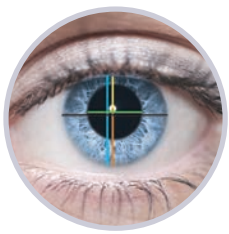
Step 3: Open the Layar app, hold the phone above the page and tap to scan it. Hold the phone above the page to view the interactive content.

The first 150 app downloads and completed forms will be entered into a drawing for a complimentary registration to one of *Review*'s 14-hour CE meetings, valued at $495.

VOLK eye check

The Perfect Solution for Contact Lens Fitting

Volk Eye Check allows you to fit specialty contact lenses in fewer sessions, increases patient satisfaction and reduces revenue loss from contact lens drop outs.



1 Image

2 Analyze

3 Fit

Now featuring the Best Fit Analysis Report

- A tailor-made CL report to identify most appropriate lens in seconds
- Use HVID to instantly pinpoint the best fitting contact lens for your patient [1]
- Enhance visual acuity in multifocals with accurate pupil measurements [2]
- Fit all contact lenses using sagittal depth for a better fit than k-values alone [3]

References: [1]Caroline P, Andre M. The effect of corneal diameter on soft lens fitting, part 1. Contact Lens Spectrum 2002; 17(4)56; [2]S. Plainis, D. Atchison, and W. Charman. Power Profiles of Multifocal Contact Lenses and Their Interpretation. Optometry and Vision Science 2013;90(10); [3] W. Douthwaite. Initial Selection of Soft Contact Lenses Based on Corneal Characteristics. The CLAO Journal 28(4): 202–205, 2002.

VOLK IMAGING

IRISS MEDICAL TECHNOLOGIES

Optimize your CL fittings today. Explore Volk Eye Check NOW
www.volk.com/eyecheck/

INTERNATIONAL VISION EXPO & CONFERENCE
LAS VEGAS

VISIONARIES

IN EDUCATION, FASHION AND TECHNOLOGY

Are you practicing full-scope medical eyecare? International Vision Expo offers advanced education focused on the core competencies of your practice: management of eye disease, contact lens technology, practice management and optical topics. By expanding your knowledge base, you'll enhance the scope of your practice and patient offerings to the maximum extent of your license.

International Vision Expo integrates new technology throughout the show. Courses demonstrate how to maximize technology for better patient outcomes, and the exhibit hall offers hands-on demonstrations of the latest innovations.

As the forum where eyecare business operates at a higher level than anywhere else in the industry, it's easy to see why International Vision Expo is often labeled the "Writing Show." That's why the most renowned brands in the industry build their biggest customer experiences exclusively for International Vision Expo. Nothing else compares – and they know it.

INTERNATIONAL VISION EXPO 2015

EDUCATION: WEDNESDAY, SEPTEMBER 16–SATURDAY, SEPTEMBER 19
EXHIBITION: THURSDAY, SEPTEMBER 17–SATURDAY, SEPTEMBER 19
SANDS EXPO & CONVENTION CENTER | LAS VEGAS, NV | **VisionExpoWest.com | #VisionExpo**

REGISTER TODAY AT VisionExpoWest.com/ReviewOfOptometry

PROUD SUPPORTER OF: think about your eyes.com
Brought to you by the AOA
AMERICAN OPTOMETRIC ASSOCIATION

Letters to the Editor

"You cannot repair a damaged cranial nerve with all of the 'training,' exercise, electrical stimulation, vitamin C, steroids or any other 'hocus pocus' treatment in the world."

Was This Oak Hollow?

Editor's Note: In April's "Focus on Refraction" column, authors Marc B. Taub, OD, and Paul Harris, OD, reviewed the case of a pilot experiencing diplopia. They recommended a reevaluation of the prescription and vision therapy. You can read this case at www.reviewofoptometry.com/content/d/retina/c/54052/.

Drs. Harris and Taub surely missed the forest for the oak in their article, "As Flexible as an Oak."

This poorly presented case is clearly one of traumatic fourth cranial nerve palsy compounding an already existing congenital fourth cranial nerve palsy and may well be a double traumatic fourth nerve palsy. Their case is poorly presented because no adequate history of the diplopia is reported. No description of the patient's current head position (i.e., tilt, rotation or chin up or down) is given. Such a poor presentation indicates the authors' little or no knowledge of fourth cranial nerve palsy.

The deviations apparently have not been measured or reported in both right and left gaze. This cannot be done behind a phoropter (which only supplies the amount of deviation in the primary position), but can be done with a handheld rotary prism or prism cover test with the patient in right and then left gaze. These results would also have pointed to and helped confirm the correct diagnosis. I should point out the measurement of "break and recovery" in a patient who is already diplopic and who has a damaged cranial nerve with an atrophied superior oblique muscle is absurd and has no meaning.

What we can "tweeze" from their presentation is that the patient had the first complaint of diplopia two years before a concussion. The most probable cause is a congenital fourth nerve palsy finally breaking fusion. We, and they, could have made this diagnosis had an adequate description of the diplopia (as above) been acquired.

The report of a concussion (with subsequent diplopia) seals the diagnosis. The history of a second head trauma (or the first one) may have produced a second fourth nerve palsy, on the opposite side of the midbrain from the first, producing a "double traumatic fourth nerve palsy."

Congenital or acquired fourth nerve palsy is as common as dirt. I see one or two of these per month and have for 40 years.

The real problem with them is that the subsequent vertical deviation will differ when the patient is right or left gaze from that in the primary position as well as from distance to near. A "compromise" amount of prism can be determined from these measurements and a trial frame with a separate pair of glasses for distance and near. These will not eliminate diplopia in all positions of gaze, but can minimize its effect.

Finally, you cannot repair a damaged cranial nerve with all of the "training," exercise, electrical stimulation, vitamin C, steroids or any other "hocus pocus" treatment in the world.

—Mark R. Flora, OD, General Eye Medicine, Disease & Injury, Atlantic Eye Associates

Drs. Taub and Harris respond:

We assure Dr. Flora that much of the data that he wanted to see was indeed collected, but only the relevant parts were included in the article.

The suggestion that this was clearly a combination of fourth nerve issues of multiple kinds was not supported by the concomitant nature of the angle of deviation. It is standard practice at Southern College of Optometry to measure the angle(s) of deviation in different directions of gaze. In this instance, the variations were small enough that non-concomitancy was ruled out. We did report that, in different directions of gaze, his ability to keep it single broke, which might suggest non-concomitancy, but the measurements don't back this up. We viewed the breaking into double as a measure of how fragile his binocular condition was. We all expend more effort when looking eccentrically. In his case, this extra demand was simply the straw that broke the camel's back. The actual angle of deviation in these eccentric gazes was the same within a standard measuring error.

In terms of the postural observation, this patient had no face turn, head tilt or chin up or down posture. The article, "Visual Conditions of Symphony Musicians" (*JAOA*, Vol 59, No 12 1988) demonstrates the subtlety of how postural asymmetries over time lead to the development of astigmatism.

Lastly, we are not claiming to repair a damaged nerve. We are simply helping a patient improve his visual abilities using the standard tools of optometric practice. In this instance, we chose to use vision therapy, which is helping our patient increase the volume of space through which he sees single and to do so with less effort and more ease. As he progresses, we look forward to sharing this with our readers. ■

REFRESH AMERICA

SENDING EYE DROPS TO OUR FIRST RESPONDERS

First responders often work in conditions that can take a toll on their eyes. Exposure to heat, smoke, wind and dust may cause Dry Eye symptoms. That's why Allergan is providing them with REFRESH.®

Starting August 1, when your patients purchase OPTIVE® or OPTIVE® *Advanced*, they are directly contributing to more eye drop donations to our nation's best.†

Your recommendation matters now more than ever.

REFRESH® #1 Doctor Recommended Brand of Artificial Tears*

helpREFRESHamerica.com

*Encuity's *Treatment Answers*, based on frequency of dry eye product recommendations, Jan 2013-Dec 2013.

†For each purchase of specially-marked REFRESH® products in the U.S. between 8/1/15 and 7/31/16, Allergan will allocate 25¢ toward an in-kind donation of REFRESH® products to select U.S. first responder groups nationwide. Minimum donation valued at $250,000. For more information, visit helpREFRESHamerica.com.

REVIEW OF OPTOMETRY

PRINTED IN USA

FOUNDING EDITOR
FREDERICK BOGER
1891-1913

EDITORIAL OFFICES
11 CAMPUS BLVD., SUITE 100
NEWTOWN SQUARE, PA 19073

EMAIL • REVIEWOFOPTOMETRY@JOBSON.COM

WEBSITE • WWW.REVIEWOFOPTOMETRY.COM

SUBSCRIPTION INQUIRIES
1-877-529-1746

CONTINUING EDUCATION INQUIRIES
1-800-825-4696

Brien's Song

The legendary Brien Holden devoted his life to the advancement of eye care. **By Jack Persico, Editor-in-Chief**

I only got to meet Brien Holden once, a few years ago at the Academy of Optometry meeting. Already in his 70s, he could have retired long before then. He had certainly earned it, when you consider the breadth of his contributions in more than four decades of practice. Rather than winding down his professional endeavors after a storied career, he was still going full-tilt.

At a time in his life when other pioneers would be on a yacht or a golf course, Brien was doing a meet-and-greet with the press, working the room with his trademark combination of charm and conviction. I remember how animated he was while describing to me how his forthcoming retinal camera would help bring eye health screenings to underserved populations, particularly in developing countries. There was a glint in his eye that conveyed just how much this meant to him. It was more than just another product launch; this, like so many of his projects, was for the greater good.

His tenacity in working to solve intractable problems like the delivery of eye care in poor communities reminds me of that famous Robert Kennedy quote: "Some men see things as they are and say, 'Why?' I dream of things that never were, and ask, 'Why not?'" Maybe Brien wouldn't have been brazen enough to say it quite that way, but he lived it. The Brien Holden Vision Institute was just one of the ways he acted upon that principle. The BHVI will no doubt continue to fulfill Brien's mission. Others are surely just as dedicated to service as he was.

"Today is a very sad day in the history of our organization," said the BHVI's Kovin Naidoo in a statement. "Brien was a man of extraordinary vision who devoted himself to the service of mankind. He demanded that the research be indivisible from the service to society."

A gregarious man, Brien apparently spent his last night in a pub with some colleagues. I'm glad he was surrounded by friends. I just wish I'd had a chance to have a pint with him too at some point. Those who knew him have been sharing stories in recent weeks about his personal and professional impact on them. His influence will long be felt. Cheers, Brien. And thank you.

The Quest for Comfort

This month marks *Review of Optometry*'s 39th year of devoting an issue to contact lenses. The theme for 2015 is one that has vexed patients and practitioners alike since the earliest days: comfort. Because discomfort is one of the most frequently reported causes of contact lens dropout, we asked several experts to share their best tips for understanding, preventing and—when needed—eliminating the sources of discomfort that lead to patient dissatisfaction. We hope you'll find many worthwhile insights to help your patients succeed.

One of Brien Holden's many passions was, of course, the advancement of contact lens technology and the clinical practice of lens fitting. *Review of Optometry* dedicates this issue to the achievements and lasting legacy of Professor Holden. ■

20TH ANNUAL OPHTHALMIC *Product Guide*

Innovative products to enhance your practice

The **future** is in your hands. One tap, many possibilities.

Experience the digital edition on your handheld device. Use your smart device to scan the code below or visit:

www.reviewofoptometry.com/supplements/

Download a QR scanner app. Launch app and hold your mobile device over the code to view http://www.reviewofoptometry.com/supplements

REVIEW® OF OPTOMETRY

Today's Special: Tapas

Don't judge a meal by one bad dish—and the same goes for the profession, because there's a lot more on the table for optometry these days. **By Montgomery Vickers, OD**

As an addicted eater, I enjoy creative food. Unfortunately, where I come from, creativity often means something like upsizing the French fries. But my surprisingly sophisticated foodie children, and my wife's insistence that we not eat at the same old sports bar every Saturday, has expanded my horizon—and by horizon I mean my waist size. Food can, then, be a blessing and a curse, kind of like our profession at times.

Optometry is full of small bites, or tapas. When the table's full of crazy-good things, don't judge the whole meal by the one crappy, deep-fried stick of the chef's favorite creepy crawler.

You see, there seem to be a lot of unhappy optometrists. Lawyers used to be the only ones discouraging people from going into their profession. Then they got into their expensive cars and drove away. But, as a rule, optometrists were happy and loved to mold bright, young patients into OD wannabes. My own optometrist, back in the day, showed me his Jaguar XKE, and I suddenly became acutely interested in serving my fellow man.

Surely you love what you do, don't you? People admire and need us—assuming, of course, it's covered by insurance.

I know there are yucky tapas—like when patients decides after 25 years of awesome care that you must be stupid because you don't want them to over-wear their contact lenses—but mostly our little dishes are wonderful.

In fact, optometry is so wonderful they're opening a new school every 300 feet. You may not know this, but everyone deserves a personal optometrist, and soon we'll have enough to make it happen. If you are my only patient, I'll take really good care of your eyes... until they start assigning a different doctor to each eye. When that happens, I hope I get the good one.

My little hometown is two square miles, and in a 10-year period it spawned five successful eye doctors. Okay, one was just an ophthalmologist, but I counted him too. That's a steady parade of inspired young people.

How many young people do you inspire in your practice? Do you only serve up the fried green slime, or do you show them what you can do with a slice of Kobe beef and a fresh pepper? In my 35 years of practice, I have recruited one prospect. He's in school right now and he'll be great. Just one, but I know a lot of retired chemical engineers, and they don't want to graduate optometry school in their 80s.

But I almost always brag about optometry, even though I don't own a Jag. Wish I did; it would be an amazing recruiting tool.

Optometry may not be as sexy as, say, proctology, but I think we provide a wonderful service. We protect the function of an organ system that is, in every way I can think of, just as important as the organ system proctologists protect.

Since they are determined to open 40 million optometry schools, we should make sure they get the best possible students. Look at it this way: 40 million schools x 30 graduates per year (minus the occasional slacker who goes into web design) = over a 100 million voters each year to support changing optometry laws so nobody has to refer to a specialist to epilate an eyelash. That's huge!

So, quit bellyaching about optometry! Get in the kitchen and serve up your best tapas every day. You take care of optometry and it will take care of you. ■

AzaSite®
(azithromycin ophthalmic solution) 1%

NOW! In stock and widely available

INSTANT SAVINGS AT PHARMACY

$20

Learn more at azasite.com

AKORN

ELEVATE

The slit lamp experience you've been waiting for is here.

Introducing the **HAI SL-5000e ELEVATE**, the world's first slit lamp redesigned from the ground up to meet the challenge of examining plus-sized patients and patients with limited mobility.

Developed through years of input from doctors, ELEVATE combines the power and features of a traditional slit lamp with a streamlined foundation. By raising the first point of contact between patient and tabletop to the upper chest, the patient can comfortably reach the chinrest and the operator can conduct a thorough exam.

HAI Laboratories, Inc.

Visit www.hailabs.com/elevate to learn more.

2015 VISION EXPO WEST SPECIAL PRICES

	LIST PRICE	SALE PRICE
Basic Exam Lane Package*	~~$12,998~~	$12,850
SL-5000p Plus Slit Lamp	~~$6,300~~	$4,995
SL-5000s Standard Lamp	~~$4,800~~	$2,980
SL-5000bx Basic Slit Lamp	~~$3,800~~	$1,950
SL-5000h Handheld Slit Lamp	~~$3,150~~	$2,200
VC-170 17" LED Vision Chart	~~$2,500~~	$1,500
CL-1000eva Specular Attachment	~~$14,800~~	$13,500

* **Includes:** HAI SL-5000bx Basic Slit Lamp, HAI VC-170 17" LED Vision Chart, S4OPTIK CB-1600 Chair & Stand Combo and SL-Y100 Refractor

HAI Ophthalmic

Visit **www.haiophthalmic.com** to order these equipment and more from our trusted partners:

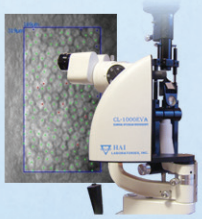
TOMEY CBD • TOMEYUSA | Inami | S4OPTIK

Corneal topographers • Keratometers • Ultrasounds
Autorefractors • Lensmeters • Pachymeters • Tonometers
Trial lens sets • Chairs and instrument stands

Visit Booth #MS6046 at Vision Expo West for these deals!

Basic Exam Lane Package

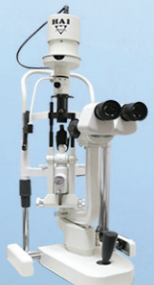
HAI SL-5000h Handheld Slit Lamp



HAI CL-1000eva Endothelium Viewing Attachment

HAI SL-5000bx Basic Slit Lamp

HAI SL-5000s Standard Slit Lamp



HAI SL-5000p Plus Slit Lamp

Is HELP on the Way?

Knowing the signs of infection can help minimize the risk of blebitis progressing to bleb-related endophthalmitis after glaucoma filtering surgery. **By Richard Mangan, OD**

A 60-year-old African American male presented complaining of a red, irritated right eye with associated brow ache, and he felt his vision had decreased slightly in that eye.

He reported a history of glaucoma surgery (trabeculectomy) in both eyes approximately five years earlier and was not on any topical glaucoma medication currently. His uncorrected distance visual acuity was 20/50 OD and 20/25 OS, and pinhole acuity was 20/30 OD.

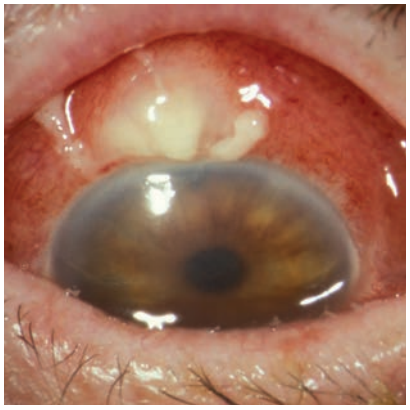
Slit-lamp examination revealed a superiorly located whitish bleb surrounded by 3+ conjunctival injection. There appeared to be a mucopurulent infiltrate within the bleb in the right eye. The left eye showed a patent bleb that was relatively avascular, and the conjunctiva was quiet. The anterior chamber was deep, showing trace cell and flare, in the right eye.

Intraocular pressure (IOP) was 5mm Hg OD and 9mm Hg OS. NaFL strip application revealed a subtle leak from the infero-lateral edge of the bleb in the right eye. Dilated examination revealed advanced cupping in both eyes.

The periphery was intact without choroidal effusions. Vitreous cells were not evident on slit-lamp exam or under binocular indirect ophthalmoscopy. B-scan ultrasound was acoustically normal in both eyes.

Discussion

One of the most concerning complications after glaucoma filtering surgery is infection.



Blebitis with decreased vision and pain prior to antibiotic therapy.

HELP, an acronym for "hypotony, endophthalmitis, leak and pain," is used to assist clinicians in remembering the key signs and symptoms associated with blebitis or bleb-related endophthalmitis, urgent complications of trabeculectomy.

It is also important to differentiate between blebitis and bleb-related endophthalmitis, as each has distinct management, treatment and prognosis.

Patient Education

Urge surgical patients to remember their own acronym, RSVP, "redness, sensitivity, vision loss and pain." If these symptoms develop, they should contact their eye doctor or surgeon immediately, no matter how long ago they had surgery.

In the absence of such education, patients may not think their symptoms are related to a procedure they had years ago. Patients are more apt to link a red, irritated eye to surgery if the symptoms develop within hours, days or months of the surgery. However, in the case of bleb-related infections, average time of onset is approximately three to four years after trabeculectomy.[1,2]

With timely intervention, blebitis will have a much better prognosis than an infection that migrates posteriorly and evolves into bleb-related endophthalmitis.

It is also important that trabeculectomy patients and comanaging physicians be educated on the avoidable (e.g., eye rubbing) and unavoidable risk factors associated with both early- and late-onset bleb leak and infection. For example, any excessive exposure to an antimetabolite or antifibrotic agent during surgery should be communicated to the comanaging eye care practitioner. The intraoperative use of antifibrotic agents like 5-fluorouracil and mitomycin-C decrease unwanted scarring after trabulectomy surgery, thereby decreasing the risk of postsurgical bleb failure. However, these agents may weaken and thin the overlying conjunctiva, increasing the risk of a bleb-related leak or infection.[3]

Although there does not have to be a bleb leak for infection to occur, one case-controlled study reported that the risk of infection is 25 times greater in the presence of a late-onset bleb leak.[4]

Stay Alert for HELP

Eye care providers should check blebs for leakage at every visit. Some patients may be asymptomatic.

Complaints of excessive tearing or watering eyes in association with even a slight IOP decrease should raise suspicion of a leak.

When assessing a bleb for potential leaks, pay attention to the thinnest, most avascular areas. It is more common to find leaks at the apex of a cyst, as these areas are most likely to dry out due to poor wetting from abnormal tear flow. Additionally, these areas are more prone to dehiscence secondary to mechanical lid rubbing.

Checking for leaks is most commonly done by applying a modest amount of sterile saline to the end of a NaFl sterile strip, followed by "painting" the thinnest apical areas of the bleb while viewing under a cobalt-blue filter at the slit-lamp biomicroscope. If there is no "Seidel sign" or evident flow of the dye, then check the base of the bleb.

Treatment and Management

Blebitis and bleb-related endophthalmitis warrant different strategies. When bleb leak is evident without signs of infection or anterior chamber involvement, initiate conservative therapy.[5]

In some cases, the combination of a topical fourth-generation FQ and an aqueous suppressant (i.e., topical beta-blocker) are enough to quell a small leak. If the IOP is too low to justify the aqueous suppressant, a large, soft bandage contact lens or a cyanoacrylate glue can be effective. According to one study, the use of a large diameter (17.5mm) soft bandage contact lens was effective at quelling bleb leaks, regardless of whether an antifibrotic agent was used during surgery.[6] Another study reported an 80% success rate using a cyanoacrylate tissue adhesive, eliminating the need for bleb revision.[7]

When using a bandage contact lens, it can take anywhere from one to three weeks for a leak to seal. If these conservative measures do not quell the leak within this time frame, refer for bleb revision.

Blebitis

When confronted with a blebitis, defined as mucopurulent infiltrate identified within a bleb, aggressive treatment is warranted. If there is no evident anterior chamber response, you can use a commercial fourth generation FQ Q1H around the clock. Oral antibiotics with good ocular tissue penetration (e.g., moxifloxacin) are also justified. Monitor these patients daily, and in some instances, such as a monocular patient, twice per day. If there is an anterior chamber response (1+ cell or greater), topical fortified antibiotics are recommended. The most commonly used fortified ABs include Vancocin (vancomycin, ViroPharma) 33mg/ml plus Tobrex (tobramycin, Alcon) or gentamicin at 15mg/ml.

Bleb-related Endophthalmitis

The diagnosis changes to bleb-related endophthalmitis once one of the following is present: a hypopyon; cells in the anterior vitreous; or culture-positive aqueous or vitreous humor biopsy. If slit-lamp exam reveals a hypopyon or cells in the anterior vitreous, refer the patient to a retina specialist. B-scan ultrasonography will help confirm anterior vitreous cells and assist the specialist in monitoring responsiveness to treatment, which is likely to include a vitreous tap and injection of fortified ABs or vitrectomy.

Prognosis

Overall, the prognosis for blebitis is good. One should expect a favorable response both clinically and symptomatically within 48 hours.[8] However, the diagnosis of bleb-related endophthalmitis usually means a four or more line drop in best-corrected visual acuity, with a majority of cases stabilizing at counting fingers or light perception vision.[9] This is why the diagnosis of blebitis carries with it a significant responsibility for treatment adherence by the patient and close monitoring by the doctor. If you have concerns about a patient strictly adhering to Q1H dosing, hospital admission may be warranted.

Our patient was given a diagnosis of blebitis and was started on topical fortified antibiotics (Vancomycin and gentamicin) every hour around the clock for the first 24 hours, then every hour while awake and Q3H during the night for the next 48 hours. The patient was monitored daily. Thankfully, the eye responded to treatment and his vision was preserved. The bleb leak resolved spontaneously.

Filtering surgery has been a tremendous addition to the arsenal in the fight against glaucoma. But it comes with a lifetime commitment for both patient and doctor in monitoring for serious secondary complications like infection.

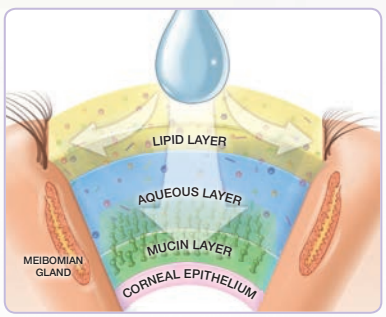
Is HELP on the way? Let's hope not! ■

1. Allingham RR, Damji KF, Freedman S, et al. Shields' Textbook of Glaucoma. Philadelphia: Lippincott, Williams & Wilkins; 2005.
2. Kim E, Law SK, Coleman AL, et al. Trabeculectomy associated with 2% incidence of bleb infection at 10 years. Am J Ophthalmol. 2015.Jun;159:1082-91.
3. Bindlish R, Condon GP, Schlosser JD, et al. Efficacy and safety of mitomycin-c in primary trabeculectomy. Ophthalmology. 202;109:1336-42.
4. Soltau JB, Rothman RF, Budenz DL, et al. Risk factors for glaucoma filtering bleb infections. Arch Ophthalmol. 2000;118:338-42.
6. Shoham A, Tessler Z, Finkelman Y, Lifshitz T. Large soft contact lenses in the management of leaking blebs. CLAO J. 2000 Jan;26(1):37-9.
7. Zalta AH, Wieder RH. Closure of leaking filtering blebs with cyanoacrylate tissue adhesive. B J Ophthalmol. 1991;75:170-3.
8. Chen PP, Gedde SJ, Budenz DL, et al. Outpatient treatment of bleb infection. Arch Ophthalmol. 1997;115:1124-8.
9. Ciulla TA, Beck AD, Topping TM, et al. Blebitis, early endophthalmitis, and late endophthalmitis after glaucoma-filtering surgery. Ophthalmology. 1997;104:986-95.

For the 75% of dry eye patients worldwide with evaporative dry eye (MGD) symptoms[1]...

SYSTANE® BALANCE Lubricant Eye Drops:

Protecting the Ocular Surface by Increasing Lipid Layer Thickness (LLT)



SYSTANE® BALANCE Lubricant Eye Drops forms a protective matrix that is designed to replenish the lipid layer for long-lasting relief from the symptoms associated with evaporative dry eye (MGD). This unique formulation is designed to work on all 3 layers of the tear film, specifically increasing LLT. This helps create a protective environment for the ocular surface.[2]

SYSTANE® Brand products are formulated for the temporary relief of burning and irritation due to dryness of the eye.

References: 1. Akpek EK, Smith RA. Overview of age-related ocular conditions. *Am J Manag Care.* 2013;19 (5 suppl):S67-S75. **2.** Korb DR, Blackie CA, Meadows DL, Christensen M, Tudor M. Evaluation of extended tear stability by two emulsion based artificial tears. Poster presented at: 6th International Conference on the Tear Film and Ocular Surface: Basic Science and Clinical Relevance; September 22-25, 2010; Florence, Italy.

Your recommendation counts.

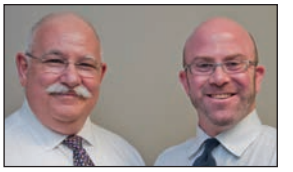
Make sure your patients get the lasting symptom relief they need by offering them SYSTANE® BALANCE Lubricant Eye Drops.[2]

Alcon®
a Novartis company

 05/14 SYS14005JAD-B

Systane® Family of Products

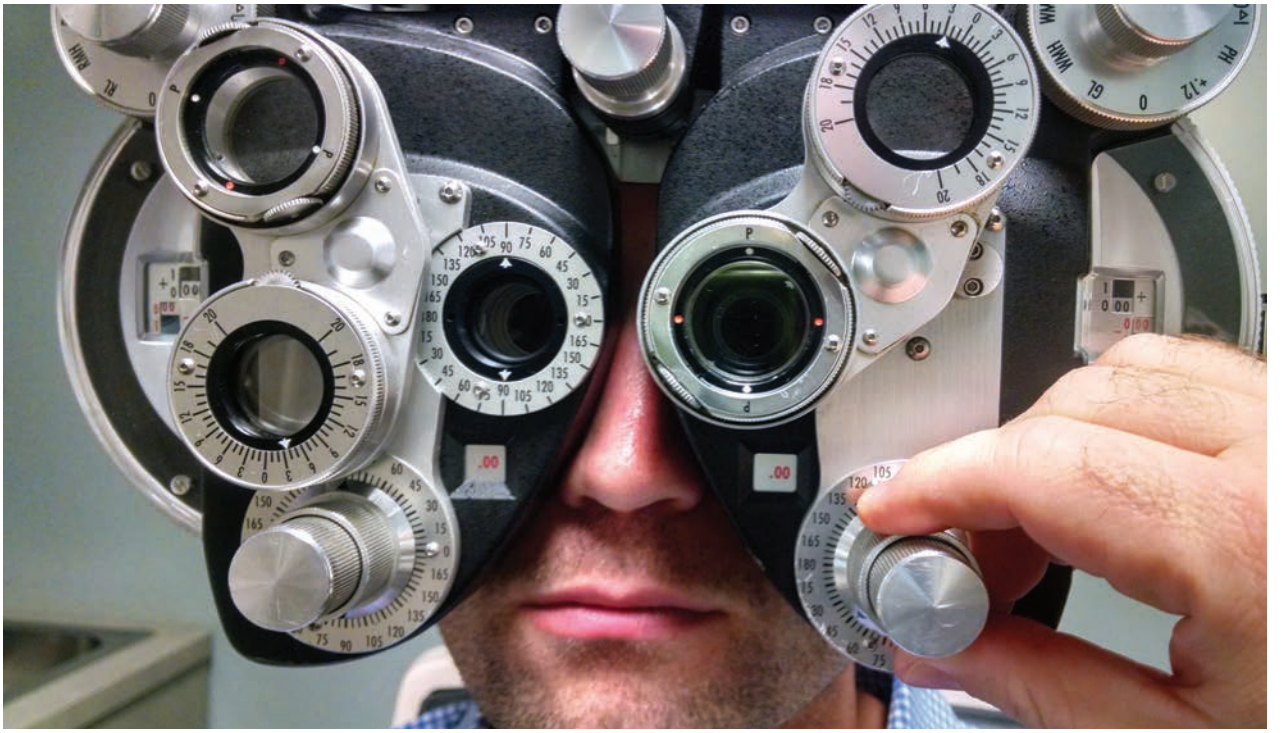
Relief that lasts



Axis of Evil

Are you making cylinder selection harder than it needs to be? Here's how to simplify.

By Marc B. Taub, OD, MS, and Paul Harris, OD



Direct your exam toward identifying the "just-noticeable differences" a patient can discern at the phoropter.

Occasionally, routine refraction takes longer than it should. Patients may struggle when the differences in refractions just aren't enough to trigger a significant response, in other words, they can't decide "which is better, one or two." On top of that, many patients are convinced they will receive the wrong prescription if they answer even one question incorrectly. It is in these cases that the use of "just-noticeable differences" (JND), or the minimal amount of change needed to produce an effect, can be hugely beneficial.

Jackson Cross Cylinder

Imagine, for example, you have identified a cylinder of 0.75 x 90 in one eye using either your retinoscope or autorefractor. First, consider your tools. Typically, the cylinder finding is refined using the Jackson Cross Cylinder (JCC). A JCC is any lens power that is a spherical equivalent plano-powered lens. Examples include +0.25 sphere with -0.50 cylinder or +0.50 sphere power with -1.00 cylinder power, otherwise specified as ±0.25 or ±0.50.

When equipping an exam lane with a new phoropter, specify the power of the JCC that is built in for the cylinder testing. Some believe the use of the ±0.25 JCC will lead to a more refined prescription, but we've found using a JCC with a greater power, such as ±0.50 or even ±0.75 for some low vision or macular degeneration patients, helps us progress through the refraction process quicker and more reliably.

The Questions Five

We put this theory to the test to see if a cylinder would reveal itself in a minimum of five questions with the JCC.

First, we tested the axis at either 75° or 105°, and increased the

Down, Boy.

Help Tame Postoperative Ocular Inflammation and Pain With LOTEMAX® GEL

Indication

LOTEMAX® GEL (loteprednol etabonate ophthalmic gel) 0.5% is indicated for the treatment of post-operative inflammation and pain following ocular surgery.

Important Safety Information about LOTEMAX® GEL

- LOTEMAX® GEL is contraindicated in most viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal diseases of ocular structures.
- Prolonged use of corticosteroids may result in glaucoma with damage to the optic nerve, defects in visual acuity and fields of vision. If this product is used for 10 days or longer, IOP should be monitored.
- Use of corticosteroids may result in posterior subcapsular cataract formation.
- Use of steroids after cataract surgery may delay healing and increase the incidence of bleb formation and occurrence of perforations in those with diseases causing corneal and scleral thinning. The initial prescription and renewal of the medication order should be made by a physician only after examination of the patient with the aid of magnification, and where appropriate, fluorescein staining.
- Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infection. In acute purulent conditions, steroids may mask infection or enhance existing infection.
- Use of a corticosteroid medication in the treatment of patients with a history of herpes simplex requires great caution. Use of ocular steroids may prolong the course and exacerbate the severity of many viral infections of the eye (including herpes simplex).
- Fungal infections of the cornea are particularly prone to develop coincidentally with long-term local steroid application. Fungus invasion must be considered in any persistent corneal ulceration where a steroid has been used or is in use.
- Patients should not wear contact lenses when using LOTEMAX® GEL.
- The most common ocular adverse drug reactions reported were anterior chamber inflammation (5%), eye pain (2%) and foreign body sensation (2%).

Please see brief summary of Prescribing Information on adjacent page.

LOTEMAX® GEL
loteprednol etabonate
ophthalmic gel 0.5%

BAUSCH+LOMB

LOTEMAX®

loteprednol etabonate
ophthalmic gel 0.5%

Brief Summary: Based on full prescribing information.

To report SUSPECTED ADVERSE REACTIONS, contact Bausch & Lomb at 1-800-323-0000 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch

INDICATIONS AND USAGE

LOTEMAX is a corticosteroid indicated for the treatment of post-operative inflammation and pain following ocular surgery.

DOSAGE AND ADMINISTRATION

Invert closed bottle and shake once to fill tip before instilling drops.

Apply one to two drops of LOTEMAX into the conjunctival sac of the affected eye four times daily beginning the day after surgery and continuing throughout the first 2 weeks of the post-operative period.

CONTRAINDICATIONS

LOTEMAX, as with other ophthalmic corticosteroids, is contraindicated in most viral diseases of the cornea and conjunctiva including epithelial herpes simplex keratitis (dendritic keratitis), vaccinia, and varicella, and also in mycobacterial infection of the eye and fungal diseases of ocular structures.

WARNINGS AND PRECAUTIONS

Intraocular Pressure (IOP) Increase

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

Cataracts

Use of corticosteroids may result in posterior subcapsular cataract formation.

Delayed Healing

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

Bacterial Infections

Prolonged use of corticosteroids may suppress the host response and thus increase the hazard of secondary ocular infections. In acute purulent conditions of the eye, steroids may mask infection or enhance existing infection.

Viral Infections

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

Fungal Infections

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

Contact Lens Wear

Patients should not wear contact lenses during their course of therapy with LOTEMAX.

ADVERSE REACTIONS

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

The most common adverse drug reactions reported were anterior chamber inflammation (5%), eye pain (2%), and foreign body sensation (2%).

USE IN SPECIFIC POPULATIONS

Pregnancy

Teratogenic Effects: Pregnancy Category C.

Loteprednol etabonate has been shown to be embryotoxic (delayed ossification) and teratogenic (increased incidence of meningocele, abnormal left common carotid artery, and limb flexures) when administered orally to rabbits during organogenesis at a dose of 3 mg/kg/day (35 times the maximum daily clinical dose), a dose which caused no maternal toxicity. The no-observed-effect-level (NOEL) for these effects was 0.5 mg/kg/day (6 times the maximum daily clinical dose). Oral treatment of rats during organogenesis resulted in teratogenicity (absent innominate artery at ≥5 mg/kg/day doses, and cleft palate and umbilical hernia at ≥50 mg/kg/day) and embryotoxicity (increased post-implantation losses at 100 mg/kg/day and decreased fetal body weight and skeletal ossification with ≥50 mg/kg/day). Treatment of rats with 0.5 mg/kg/day (6 times the maximum clinical dose) during organogenesis did not result in any reproductive toxicity. Loteprednol etabonate was maternally toxic (significantly reduced body weight gain during treatment) when administered to pregnant rats during organogenesis at doses of ≥5 mg/kg/day.

Oral exposure of female rats to 50 mg/kg/day of loteprednol etabonate from the start of the fetal period through the end of lactation, a maternally toxic treatment regimen (significantly decreased body weight gain), gave rise to decreased growth and survival, and retarded development in the offspring during lactation; the NOEL for these effects was 5 mg/kg/day. Loteprednol etabonate had no effect on the duration of gestation or parturition when administered orally to pregnant rats at doses up to 50 mg/kg/day during the fetal period.

There are no adequate and well controlled studies in pregnant women. LOTEMAX should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nursing Mothers

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

Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

Geriatric Use

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

NONCLINICAL TOXICOLOGY

Carcinogenesis, Mutagenesis, Impairment Of Fertility

Long-term animal studies have not been conducted to evaluate the carcinogenic potential of loteprednol etabonate. Loteprednol etabonate was not genotoxic *in vitro* in the Ames test, the mouse lymphoma tk assay, or in a chromosome aberration test in human lymphocytes, or *in vivo* in the single dose mouse micronucleus assay. Treatment of male and female rats with up to 50 mg/kg/day and 25 mg/kg/day of loteprednol etabonate, respectively, (600 and 300 times the maximum clinical dose, respectively) prior to and during mating did not impair fertility in either gender.

PATIENT COUNSELING INFORMATION

Administration

Invert closed bottle and shake once to fill tip before instilling drops.

Risk of Contamination

Patients should be advised not to allow the dropper tip to touch any surface, as this may contaminate the gel.

Contact Lens Wear

Patients should be advised not to wear contact lenses when using LOTEMAX.

Risk of Secondary Infection

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

FOR MORE DETAILED INFORMATION, PLEASE READ THE PRESCRIBING INFORMATION.

Bausch & Lomb Incorporated
Tampa, Florida 33637 USA
US Patent No. 5,800,807

A Pearl to Remember

Sometimes, the most efficient method may appear to be slower than one expects it to be. Here is one such case:

At the end of their second year at Southern College of Optometry, as part of the approval process before seeing real patients, students are put through timed checkouts. They get used to asking, "Which is better, one or two?" and flipping the JCCs so quickly one might wonder what the mock patients can actually see, let alone report. Many of us have found patients ask to see the choices over and over again. Well, here is a place we can all benefit from "training" the patient and not letting them usurp the refraction process. If our patient asks to see the choices again, we may decide to pull away the phoropter and say something like:

"The system we use will hone in on what is best for you. You needn't worry at all about making a mistake. What I'm after is your impression about which one of the presentations you like better. I'll slow down and give you plenty of time to look at each, but I want your first impression."

We have found that this works well in helping free the patient from worry. Our students find slowing down difficult, but eventually they all get it. Pausing for about two seconds on each presentation does the trick.

A Southern College of Optometry intern performing cylinder testing using a handheld Jackson Cross Cylinder of +/- 0.50.

power of the cylinder by -0.25 to -1.00 to boost the patient's sensitivity. Now, the steps that will lead you to the goal: if we present the patient with two choices, assuming we have performed retinoscopy well, they will generally pick the axis towards our scope.

We then shifted the axis 15° on either side of 90° and repeated the probe again, expecting an indication that directs up back towards 90°. Only two questions in and we had already finished checking the axis. Note: with higher power cylinders, we move the axis less than 15°.

The next step is moving the cylinder back to 90° and rotating the JCC for power testing. Remember, we increased the power by -0.25. At this point, we asked the patient if she wanted more power, or if the original amount sufficed. Again, if our retinoscopy skills are up to snuff, the patient will indicate they want less power. So, we removed -0.50 of cylinder power and returned to a point of less power than what we scoped.

Next, we asked if she wanted less cylinder power or the amount found via retinoscopy. Generally, the patient will answer more.

Finally, we reached question five. By this time, we expected our patient to first choose between two presentations that look fairly similar. Since we tested both greater and lesser power, we sought to determine if she wanted this power, or if it looks too similar to the lower power. Our bias is always towards the lower power; however, if the patient hesitates, generally it indicates a desire for less power, and we should assume the refraction will include a cylindrical component of -0.50 x 90.

In future articles, we will demonstrate how increasing JNDs applies to other time-saving aspects of the refraction technique. We hope, however, that by going through this thought experiment and trying it with a few patients, you find yourself asking fewer questions and, ultimately, having shorter appointments. Let us know! ■

Drops are On the Rise

With higher prices and a dwindling supply, some ophthalmic preparations are more in demand than ever. **Edited by Paul C. Ajamian, OD**

Q Why are the prices of phenylephrine and proparacaine skyrocketing, and what alternatives are available?

A The number one factor influencing this rise in cost is the shortage of phenylephrine, explains Jill Autry, OD, RPh, who practices at the Eye Center of Texas. Phenylephrine is most commonly used for its sympathomimetic effect to dilate the pupil before eye examinations or surgery, and is a vasoconstrictor that can ameliorate ocular injection. "Over the past two years, in the generic market, companies that were making phenylephrine have stopped," she says. She notes three manufacturers are having issues with production, while the remaining manufacturers of phenylephrine have increased their prices significantly, which has providers scrambling for alternative dilation medications. Prices for proparacaine, the topical anesthetic, have also risen, though not as significantly as phenylephrine.

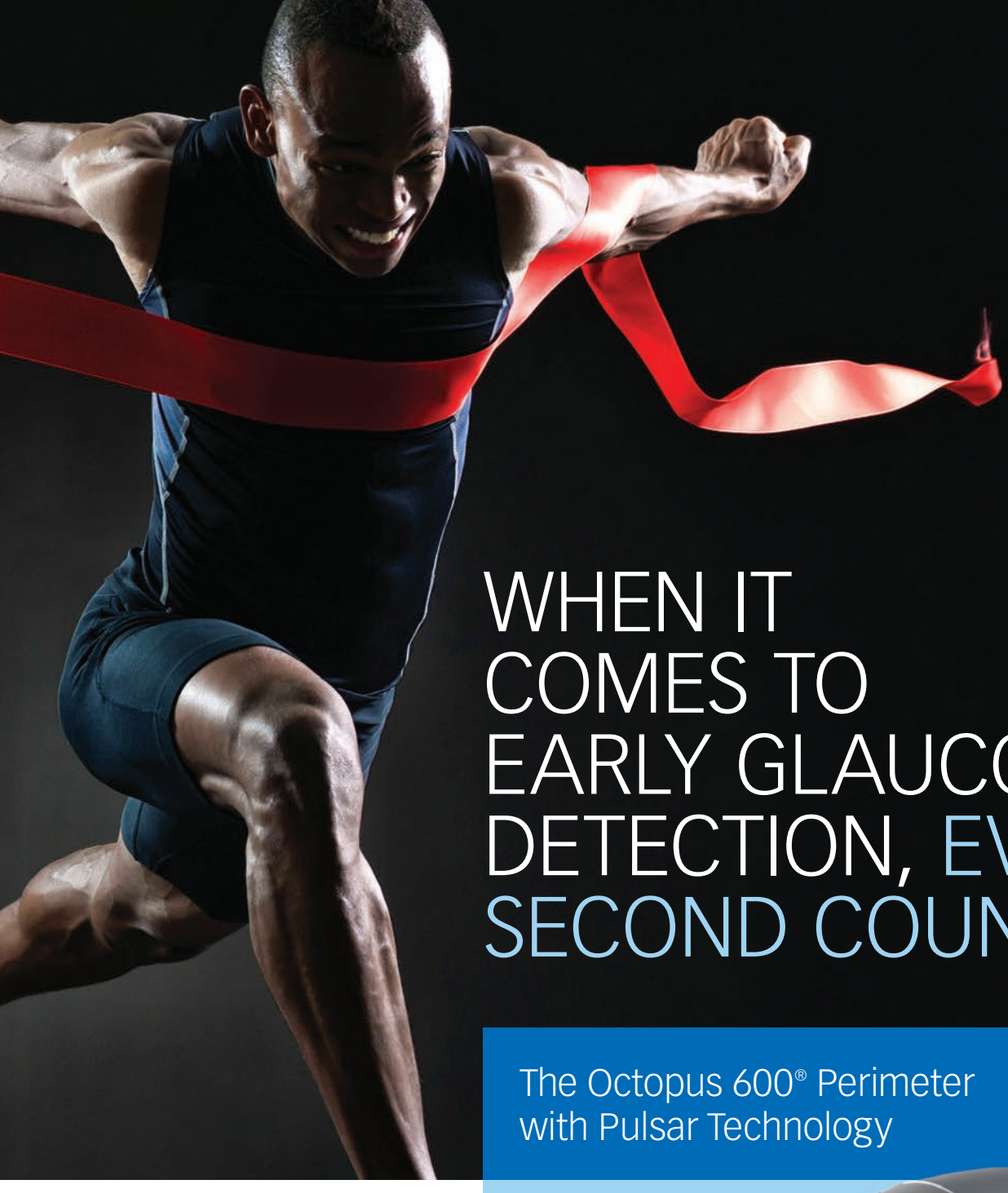
Dr. Autry notes the manufacturing shortage for both solutions is likely due to a narrow profit margin for production, which impacts the amount of ophthalmic solution produced. "Since these drops have a shorter shelf life, the manufacturers don't make a whole bunch of it," she says. "There's a lot more stringency on ophthalmic products—anything in glass bottles, IV medications, anything where the sterility is more of a concern than [it would be with] a pill."

Typically, she explains, if something at the manufacturing plant temporarily impedes production, the company could simply rely on a stockpile of pills for up to several weeks, since pills have a longer shelf life. This is not the case, however, with ophthalmic solutions. Instead, the supply simply runs out until the manufacturing plant can be brought back online.

A manufacturing shortage means that generic phenylephrine prices are rising. What other options do practitioners have?

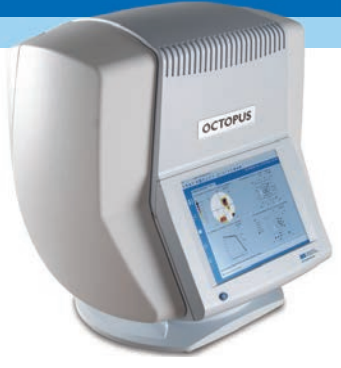
Dr. Autry suggests substituting tetracaine, another ophthalmic numbing drop, as a lower-cost alternative for proparacaine. On the phenylephrine side, tropicamide is a good choice, though it dilates through the parasympathetic system instead of the sympathetic system. "We use both [phenylephrine and tropicamide], on the patients that need to be dilated over a longer time period, especially for retinal exams," Dr. Autry says. She notes that phenylephrine should be used in addition to tropicamide in patients who are hard to dilate, like those with diabetes or who are on benign prostatic hyperplasia (BPH) medications. Paremyd (hydroxyamphetamine hydrobromide 1% and tropicamide ophthalmic solution 0.25%, Akorn) is also a good substitution for phenylephrine, though the combination may be weaker than single-component formulas, Dr. Autry says.

Until pricing for phenylephrine and proparacaine drastically change, Dr. Autry recommends the use of phenylephrine on a case-by-case basis. "What we're going to start doing now in our offices is dilating our non-retinal patients with just tropicamide. If we find the dilations are not adequate, then we'll add the phenylephrine," she says. "That way, we won't go through as much of the pricey drops, keeping overhead a bit lower." ■



WHEN IT COMES TO EARLY GLAUCOMA DETECTION, EVERY SECOND COUNTS.

The Octopus 600® Perimeter with Pulsar Technology



Thanks to our new Pulsar Technology, we're once again leading the race for early glaucoma detection. The **Octopus 600 with Pulsar Technology** is specifically designed to target the disease for faster, easier, more accurate results. Even better, your patients will find the exam itself is now quicker and more comfortable than before. So in the end, everybody wins.

Call Haag-Streit for an online demo at 800-787-5426.

800.787.5426
haag-streit-usa.com

HAAG-STREIT USA

A New Multifocal: Built from the Ground Up

Kurt Moody, OD, FAAO

1-DAY ACUVUE® MOIST Brand MULTIFOCAL Contact Lens

1-DAY ACUVUE® MOIST Brand MULTIFOCAL Contact Lenses are an exciting new option for your presbyopic patients.

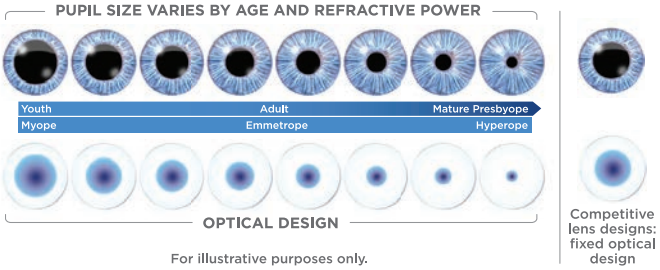
In developing this new aspheric center-near design, the engineers at Johnson & Johnson Vision Care, Inc., drew on lessons from more than 15 years of experience with presbyopic lenses, combined with data from thousands of lens fits in practices across the world, to arrive at a concept that is simple yet revolutionary: There are anatomical differences in presbyopic patients that could drive differences in fit success, thus no one lens design will work for every presbyope. So, we made 183 lens designs targeted to address these differences.

The uniquely optimized optic designs of this lens have been created to address the natural variation in pupil size according to age and refractive power. And, the unique hybrid-back curve design was developed to help maintain centration over the pupil, and preserve the integrity of the front surface optics.

In a clinical study, 94% of subjects were successfully fit in four or fewer total lenses: Three in five patients on the very first pair recommended by the fit guide, an additional 20% with just one adjustment, and another ~15% with only two adjustments (see sidebar).

Pupil optimization

It is well known that pupil size decreases with age. Less well known is the fact that there is a very consistent, natural variation of pupil size by refractive status, with myopes having larger pupils than hyperopes, and high myopes having larger pupils than low myopes.



For illustrative purposes only.

Because of their complex optics, the success of multifocal lenses is greatly influenced by pupil size. If the pupil is larger or smaller than the optical design of the lens, for example, the image quality will be reduced. That's why a single optical design just won't work for every presbyope.

Based on extensive data to validate this phenomenon, we've created 183 unique optical designs. This sounds like an intimidating number, but it actually means that the work of figuring out the best combination has been done already. For every power/add combination, from +6.00 D to -9.00 D in 0.25 D steps, the lenses are designed to optimize visual performance across ~95% of the range of pupil sizes expected for any given refractive error and add power.

Hybrid back-curve design

Lens centration also becomes a critical factor with more complex multifocal optics. The hybrid back-curve design of 1-DAY ACUVUE® MOIST Brand

MULTIFOCAL relies on an aspheric central back curve, as well as low modulus, to help it drape well on the cornea, preserving the integrity of the front-surface optics. Meanwhile, the spherical periphery of the back curve helps maintain centration.

The lens has a base curve of 8.4 with a 14.3-mm diameter, but the unique design gives it a very flexible fit profile. In clinical studies, normal eyes with Ks between 38.75 D and 48.50 D could be successfully fit with a single base curve.

Proven platform

The etafilcon A material has a 30-year track record of success in delivering comfortable lens wear and crisp vision to millions of patients around the world. The proven material of the 1-DAY ACUVUE® MOIST Family of Lenses uses dual-action technologies to keep moisture in and irritation out, which helps to address the essential needs of the aging eye:

- LACREON® Technology to lock moisture in
- An INFINITY EDGE™ Design and low modulus to minimize mechanical irritation
- A unique ability to attract and maintain the enzyme lysozyme in its beneficial natural state*
- Class 2 UV blocking†**

This comfortable daily disposable platform is ideal for presbyopic patients, who are far more likely to struggle with irritation and symptoms of contact lens-related dryness as they age.

Clinical Experience Pearls

Drew Dayton, OD

As an unhappy presbyope, I have personally tried every multifocal contact lens on the market. Not only is 1-DAY ACUVUE® MOIST Brand MULTIFOCAL the first one I've been able to wear, but it has been wildly successful with my patients, too. Of the first 15 I tried it on, 11 purchased lenses – a previously unheard of percentage for me. The difference is that with 1-DAY ACUVUE® MOIST MULTIFOCAL, my patients don't have to compromise distance or comfort to get the near vision they want.

Four steps to a good fit:

1. Perform a good functional refraction for distance, being careful not to over-minus.
2. Determine neurosensory eye dominance by testing a +1.0 lens over each eye, with the patient looking binocularly, to see which one blurs their vision more.
3. Determine the best functional add (LOW, MID, or HIGH), based on their age, history, and the visual tasks that are a high priority for that patient.
4. Use the fit guide. I promise you, it will help you avoid mistakes and reduce chair time! Let the lens settle for 10 minutes and let the patient experience real-life distance and near tasks (ideally for several days at home) before making any changes.

In my experience, most patients are successful on that very first fit. If you need to refine, try these quick tips from the fit guide:

- To improve DISTANCE performance, reduce the add power in the dominant eye
- To improve NEAR performance, add +0.25 D to the non-dominant eye
- NOTE: Refer to the Fitting Tips for patients requiring a HIGH add, as small differences to the directions above for fitting these patients.

*Data on file, 2014. Based on in-vitro data; clinical studies have not been done directly linking differences in lysozyme profile with specific clinical benefits.
†Helps protect against transmission of harmful UV radiation through the cornea and into the eye.
**WARNING: UV-absorbing contact lenses are NOT substitutes for protective UV-absorbing eyewear, such as UV-absorbing goggles or sunglasses, because they do not completely cover the eye and surrounding area. You should continue to use UV-absorbing eyewear as directed.
NOTE: Long-term exposure to UV radiation is one of the risk factors associated with cataracts. Exposure is based on a number of factors such as environmental conditions (altitude, geography, cloud cover) and personal factors (extent and nature of outdoor activities). UV-blocking contact lenses help provide protection against harmful UV radiation. However, clinical studies have not yet been done to demonstrate that wearing UV-blocking contact lenses reduces the risk of developing cataracts or other ocular disorders. Consult your eye care practitioner for more information.

THE SCIENCE of Contact Lens Discomfort

Here's what's happening behind the scenes of your patient's discomfort —and what you can do about it.

By Sruthi Srinivasan, PhD, BSOptom, and Lakshman N. Subbaraman, PhD, BSOptom, MSc

It is estimated that there are more than 140 million contact lens wearers worldwide, with approximately 44 million in the United States alone.[1] A recent report offers encouraging news that the current contact lens market is healthy, estimated at approximately $7.6 billion globally—$2.5 billion of which is in the United States.[1] Despite this healthy trend, one of the major issues related to contact lens wear is dropout, largely due to contact lens discomfort (CLD).

This article provides a brief overview of the current understanding of the factors that influence CLD, the impact of contact lens wear on ocular surface sensitivity and management strategies that a practitioner can adopt to minimize contact lens discomfort.

The Basics of CLD

Because CLD has attracted a significant amount of attention from practitioners, researchers and industry, the Tear Film and Ocular Surface Society (TFOS) organized an international panel of experts to delve into the issue. This group defined CLD as "a condition characterized by episodic or persistent adverse ocular sensations related to lens wear, either with or without visual disturbance, resulting from reduced compatibility between the contact lens and the ocular environment, which can lead to decreased wearing time and discontinuation of contact lens wear."[2]

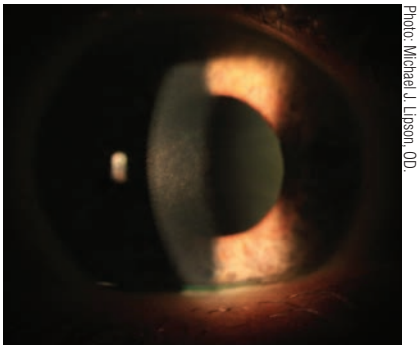


Photo: Michael J. Lipson, OD.

Punctate keratitis from debris trapped under a gas permeable lens.

The perception of symptoms in CLD is extremely complex and is a result of interactions between several psychophysical channels. In addition to discomfort and dryness, scratchy and watery sensations have been reported 52% and 30% of the time in daily HEMA lens wearers.[3] Other symptoms include blurry vision, irritation, light sensitivity, eye soreness, tiredness, itchiness, watering, pain, excessive blinking and burning.

There is a distinctive, five-step pattern to contact lens discomfort progression.[2] Step one begins when patients start to struggle with symptoms such as physical awareness and visual disturbance. This is followed by step two, wherein patients adopt certain management strategies such as reducing comfortable wearing time, which leads to step three: reduced total wear time. Step four is temporary discontinuation of contact lens wear, and step five is when patients permanently discontinue lens wear. Given this progression,

39th Annual Contact Lens Report

Broad Managed Care Coverage[1]

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

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

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

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

Available in 1.7 mL and new 3 mL fill sizes

INDICATIONS AND USAGE

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

IMPORTANT SAFETY INFORMATION

Contraindications

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

Warnings and Precautions

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

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

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

Adverse Reactions

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

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

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

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

ILEVRO®
(nepafenac ophthalmic suspension) 0.3%

Alcon®
a Novartis company

 7/14 ILV14057JAD

ILEVRO®

(nepafenac ophthalmic suspension) 0.3%

BRIEF SUMMARY OF PRESCRIBING INFORMATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Alcon®
a Novartis company

ALCON LABORATORIES, INC.
Fort Worth, Texas 76134 USA
 7/14 ILV14057JAD

it is important that eye care providers identify the factors that play a role in the earlier stages of the discomfort in order to adopt appropriate management strategies. Such preliminary measures could help prevent patients from permanently dropping out of contact lens wear.

The terms *contact lens discomfort*, *contact lens-related dryness* and *contact lens dry eye* have been used synonymously in the literature. However, there are differences between these conditions, as outlined by the TFOS report. Contact lens-related dryness and contact lens dry eye both refer to contact lens wearers with pre-existing dry eye, which may or may not be exacerbated by lens wear. Contact lens discomfort occurs only during lens wear, and this can be induced by many factors, broadly classified into three sub-groups: (1) contact lens-related, (2) patient-related and (3) environmental.[3]

Contact Lens-Related Factors

There are several contact lens-related factors investigators believe play a role in determining comfort during lens wear.[4] The only material-related factor shown to correlate with CLD was coefficient of friction.[5] A number of other factors have only weak links with CLD, including oxygen transmissibility, wettability, surface modification, modulus and lens dehydration.[4]

Other physical properties of soft contact lenses that seem to be convincingly related to CLD include lens replacement frequency, design, thickness and edge configuration.[4]

Many studies have reported that improved comfort is linked with increasing lens replacement frequency.[4] When it comes to lens design, thin, tapered edges interact less with the lids than thicker lenses, thereby resulting in improved comfort.[6] Lens materials with thicker designs are often less comfortable than thinner ones and result in higher reports of CLD.[7] Increased lens movement results in reduced comfort, while lower lens mobility increases perceived comfort.[8]

High water content is associated with an increase in contact lens discomfort as demonstrated in conventional hydrogel lens materials; however, research has yet to show a similar link with ionicity variations.[9,10] No studies examine these factors using silicone hydrogel lens materials. Although deposition of tear film components, including proteins and lipids, did not correlate with subjective symptoms, one study showed that the degree of denaturation of protein had a significant correlation with subjective comfort.[11]

Another important aspect to consider is the use of lens care products, which are composed of several components including biocides, wetting agents, chelating agents, surfactants and buffering agents. Although reports show the presence of one biocide will improve comfort when compared with the other, in reality, it is not possible to isolate the presence of one specific component and attribute its presence to contact lens comfort.[4] Evidence shows that the presence of certain wetting agents in a lens care product could result in reduced CLD, possibly by improving the wettability of lenses and by making the lenses feel moist.[4]

Practitioners can suggest their patients use lens care products that incorporate wetting agents, which can potentially improve CLD.

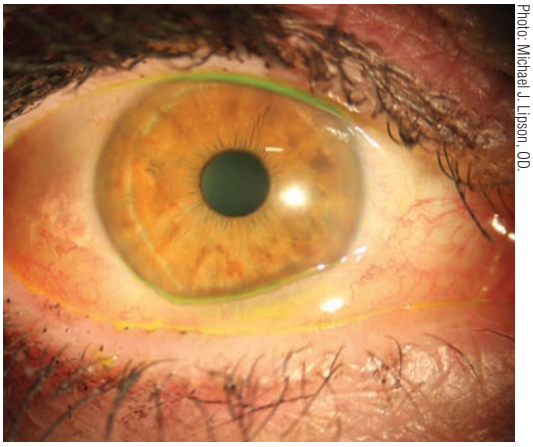


Photo: Michael J. Lipson, OD.

Inflamed conjunctival tissue prolapsed onto the cornea.

Patient-Related Factors

Several non-modifiable and modifiable patient-related factors may affect CLD.

Non-modifiable factors

Several studies indicate that women are more likely to report symptoms of CLD than men.[9] Age is another non-modifiable factor; younger wearers report more symptoms compared with elderly wearers, perhaps because patients become more tolerant as they age.[12] Other non-modifiable factors known to play a role in CLD include poor tear film quality and quantity and seasonal allergies.[9,13] While factors such as ethnicity, blink rate and systemic diseases play a huge role in dry eye disease, little evidence indicates these non-modifiable factors impact CLD.[14] However, conditions such as ocular medicamentosa, atopic and autoimmune disease, tear film abnormalities and corneal and conjunctival diseases could affect comfort during contact lens wear.[14]

Modifiable factors

Oral contraceptives and over-the counter pain medications have been shown to be associated with symptoms of scratchiness and dryness.[9,15]

Other factors commonly associated with CLD include diet, alcohol consumption, smoking, cosmetic use and psychology; yet, little evidence supports the supposition that these factors play a role in CLD.[14]

Environmental Factors

Although it is commonly believed that environmental conditions such as high altitude, air conditioning, pollution, climate and temperature will impact CLD, there is no direct evidence to support this.[14]

However, any condition with reduced relative humidity, increased air flow (wind) and blink rate-modifying activities (such as computer use or video-gaming) can cause contact lens discomfort.[14]

Ocular Surface Sensitivity

Different ocular structures perceive various sensory messages, which can be measured using aesthesiometry. The neurons that innervate the cornea respond to different physical and chemical stimuli, and the impulses originating at the peripheral nerves ultimately reach the cortex via the lower brain stem. Among the various sensations that are perceived by the ocular surface is pain, which is evoked by inflammatory and traumatic events, especially in the cornea. Tactile sensations, however, are evoked at the conjunctiva. Other sensations such as dryness, grittiness and fatigue are due to psychophysical channels and complex interactions in the brain.

Contact lenses interact with the ocular surface, including the cornea, conjunctiva and eyelid tissues during lens wear. These structures are densely innervated.[15] Because the stimuli to the ocular surface from a contact lens are extremely complex and multifactorial, there is limited evidence for understanding the mechanisms involved in CLD. The various stimuli to the ocular surface during lens wear could include the effects of a lens care product, thermal effect, hyperosmolarity, desiccation, friction, inflammation and mechanical stimulation.

Several studies show that polymethyl methacrylate (PMMA), rigid gas permeables (RGP), orthokeratology and conventional hydrogel contact lens wear are associated with reduced sensitivity.[16-18] Researchers speculate that this reduced sensitivity impacts the blinking mechanism and lacrimal glands' tear secretion, leading to increased tear evaporation and tear secretion, ultimately resulting in increased symptoms of dry eye.[15]

Recent studies show the use of silicone hydrogels or daily disposables have no impact on corneal sensitivity.[17,19] There is limited information on the effect solutions have on the neurobiology of the ocular surface from which to draw any meaningful conclusions. Throughout the past decade, researchers have advanced our understanding of the dynamic nature of pain and various mechanisms involved in perceiving pain, which will help in better understanding CLD.

CLD Management

CLD is multifactorial, and there is no single, straightforward solution to treat this condition. Each case should be considered carefully, and individual assessment is required. Here are steps every doctor should take when seeing a patient with contact lens discomfort:

1. Take a careful history and assess the status of both the patient and the lenses he or she is using.[20] This assessment should include, but should not be limited to, determining the patient's age, sex, current lens type, lens care product, replacement schedule, environmental conditions (especially the occupational environment), onset of symptoms and use of any drops or oral medications.

2. Identify non-contact lens related factors such as systemic and ocular conditions that could contribute to contact lens discomfort. Treating these could significantly reduce your patient's contact lens discomfort.

3. Identify contact lens- and care system-related factors that may be causing discomfort. These include physical defects on the lens, poor lens fitting or deposition. Fitting with steeper base curves, using larger diameter lenses, alternating the back lens surface shape and using lenses with a thinner center thickness may improve CLD.

Also consider changing the replacement frequency, material or care system. For example, peroxide systems have long been appreciated for their superior cleaning capabilities, leading to better overall patient satisfaction. You can also suggest the use of tear supplements and wetting agents to improve comfort.

Oral azithromycin and a change in diet to include more omega-6 fatty acids, such as evening primrose oil, has also shown to improve contact lens discomfort.[20] One study also highlighted that intracanalicular plug occlusion of the upper and lower drainage systems improves symptoms in hydrogel lens wearers who are symptomatic of dry eye.[20] Lower punctal occlusion with a silicone plug resulted in increased wearing times in symptomatic wearers of soft lenses.[20]

Because contact lens discomfort is a complex condition, it is essential for practitioners to understand the myriad patient- and contact lens-related factors that can contribute to the problem. With a

firm grasp of the potential issues in play, we can manage each patient's contact lens concerns in the earliest stages of CLD. Such an approach could potentially improve the long-term prognosis of safe and comfortable contact lens wear. ■

Drs. Srinivasan and Subbaraman are optometrists at the Centre for Contact Lens Research (CCLR), School of Optometry and Vision Science, at the University of Waterloo, Ontario, Canada.

Disclosure: CCLR has received research support or honoraria from Advanced Vision Research, Alcon, AlgiPharma, Allergan, Ciba Vision, CooperVision, Contamac US, Eleven Biotherapeutics, Essilor, Johnson & Johnson Vision Care, Ocular Dynamics, Oculus, Ocusense, TearScience and Visioneering Technologies.

1. Nichols J. Contact Lenses 2014. Contact Lens Spectrum. 2015 January.
2. Nichols KK, Redfern RL, et al. The TFOS International Workshop on Contact Lens Discomfort: report of the definition and classification subcommittee. Invest Ophthalmol Vis Sci. 2013;54:14-9.
3. Nichols JJ, Willcox MD, Bron AJ, et al. The TFOS International Workshop on Contact Lens Discomfort: executive summary. Invest Ophthalmol Vis Sci. 2013;54:7-13.
4. Jones L, Brennan NA, Gonzalez-Meijome J, et al. The TFOS International Workshop on Contact Lens Discomfort: report of the contact lens materials, design, and care subcommittee. Invest Ophthalmol Vis Sci. 2013;54:37-70.
5. Coles C, Brennan N. Coefficient of friction and soft contact lens comfort. Optom Vis Sci. 2012;89:E-abstract: 125603.
6. Maissa C, Guillon M, Garofalo RJ. Contact lens-induced circumlimbal staining in silicone hydrogel contact lenses worn on a daily wear basis. Eye Contact Lens. 2012;38:16-26.
7. Young G, Chalmers RL, Napier L, et al. Characterizing contact lens-related dryness symptoms in a cross-section of UK soft lens wearers. Cont Lens Anterior Eye. 2011;34:64-70.
8. Young G. Evaluation of soft contact lens fitting characteristics. Optom Vis Sci. 1996;73:247-54.
9. Nichols JJ, Sinnott LT. Tear film, contact lens, and patient-related factors associated with contact lens-related dry eye. Invest Ophthalmol Vis Sci. 2006;47:1319-28.
10. Ramamoorthy P, Sinnott LT, Nichols JJ. Treatment, material, care, and patient-related factors in contact lens-related dry eye. Optom Vis Sci. 2008;85:764-72.
11. Subbaraman LN, Glasier M, Srinivasan S, et al. Protein deposition and clinical symptoms in daily wear of etafilcon lenses. Optom Vis Sci. 2012 Oct;89(10):1450-9.
12. Chalmers RL, Hunt C, Hickson-Curran S, Young G. Struggle with hydrogel CL wear increases with age in young adults. Cont Lens Anterior Eye. 2009;32:113-9.
13. Glasson MJ, Stapleton F, Keay L, et al. Differences in clinical parameters and tear film of tolerant and intolerant contact lens wearers. Invest Ophthalmol Vis Sci. 2003;44:5116-24.
14. Dumbleton K, Caffery B, Dogru M, et al. The TFOS International Workshop on Contact Lens Discomfort: report of the subcommittee on epidemiology. Invest Ophthalmol Vis Sci. 2013;54:20-36.
15. Brennan NA, Efron N. Symptomatology of HEMA contact lens wear. Optom Vis Sci. 1989;66:834-8.
16. Millodot M, Henson DB, O'Leary DJ. Measurement of corneal sensitivity and thickness with PMMA and gas-permeable contact lenses. Am J Optom Physiol Opt. 1979;56:628-32.
17. Lum E, Golebiowski B, Gunn R, et al. Corneal sensitivity with contact lenses of different mechanical properties. Optom Vis Sci. 2013;90:954-60.
18. Murphy PJ, Patel S, Marshall J. The effect of long-term, daily contact lens wear on corneal sensitivity. Cornea. 2001;20:264-9.
19. Situ P, Simpson TL, Jones LW, Fonn D. Effects of silicone hydrogel contact lens wear on ocular surface sensitivity to tactile, pneumatic mechanical, and chemical stimulation. Invest Ophthalmol Vis Sci. 2010;51:6111-7.
20. Papas EB, Ciolino JB, Jacobs D, et al. The TFOS International Workshop on Contact Lens Discomfort: report of the management and therapy subcommittee. Invest Ophthalmol Vis Sci. 2013;54:183-203.

Yes, Dry Eye Patients *Can* Wear Contacts

Ocular surface compromise is historically a contraindication, but evidence shows technology is turning that old wisdom on its head. **By Dan Fuller, OD**

Every day we are confronted with patients who experience discomfort while wearing contact lenses. This often manifests as non-specific complaints of dryness, burning, stinging or signs of redness and blur. Traditionally, optometry has asserted that dryness is a relative contraindication for wearing contact lenses, with the exception of fitting scleral lenses for cases of Sjögren's, cicatricial pemphigoid or other disease-related desiccation of the ocular surface. But as technology develops, we must re-evaluate this wisdom and ask: Can patients experiencing dryness today wear contact lenses?

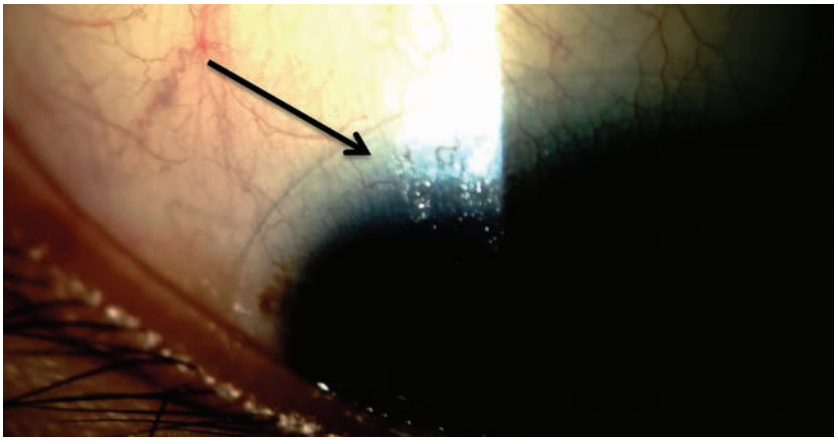


Fig. 1. Clinical finding of poor tear film stability that caused meibomian dysfunction, which results in the lipid layer thinning (arrow).

Dry Eye Discomfort

The International Dry Eye Workshop (DEWS) report is currently being updated. One of the myriad details emerging from the 2007 report was a discussion about the role contact lens wear can play in both aqueous tear-deficient and evaporative dry eye.[1] The report exhaustively reviewed the subject of contact lens symptomatology, finding that 50% of contact lens wearers report dry eye symptoms.[1] They are 12 times more likely than emmetropes and five times more likely than spectacle wearers to report dry eye symptoms.[1]

39th Annual Contact Lens Report

As is true of dry eye complaints in the non-contact lens wearing population, female wearers reported symptoms at a rate roughly 50% higher than men, suggesting a hormonal influence.[1] Associated factors cited were loss of corneal sensitivity, increased tear osmolarity, trigeminal denervation, pre-lens tear film thinning (particularly of the lipid layer), higher water content contact lenses and shortened blink intervals.[1]

Various investigators estimate the number of contact lens wearers who "drop out" due to discomfort (including symptoms of dryness) at 12% to 51%, depending on how you define "drop out."[2] Drop outs have been variously defined as those whose discomfort results in reduced wearing time, intermittent wear time, temporary discontinuance of wear over varying periods and permanent discontinuation of contact lens wear.[2] This study

ELI EZER
THE EZER WAY OF LIFE

ELI EZER
ERK-9000
AUTO REFRACTOR / KERATOMETER

THE FUTURE IS NOW

OWN IT

BLUETOOTH CONNECTIVITY

OWN THE NEW ERK-9000
FOR ONLY 36 PAYMENTS OF $237
or choose one of our financing plans below

The new ERK-9000 has arrived and you can own it by making 36 low monthly payments. The ERK-9000 combines all of the necessary visual pre-testing functions in one professionally designed instrument. The latest technology now at the reach of your fingertips.

2 YEAR WARRANTY

*FINANCING PLANS	$626/month	$334/month	$237/month
	12	24	36

*Credit review determines the rate and term of the loan. The amounts shown above are based on excellent credit (FICO 700+) and 2 years+ in the industry. Rates vary per state. Call your US Ophthalmic sales rep for more information. Financing is not available in the following states: AK, DE, ND, VT.

US OPHTHALMIC

www.usophthalmic.com | Ph: 1.888.334.4640 | info@usophthalmic.com | 9990 NW 14th St. Suite 105 Doral, FL 33172

reaffirms the considerable overlap between the two distinctly different yet intertwined conditions.[2]

Another important publication was the International Workshop on Meibomian Gland Dysfunction (MGD).[3] This compendium reviews what is known about MGD, including discussions related to the interactions between contact lenses and lipids, and their contributory role in MGD. Important takeaways include: a recognition of complex differences in lipid attraction among the different FDA groups of polymers; increased instability of the tear film is caused by the presence of a contact lens, leading to evaporative drying; and these processes have associated higher rates of discomfort or intolerance.[3-6]

Evaluating the Problem

The old adage, "seek and ye shall find" applies here. Not all patients with dry eye disease are symptomatic, nor do the clinical signs correlate well with the symptoms.[6,7] For this reason, it is imperative we not only thoroughly review the history of a patient's contact lens use, but also probe for symptoms and signs of dry eye.

History and symptoms are relatively easy to elicit with appropriate questioning. Assessing the signs, though, can be a little more daunting, given their relatively poor individual associations with dry eye. Experts argue the relative merits of one test over another, but research shows the most effective approach is one that uses a combination of both patient symptoms and clinical signs.[1]

The approach discussed below is evidence-based, employing some of the stronger clinical markers—i.e., symptoms, meibomian gland dysfunction, lid wiper epitheliopathy (LWE), lid-parallel conjunctival folds (LIPCOFs)—and associated symptoms of contact lens discomfort. This is certainly not an inclusive discussion and should be modified as your judgment or the emerging science dictates.

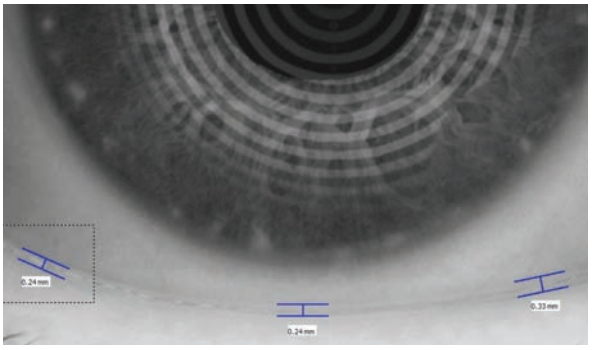


Figure 2. Keratograph 5M assessment of tear prism height.

1. Ask the patient. Multiple questionnaires are available to determine whether or not a patient is symptomatic, such as the Ocular Surface Disease Index, Contact Lens Dry Eye Questionnaire and McMonnies questionnaire.[7-13] While others are available, these have been validated, standardized and shown to assess multiple dimensions of frequency and severity of symptoms.[14-19] Studies show that symptoms correlate poorly with signs.[19,20] Their true value is in being able to establish "soft" benchmarks to gauge the effectiveness of your management plan in relieving symptoms.

2. Tear film/lens interactions. Research has established that contact lenses disrupt the normal dynamics of the tear film and reduce its thickness.[21,22] This can contribute to discomfort and intolerance.[23-27] For this reason, it is important to assess the quantity, quality and interactions of the tears with the surface of the contact lens (*Figure 1*). This is done during the course of your biomicroscopic examination of the patient. Patients at risk will often show an abundance of debris in the tear film, a reduced tear prism height, and a rapid thinning or evaporation of the pre-lens tear film.[21,28,29]

Sophisticated tear film measuring devices making their way out of research labs and into our clinics include interferometers and tomographers.[2,30,31] Two more common devices are the Keratograph 5M (Oculus) and Lipiview (TearScience) units.[33,34] These instruments, designed to assess tear film properties without a lens on the eye, are helpful for identifying at-risk wearers. Their value in assessing the tear film during lens wear has yet to be scientifically established. The K5M is a multifunctional tool that can provide topographical information, pupilometry, tear film analysis, meibography, oxygen maps, color imaging and contact lens fitting support (*Figure 2*).

3. Lens wetting. The issues associated with lens wettability and the lack of agreement on how to best measure it is complicated. Despite the lack of conclusive evidence and challenges to reliably measuring this attribute, wettability may contribute to lens intolerance and discomfort.[35] The surface and bulk properties of the polymers used in the manufacture of contact lenses are manipulated by chemists to enhance the attraction, retention and release of moisture from a particular lens. You can subjectively evaluate the wettability of the lens clinically by assessing for an even

For more images, visit www.reviewofoptometry.com, or scan this QR code.

ACUVUE®
BRAND CONTACT LENSES
INNOVATION FOR HEALTHY VISION®

Your patients protect their skin.

Help protect their eyes.

Many patients are unaware of the long-term implications that may be associated with cumulative day-to-day ultraviolet (UV) exposure to eye health.[1]

UV-blocking contact lenses worn in addition to sunglasses and a wide-brim hat can provide an additional layer of protection against UV radiation.[2]

Educate your patients about ACUVUE® Brand Contact Lenses—the only major brand to block at least 97% of UVB and 81% of UVA rays as standard across the entire line.*†

To learn more, visit **acuvueprofessional.com**.

*UV-blocking percentages are based on an average across the wavelength spectrum.

ACUVUE® Brand Contact Lenses are indicated for vision correction. As with any contact lens, eye problems, including corneal ulcers, can develop. Some wearers may experience mild irritation, itching or discomfort. Lenses should not be prescribed if patients have any eye infection, or experience eye discomfort, excessive tearing, vision changes, redness or other eye problems. Consult the package insert for complete information. Complete information is also available from Johnson & Johnson Vision Care, Inc., by calling 1-800-843-2020 or by visiting acuvueprofessional.com.

†Helps protect against transmission of harmful UV radiation to the cornea and into the eye.

WARNING: UV-absorbing contact lenses are NOT substitutes for protective UV-absorbing eyewear such as UV-absorbing goggles or sunglasses, because they do not completely cover the eye and surrounding area. You should continue to use UV-absorbing eyewear as directed. **NOTE:** Long-term exposure to UV radiation is one of the risk factors associated with cataracts. Exposure is based on a number of factors such as environmental conditions (altitude, geography, cloud cover) and personal factors (extent and nature of outdoor activities). UV-blocking contact lenses help provide protection against harmful UV radiation. However, clinical studies have not been done to demonstrate that wearing UV-blocking contact lenses reduces the risk of developing cataracts or other eye disorders. Consult your eye care practitioner for more information.

References: 1. The big picture: eye protection is always in season. The Vision Council Website. http://www.thevisioncouncil.org/sites/default/files/VCUVReport2013FINAL.pdf. Accessed May 7, 2014. **2.** Chandler H. Ultraviolet absorption by contact lenses and the significance on the ocular anterior segment. *Eye Contact Lens.* 2011;37(4):259-266.

distribution and stability of the pre-lens tear film, but recognize the limitations of interpreting the findings.

4. Meibomian gland assessments. Evidence shows contact lens wear is associated with changes in meibomian gland morphology.[36-38] The relationship between symptoms of dryness and observed changes in the meibomian glands may be related more to artifacts from the testing method than an actual causal relationship.[39,40] Evidence shows this may result in instability of the lipid layer, hastening evaporation of the pre-lens tear film.[3] This, in turn, leads to intolerance and discomfort. Visual inspection of the lid margins is important. Expressing the lid with digital pressure against the globe or a flat metal instrument, between two applicators, or with the meibomian gland expressor, is a simple way to assess patency of the orifices and quality of the secretions.[41]

Using a transilluminator held on the external side of an everted lid can allow you to visualize the number, shape and extent of the meibomian glands. A growing number of devices use infrared imaging to enhance the contrast between the glands and surrounding structures.[42] Atrophy, drop out and tortuous dilations of the glands are all signs of dysfunction that may indirectly contribute to symptoms.

5. Corneal and conjunctival staining. If you have not been routinely using lissamine green or fluorescein as part of your soft lens patient evaluation because of fear of staining their lenses or the time it may require to irrigate the stain, you are missing out. I will leave discussions of high molecular weight fluorescein and differences in uptake between hydrogel and silicone hydrogels aside. Multiple authors have found staining to be more prevalent in contact lens wearers and associated with discomfort (*Figures 3-5*).[43-47]

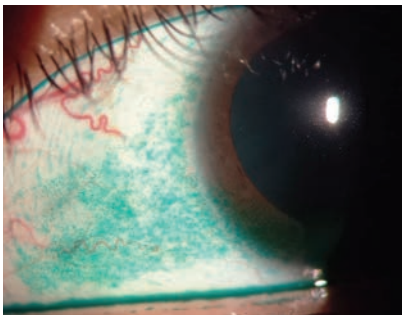


Fig. 3. Above, dense area of lissamine green staining in a case of severe dry eye with underlying meibomian gland dysfunction.

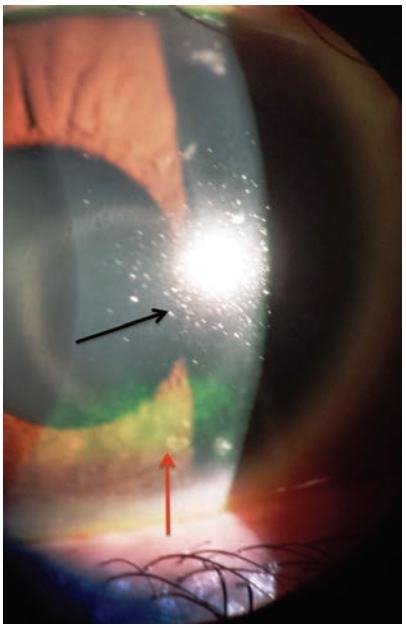


Fig. 4. At right, the black arrow indicates debris and unstable tear film after expression of the meibomian glands. The red arrow indicates a dense area of inferior fluorescein staining associated with meibomian gland dysfunction.

Corneal staining's mechanism and its potential impact on ocular health should be part of your calculus in troubleshooting. This staining can tip you off to meibomian gland dysfunction (inferior third of the cornea), ocular surface disease (in any region), solution-induced staining (typically diffuse) and mechanical lens-ocular surface interactions (isolated regions).[2] Document your findings consistently using any number of standardized scales.[48] Pay particular attention to markers of dryness in the lid-wiper region of the upper lid after staining with lissamine green. Prevalence rates of staining are at least two and a half times higher in symptomatic contact lens wearers than asymptomatic wearers.[49,50] Lid parallel conjunctival folds (LIPCOFs) may also represent damage from the mechanical friction between dry surfaces and have been shown to be associated with lid wiper epitheliopathy (LWE) and dry eye in contact lens wearers (*Figure 6*).[51]

Systematic Management

Once you have identified the root cause for the patient's intolerance and reduced wearing time, it's time to strategize a treatment. Since it is a multifactorial problem, the solution frequently requires a multifaceted approach. I prefer an approach that provides both short-term relief of symptoms and a long-term attack on the underlying issues. This demonstrates empathy for patients by addressing their acute complaints, engages their compliance and buys time to address any chronic physiological issues.

Here are the recommendations from the International Workshop on Contact Lens Discomfort based upon the review of the scientific literature.[2] Let's take them one at a time in an attempt to develop a methodical approach. An underlying assumption is that you have perfected the lens fit in accordance with the manufacturer fitting guides

Exclusive Optical Shop Distribution

The New Non-Rx, 1st Step to Longer, Lusher, Fuller Looking Lashes and Brows

#1 Recommended Among Eyecare Professionals

2 Special LASH ADVANCE offers — Choose 1 or Both:

Introduced exclusively for eyecare professionals, new LASH ADVANCE® is a non-prescription cosmeceutical developed in conjunction with a female optometrist as a sensible start to healthier lashes and brows. LASH ADVANCE is suggested for use prior to expensive prescription products.

PROFESSIONAL COURTESY PRICING OFFER :

TRY IT!

provides you and your staff an opportunity to try new Lash Advance at a very low price (just $10 + S & H — 80% off the regular retail price). Visit **www.mediniche.com/LAprofessionalpricing.html** or call MediNiche at 1-888-325-2395 for more details.

INTRODUCTORY PURCHASE OFFER :

BUY IT!

buy a dozen (12) packages of Lash Advance at the regular wholesale price of $24/package and receive a 25% discount, two (2) free packages, free shipping, a free counter display, customer/staff materials and more. Visit **www.mediniche.com/lashadvanceoffer.html** or call MediNiche at 1-888-325-2395 for more details.

- Natural; no drugs or known sensitizers.
- Contains PeptiPlex®, advanced peptide complex, supports the growth cycle of lashes and brows.
- Unlike other lash products, not sold at major drug and food retailers.
- Easy application; will not run, clear gel absorbs with no residue.
- Reasonably priced; affordable.

1 Positive RESULTS with one tube of use!

MediNiche

St. Louis, MO 63017 1-888-325-2395 info@mediniche.com © 2014

and your clinical judgment and have addressed any coexisting factors such as autoimmune or atopic disease, including lid or tear film disease, structural issues with lid anatomy and corneal or conjunctival diseases.[3]

1. Changing replacement interval. The thought behind increasing replacement frequency centers on the belief that lens soilage leads to discomfort. It is nearly impossible to separate out replacement frequency from other factors contributing to contact lens comfort.[52] Many studies looked at hydrogel lens wearers who converted from conventional to either quarterly or monthly replacement intervals.[2] Given the preeminence of silicone hydrogels and the decline of both conventional and quarterly replacement, these findings may not be so useful. The evidence for increasing replacement intervals from monthly to biweekly, resulting in improved comfort, remains equivocal.[2] But, research shows improved comfort for patients who switch to daily disposables.[53] The bigger issue, regardless of frequency of replacement, appears to be patients exceeding manufacturer recommended replacement intervals.[54]

2. Changing materials. Recognize that, when changing materials, you are also changing many other parameters such as the surface or bulk properties, FDA group and edge profiles or thickness. Methodological study differences further complicate arrival at a consensus on the perfect material. Each material offers a rational basis for its existence, though it is clear there are differences among them. It is difficult, under these circumstances, to know why a change produces a certain result, making it challenging to reproduce the positive effects for an individual patient. Nonetheless,

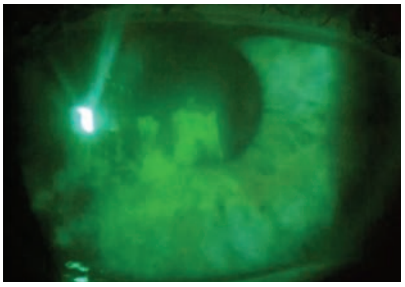


Fig. 5. Fluorescein staining of another MGD patient.

there are multiple studies demonstrating improvement in symptoms of dryness when hydrogel wearers are converted to silicone hydrogels.[55-60] There is continuing debate among stakeholders regarding the separation of silicone hydrogels into multiple new FDA groups, which may better reflect material differences within this category of lenses.

3. Care systems. Those of us who began fitting contact lenses when the dinosaurs roamed the earth can share stories of thimerosal and chlorhexidine hypersensitivities. There is nothing new about lens solution interactions, but practitioner awareness was piqued by the *Fusarium* and *Acanthamoeba* events of 2006 to 2008. This has stimulated investigators to dive into the issues with renewed vigor. Invariably, discussions include comfort issues as well as concerns over compliance and adverse events. This is an important point. Comfort and adverse events for a given lens/solution combination do not necessarily go hand in hand, requiring each be considered separately. The important takeaway regarding comfort is that changing solutions to improve comfort may be effective but confusing.[61,62] Peroxide systems are currently enjoying market growth for their efficacy and low rates of adverse events. This is not a useful option for intermittent wearers who may leave lenses soaking in a neutralized solution for days or longer.

A seemingly simple approach is to eliminate care systems altogether by going to daily replacement, but as discussed above this is not always a panacea. Not only do the surface and bulk properties as well as edge profiles need to be considered, but the packaging solution may also contain wetting agents that may be irritating to sensitive patients. Keep this in mind, particularly if discomfort develops early in the wear cycle or upon insertion, and consider having the patient rinse the lens with saline before insertion.

4. Tear supplements/wetting agents. The use of tear supplements, rewetting agents, lubricants and artificial tears can be useful in providing symptomatic relief for contact lens wearers experiencing dry eye, research shows.[2] In some cases it may be placebo effect rather than actual changes to the surface properties of the eye and contact lens. Attributes of topical agents deemed to be beneficial include hypo-osmotic status; non-preserved formulation or use of 2% povidone preservative; and presence of carboxymethylcellulose (CMC) or polyvinyl alcohol.[2]

Older technologies shown to provide relief are sometimes forgotten, but are still available, such as hydroxypropylcellulose inserts.[63,64] Don't forget that punctal plugs have utility here, but plug both upper and lower lids for best effect.[2] Both technologies are indicated for the management of symptomatic moderate to severe dry eye, keratoconjunctivitis sicca and may be viewed as additive to other coexisting therapies.[1]

5. Dietary supplements. Another area where substantive evidence exists for how to improve dry eye

Specialty GP lens fitting tools, anytime and anywhere

fit-boston.com

Educational materials at your fingertips

The Boston website offers a variety of educational materials and videos for the specialty lens fitting practice. Bookmark **fit-boston.com** and make it your "go to" resource for specialty GP lens information.

- "Correction of Keratoconus with GP Lenses"
- A Guide to Scleral Lens Fitting
- Scleral Lens Fitting Videos
- Scleral Lens Fitting Scales

Experience the website now!
Scan this QR code on your device and watch a video on what **fit-boston.com** has to offer.

Boston®
Materials

BAUSCH+LOMB

symptoms is the use of essential free fatty acids, specifically omega-3s and omega-6s. The DEWS and MGD workshops cover their anti-inflammatory efficacy in great detail.[1,3] Evening primrose oil has been evaluated in a group of soft lens wearers, demonstrating improvements in comfort and tear prism heights.[65] Other supplements such as fish, krill and flaxseed oils may produce similar benefits.[1] The strategy is to manage the underlying dry eye problems to improve the ocular surface environment and reduce evaporative tear loss.

6. Topical medications. Some may consider the use of topical agents with anti-inflammatory properties a temporary measure for managing acute inflammation since their long-term safety has not been established in contact lens wearers. Concerns include toxicity from the binding of preservatives to reusable lenses, development of antibiotic resistance, opportunistic infection and risks of cataract or glaucoma in the case of steroids. The most commonly advocated agents for which there is evidence of efficacy are azythromycin 1% solution, cyclosporin A 0.05% emulsion and steroids or NSAIDs.[2,66-69]

Steroid and NSAID use has not been studied in sufficient detail to assess their merits beyond acute relief of symptoms.

It is clear more rigorous studies are needed to identify the modifiable factors contributing to dry eye symptoms in contact lens discomfort, which tests are most diagnostic and which management strategies are most effective. Nonetheless, searching for underlying ocular surface pathologies, symptoms and signs is a jumping off point. Treating the underlying problems in conjunction with a methodical (often multi-pronged) treatment approach can allow wearers to comfortably increase their wearing times or continue to wear contact lenses. Dry eye issues need not result in patients dropping out of contact lens use altogether in most cases. Apply the scientific literature critically to each individual's needs and improve the quality of your patient's lives. ■

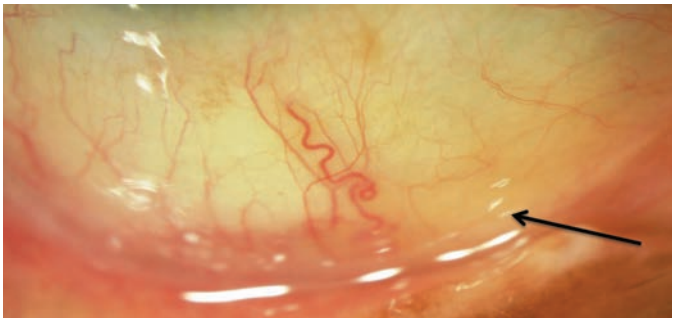


Fig. 6. Arrow indicates lid parallel conjunctival folds (LIPCOF).

Dr. Fuller is an associate professor and founding supervisor of the cornea contact lens refractive surgery residency at The Eye Center, Southern College of Optometry.

1. Foulks GN. 2007 Report of the international dry eye workshop (DEWS). Ocular Surf 2007;5(2):81-6.
2. Nichols JJ, Jones L, Nelson JD, et. al. The TFOS Workshop on contact lens discomfort. Invest Ophthalmol Vis Sci 2013;54(11):1-156.
3. Nichols KK, et. al. The International Workshop on Meibomian Gland Dysfunction. Invest Ophthalmol Vis Sci 2011;52(4):1917-2085.
4. Rohit A, Willcox M, Stapleton F. Tear lipid layer and contact lens comfort: a review. Eye Contact Lens 2013. May;39(3):247-53.
5. Rohit A, Willcox MD, Brown SH, et al. Clinical and biochemical tear lipid parameters in contact lens wearers. Optom Vis Sci. 2014 Dec;91(12):1384-90.
6. Sullivan B, Crews L, Messmer E, et al. Correlations between commonly used objective signs and symptoms for the diagnosis of dry eye disease: clinical implications. Acta Ophthalmol. 2014 Mar;92(2):161-6.
7. Walt J, Rowe M, Stern K. Evaluating the functional impact of dry eye: the Ocular Surface Disease Index (Abstract). Drug Inf J:1997;31:1436.
8. Dougherty BE, Nichols JJ, Nichols KK. Rasch analysis of the Ocular Surface Disease Index (OSDI). Invest Ophthalmol Vis Sci 2011 Nov 7;52(12):8630-5.
9. Chalmers RL, Begley CG, Moody K, Hickson-Curran SB. Contact Lens Dry Eye Questionnaire-8 (CLDEQ-8) and opinion of contact lens performance. Optom Vis Sci 2012 Oct;89(10):1435-42.
10. Nichols JJ, Mitchell GL, Nichols KK, et al. The performance of the contact lens dry eye questionnaire as a screening survey for contact lens-related dry eye. Cornea. 2002 Jul;21(5):469-75.
11. MCMonnies CW, Ho A. Patient history in screening for dry eye conditions. J Am Optom Assoc. 1987;58(4):296-301.
12. McMonnies CW. Key questions in a dry eye history. J Am Optom Assoc. 1986 Jul;57(7):512-7.
13. Bhatnagar KR, Pote S, Pujari S, Deka D. Validity of subjective assessment as screening tool for dry eye disease and its association with clinical tests. Int J Ophthalmol. 2015;8(1):174-81.
14. Gothwal VK, Pesudovs K, Wright TA, McMonnies CW. McMonnies questionnaire: enhancing screening for dry eye syndromes with Rasch analysis. Invest Optomthalmol Vis Sci. 2010;51(3):1401-7.
15. Khadka J, McAlinden C, Pesudovs K. Quality assessment f ophthalmic questionnaires: review and recommendations. Optom Vis Sci. 2013;90(8):720-44.
16. Ngo W, Situ P, Keir N, et al. Psychometric properties and validation of the Standard Patient Evaluation of Eye Dryness questionnaire. Cornea. 2013;32(9):1204-10.
17. Michel M, Sickenberger W, Pult H. The effectiveness of questionnaires in the determination of Contact Lens Induced Dry Eye. Ophthalmic Physiol Opt. 2009;29(5):479-86.
18. Simpson TL, Situ P, Jones LW, Fonn D. Dry eye symptoms assessed by four questionnaires. Optom Vis Sci. 2008;85(8):692-9.
19. Nichols KK, Nichols JJ, Mitchell GL. The lack of association between signs and symptoms in patients with dry eye disease. Cornea. 2004;23(8):762-770.
20. Young G, Chalmers R, Napier L, et al. Soft contact lens-related dryness without clinical signs. Optom Vis Sci. 2012;89(8):1125-1132.
21. Guillon M, Styles E, Guillon JP, Maissa C. Preocular tear film characteristics of nonwearers and soft contact lens wearers. Optom Vis Sci. 1997;74(5):273-279.
22. Faber E, Golding TR, Lowe R, Brennan NA. Effect of hydrogel lens wear on tear film stability. Optom Vis Sci. 1991;68(5):380-384.
23. Fonn D, Situ P, Simpson T. Hydrogel lens dehydration and subjective comfort and dryness ratings in symptomatic and asymptomatic contact lens wearers. Optom Vis Sci. 1999;76(10):700-704.
24. Santodomingo-Rubido J, Wolfsohn JS, Gilmartin B. Changes in ocular physiology, tear film characteristics, and symptomatology with 18 months silicone hydrogel contact lens wear. Optom Vis Sci. 2006(2);83:73-81.
25. Fonn D, Dumbleton K. Dyness and discomfort with silicone hydrogel contact lenses. Eye Contact Lens. 2003;29(1 Suppl):S101-S104; discussion S115-S118, S192-S194.
26. Glasson MJ, Hseuh S, Wilcox MD. Preliminary tear film measurements of tolerant and non-tolerant contact lens wearers. Clin Exp Optom. 1999(5);82:177-181.
27. Hom MM. Bruce AS. Prelens tear stability: relationship to symptoms of dryness. Optometry 2009;80(4):181-184.
28. Glasson MJ, Stapleton F, Keay L, et al. Differences in clinical parameters and tear film of tolerant and intolerant contact lens wearers. Invest Ophthalmol Vis Sci. 2003;44(12):5117-24.
29. Nichols JJ, Sinnott LT. Tear film contact lens, and patient-related factors associated with contact lens-related dry eye. Invest Ophthalmol Vis Sci. 2006;47(4):1319-28.
30. Finis D, Pischel N, Borrelli M, Schrader S, Geerling G. Factors influencing the measurement of tear film lipid layer thickness with interferometry. Klin Monbl Augenheilkd. 2014 Jun;231(6):603-10.
31. Huang J, Yuan Q, Zhang B, et al. Measurement of a multi-layered tear film phantom using optical coherence tomography and statistical decision theory. Biomed Opt Express. 2014;24;5(12):4374-86.
32. Lan, W, Lin, L, Yang, et al. Automatic Noninvasive Tear Breakup Time (TBUT) and Conventional Fluorescent TBUT. Optom Vis Sci. 2014;91(12):1412-1418.
33. Finis D, Pischel N, Schrader S, Geerling G. Evaluation of lipid layer thickness measurement of the tear film as a diagnostic tool for Meibomian gland dysfunction. Cornea. 2013 Dec;32(12):1549-53.

34. Keir N, Jones L. Wettability and silicone hydrogel lenses: a review. Eye Contact Lens. 2013;39(1):100-8.
35. Korb DR, Henriquez AS. Meibomian gland dysfunction and contact lens intolerance. J Am Optom Assoc. 198;51(3):243-51.
36. Henriquez AS, Korb DR. Meibomian glands and contact lens wear. Br J Ophthalmol. 1981;65(2):108-111.
37. Arita R, Itoh K, Inoue K, et al. Contact lens wear is associated with decrease of meibomian glands. Ophthalmology. 2009;116(3):379-84.
38. Paugh JJ, Knapp LL, Martinson JR, et al. Meibomian therapy in problematic contact lens wear. Optom Vis Sci. 2009;116(11):379-84.
39. Nichols JJ, Sinnott LT. Tear film, contact lens, and patient-related factors associated with contact lens–related dry eye. Invest Ophthalmol Vis Sci 2006;46(4):1319-28.
40. Korb DR, Blackie CA. Meibomian gland diagnostic expressibility: correlation with dry eye symptoms and gland location. Cornea. 2008;28(10):1142-47.
41. Pult H. Meibography in clinical practice. Ophthalmology Times 2012; (6) Available at: http://ophthalmologytimes.modernmedicine.com/news/meibography-clinical-practice?page=full . (Last accessed 5/7/2015).
42. Brautaset RL, Nilsson M, Leac N, et al. Corneal and conjunctival epithelial staining in hydrogel contact lens wearers. Eye Contact Lens 2008;34(6):312-16.
43. Maldonado-Codina C, Morgan PB, Schnider CM, Efron N. Short-term physiologic response in neophyte subjects fitted with hydrogel and silicone hydrogel contact lenses. Optom Vis Sci. 2004;81(12):911–21.
44. Lakkis C, Brennan NA. Bulbar conjunctival fluorescein staining in hydrogel contact lens wearers. CLAO J. 1996;22(3):189–94.
45. Morgan PB, Chamberlain P, Moody K, Maldonado-Codina C. Ocular physiology and comfort in neophyte subjects fitted with daily disposable silicone hydrogel contact lenses. Cont Lens Anterior Eye. 2013;36(3):118–25.
46. Guillon M, Maissa C. Bulbar conjunctival staining in contact lens wearers and non lens wearers and its association with symptomatology. Cont Lens Anterior Eye. 2005;28(2):67–73.
47. Wolffsohn JS, Naroo SA, Christie C, et al. Anterior eye health recording. Cont Lens Anterior Eye. 2015 Mar 23. pii: S1367-0484(15)00039-9.[Epub ahead of print]
48. Korb DR, Greiner JV, Herman JP, et al. Lid-wiper epitheliopathy and dry-eye symptoms in contact lens wearers. CLAO J. 2002;28(4):211-6.
49. Yeniad B, Beginoglu M, Bilgin LK. Lid-wiper epitheliopathy in contact lens users and patients with dry eye. Eye Contact Lens. 2010;36(3):140-3.
50. Pult H, Purslow C, Berry M, Murphy PJ. Clinical tests for successful contact lens wear: relationship and predictive potential. Optom Vis Sci. 2008;85(10):E924-E929.
51. Dumbleton K, Woods C, Jones L, Richter D, Fonn D. Comfort and vision with silicone hydrogel lenses: effect of compliance. Optom Vis Sci. 2010 Jun;87(6):421-5.
52. Lazon de la Jara P, Papas E, Diec J, et al. Effect of lens care systems on the clinical performance of a contact lens. Optom Vis Sci. 2013 Apr;90(4):344-50.
53. Ramamoorthy P, Nichols JJ. Compliance factors associated with contact lens-related dry eye. Eye Contact Lens. 2014 Jan;40(1):17-22.
54. Aakre BM, Ystenaes AE, Doughty MJ, et al. 6-month follow-up of successful refits from daily disposable soft contact lenses to continuous wear of high-Dk silicone-hydrogel lenses. Ophthalmic Physiol Opt. 2004;24(2):130–41.
55. Chalmers R, Long B, Dillehay S, Begley C. Improving contact lens related dryness symptoms with silicone hydrogel lenses.Optom Vis Sci. 2008;85(8):778–84.
56. Chalmers R, Dillehay S, Long B, et al. Impact of previous extended and daily wear schedules on signs and symptoms with high Dk lotrafilcon A lenses. Optom Vis Sci. 2005;82(6):549–554.
57. Schafer J, Mitchell GL, Chalmers RL, et al. The stability of dryness symptoms after refitting with silicone hydrogel contact lenses over 3 years. Eye Contact Lens. 2007;33(5):247–252.
58. Fonn D, Dumbleton K. Dryness and discomfort with silicone hydrogel contact lenses. Eye Contact Lens. 2003;29 (1 Suppl):S101–S104.
59. Young G, Veys J, Pritchard N, Coleman S. A multi-centre study of lapsed contact lens wearers. Ophthalmic Physiol Opt. 2002;22(6):516–527.
60. Diec J, Papas EB, Naduvilath T, et al. Subjective comfort and adverse events during daily contact lens wear. Optom Vis Sci. 2013;90(7):674–81.
61. Tilia D, Lazon de la Jara P, Peng N, et al. Effect of lens and solution choice on the comfort of contact lens wearers. Optom Vis Sci. 2013;90(5):411–8.
62. Luchs JI, Nelinson DS, Macy JI, Group LACS. Efficacy of hydroxypropyl cellulose ophthalmic inserts (LACRISERT) in subsets of patients with dry eye syndrome: findings from a patient registry. Cornea. 2010;29(12):1417–27.
63. McDonald M, D'Aversa G, Perry HD, et al. Hydroxypropyl cellulose ophthalmic inserts (lacrisert) reduce the signs and symptoms of dry eye syndrome and improve patient quality of life. Trans Am Ophthalmol Soc. 2009;107(12):214–21.
64. Kokke KH, Morris JA, Lawrenson JG. Oral omega-6 essential fatty acid treatment in contact lens associated dry eye. Cont Lens Anterior Eye. 2008;31(3):141–6.
65. Nichols JJ, Bickle KM, Zink RC, et al. Safety and efficacy of topical azithromycin ophthalmic solution 1.0% in the treatment of contact lens-related dry eye. Eye Contact Lens. 2012 Mar;38(2):73-9.
66. Egorova GB, Mitichkina TS, Fedorov AA, Shamsudinova AR. Topical cyclosporine for the treatment of ocular surface changes in contact lens wearers. Vestn Oftalmol. 2015 Jan-Feb;131(1):36-42.
67. Hom MM. Use of cyclosporine 0.05% ophthalmic emulsion for contact lens-intolerant patients. Eye Contact Lens. 2006;32(2):109–11.
68. Willen CM, McGwin G, Liu B, et al. Efficacy of cyclosporine 0.05% ophthalmic emulsion in contact lens wearers with dry eyes. Eye Contact Lens. 2008;34(1):43–5.

PEER • REVIEWED • PRA • ARTICLE

Real-World Factors That Affect Contact Lens Success

Our patients are suffering from reduced comfort, but they don't have to. Teach them how small lifestyle changes can produce big results.

By Leslie O'Dell, OD

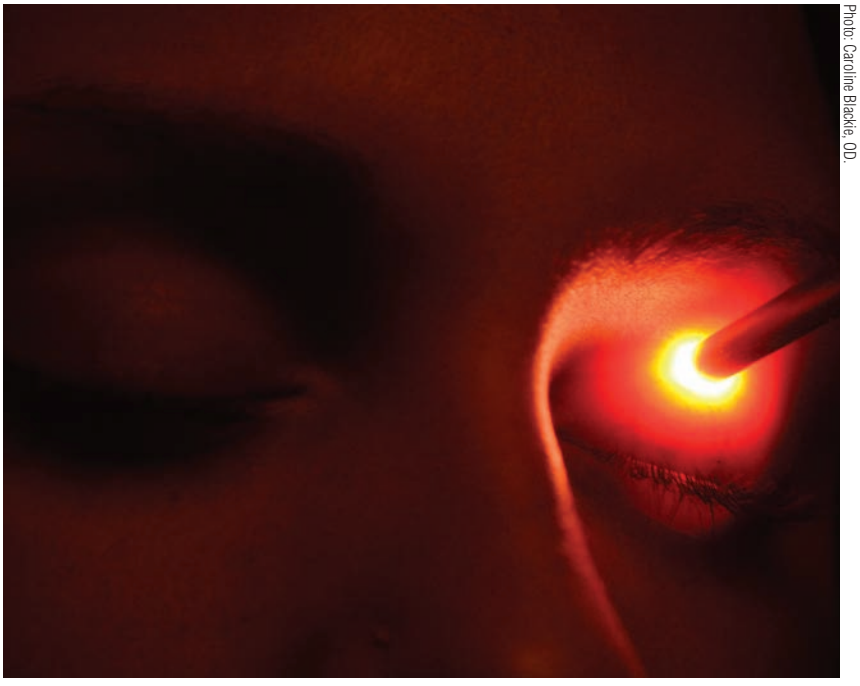


Photo: Caroline Blackie, OD

Using the Korb-Blackie light test, the examiner places the transilluminator at the lid crease and then evaluates the lash margin, looking for light to spill out, indicating inadequate lid closure.

Maintaining a patient's contact lens comfort and lens wear success often comes down to one invaluable element: patient education. Imparting the knowledge a patient needs to ensure proper contact lens replacement and care is integral to maintaining comfort. However, it's not always easy to cover all the contingencies in the initial patient encounter, and practitioners must be careful not to take anything for granted. For instance, a contact lens patient recently presented to my office with an emergency exam for bilateral chemical burns from using a store-bought eyeglass cleaner to store her contacts overnight.

39th Annual Contact Lens Report

Patients, especially those new to contact lenses, require repeated step-by-step instructions to retain the basics of contact lens care and develop an understanding of how real-world factors such as routine care, allergies, injuries and even their occupations can impact contact lens comfort. Discomfort should not be an acceptable reason for contact lens dropout—it is an eminently correctable problem when it does occur, and careful attention to patient education, particularly at the initial encounter, can help avoid it in the first place. This article focuses on patient education for contact lens wearers, and how doctors and patients alike can maintain an awareness of potential causes for discomfort before complaints arise.

Post-op relief is affordable for your patients[1-3]

DON'T LET POSTOPERATIVE INFLAMMATION AND PAIN LEAVE A BAD IMPRESSION

3x more cataract patients achieved zero inflammation on postoperative Days 8 and 15 vs placebo
- 22%* vs 7% on Day 8; 41%* vs 11% on Day 15[1]

Nearly 2x as many cataract patients achieved zero pain on postoperative Days 8 and 15 vs placebo
- 58%* vs 27% on Day 8; 63%* vs 35% on Day 15[1]

WHEN TREATING ENDOGENOUS ANTERIOR UVEITIS, DUREZOL® EMULSION WAS NONINFERIOR TO PRED FORTE^ (DUREZOL® EMULSION 4X DAILY VS PRED FORTE^ 8X DAILY)[1]

- **BETTER** or comparable formulary coverage vs generic prednisolone acetate on some Medicare Part D plans[4-7]
- **NO** therapeutic equivalent to DUREZOL® Emulsion

*Pooled data from placebo-controlled trials in patients undergoing cataract surgery; $P<0.01$ vs placebo.
^Trademark is the property of its owner.

CORTICOSTEROID COVERAGE IS NOT THE SAME

LEARN MORE ABOUT DUREZOL® EMULSION FORMULARY ACCESS IN YOUR AREA AT MYALCON.COM/FORMULARY

INDICATIONS AND USAGE:

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

Dosage and Administration

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

IMPORTANT SAFETY INFORMATION

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

Warnings and Precautions

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

Most Common Adverse Reactions

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

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

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

References: 1. DUREZOL (difluprednate ophthalmic emulsion) [package insert]. Fort Worth, TX: Alcon Laboratories, Inc; Revised May 2013. **2.** Korenfeld MS, Silverstein SM, Cooke DL, Vogel R, Crockett RS; Difluprednate Ophthalmic Emulsion 0.05% (Durezol) Study Group. Difluprednate ophthalmic emulsion 0.05% for postoperative inflammation and pain. *J Cataract Refract Surg.* 2009;35(1):26-34. **3.** Fingertip Formulary, November 2014 (estimate derived from information used under license from Fingertip Formulary, LLC, which expressly reserves all rights, including rights of copying, distribution and republication). **4.** WellCare. Medication Guide: 2014 WellCare Classic. WellCare website. https://www.wellcarepdp.com/medication_guide/default. Accessed November 14, 2014. **5.** WellCare. Medication Guide: 2015 WellCare Classic and Simple. WellCare website. https://www.wellcarepdp.com/medication_guide/default. Accessed November 14, 2014. **6.** Humana. Drug guides for Medicare plans 2014. Humana website. https://www.humana.com/medicare/products-and-services/pharmacy/rx-tools/medicare-drug-list/2014-print. Updated October 30, 2014. Accessed November 14, 2014. **7.** Humana. Drug guides for Medicare plans 2015. https://www.humana.com/medicare/products-and-services/pharmacy/rx-tools/medicare-drug-list/2015-print. Updated September 5, 2014. Accessed November 14, 2014.

Alcon®
a Novartis company

DUREZOL®
(difluprednate ophthalmic emulsion) 0.05%

DUREZOL®
(difluprednate ophthalmic emulsion) 0.05%

BRIEF SUMMARY OF PRESCRIBING INFORMATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Pediatric Use
Safety and effectiveness in pediatric patients have not been established.

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

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

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

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

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

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

Revised: June 2012
U.S. Patent 6,114,319

Manufactured For
Alcon®
Alcon Laboratories, Inc.
6201 South Freeway
Fort Worth, Texas 76134 USA
1-800-757-9195
MedInfo@AlconLabs.com
Manufactured By:
Catalent Pharma Solutions
Woodstock, IL 60098

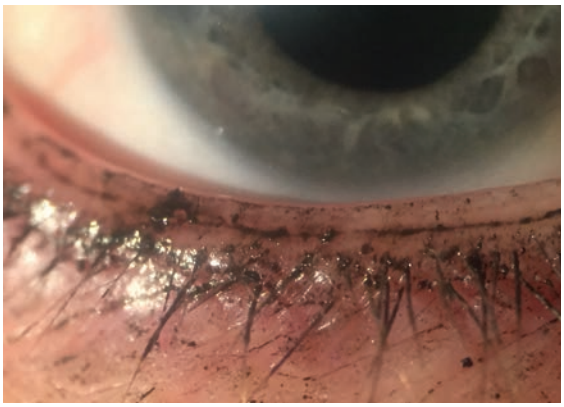
Pre-fitting Evaluation

Ocular surface symptoms, namely dryness and discomfort, are the leading causes of contact lens drop out for both soft and rigid lenses.[1] Contact lens patients are 50% more likely to experience these symptoms than those who do not wear contacts.[2] You may be able to prevent this discomfort before it starts by first evaluating the ocular surface health of all your patients before fitting them with contact lenses.

Investigators estimate that 10% of patients will discontinue contact lens wear.[3,4] Developing a protocol for evaluating all contact lens patients, new and long-time wearers alike, is the first step to reducing these rates. This protocol should include:

- A dry eye questionnaire, such as the SPEED or OSDI—both validated questionnaires. These can help identify patients with ocular discomfort before initiating contact lens wear.
- Obtaining a comprehensive history, including daily wear time, digital device use, cleaning habits, lens replacement schedule and hobbies—even occupation and social history. These are important factors to consider for long-term lens comfort.
- A clinical evaluation, including vital dye staining to test for lid wiper epitheliopathy (LWE) as well as corneal/conjunctival staining indicative of dry eye disease.
- An osmolaritiy test.
- Testing for matrix metalloproteinase 9.
- Lid and meibomian gland evaluation.
- Lash evaluation.

These tests are designed to help identify common causes for dry eye, non-obvious meibomian gland dysfunction (MGD), *Demodex* infestation, blepharitis, lid wiper epilethiopathy (LWE) and lid-parallel conjunctival folds, as well as aqueous deficient dry eye.



Patients often apply make-up directly to the meibomian gland orifices. However, even when applied properly, make-up debris can migrate to the lid, conjunctiva and even deposit on contact lenses, ultimately leading to discomfort.

To institute this protocol start by educating your staff about risks associated with contact lenses and the need to treat any pre-existing ocular conditions before dispensing the lenses.

Also, be sure to update the protocol, as investigators learn more regarding knowledge of the underlying causes of contact lens discomfort.

Likely Discomfort Causes

Research shows contact lens patients have a higher incidence of dryness and end-of-day irritation than non-contact-lens-wearing patients.[5] These complaints may or may not be part of a prior dry eye condition. For patients who did not experience any pre-existing symptoms or display any signs of dry eye prior to fitting, we must search for other causes. In some cases, contact lens materials or cleaning solutions may play a role.[6]

To determine the cause of this discomfort, develop a treatment plan and decrease our rate of contact lens discontinuation, doctors must put on their sleuthing hats. Start by listening to patients' complaints, with an acute awareness of dry eye triggers.

Therapeutic Factors

The history for a contact lens patient should include a comprehensive list of medications. Many medications can cause ocular surface dryness. The prime culprits include antihistamines, blood pressure medications, oral contraceptives, antidepressants and cholesterol-lowering medications.[7-9]

Non-prescribing physicians should not discontinue medications; however, alternative choices are often available with a lower risk of ocular side effects from dryness. Keeping the line of communication open between the primary care providers, OB-GYN, allergists and immunologists, rheumatologists and cardiologists can create a more comprehensive treatment approach.

Lifestyle

In addition to a dry eye questionnaire, it is also helpful to add a few key questions before your exam. Questions may include: 'How do your eyes feel upon awakening?' or 'Do you have fluctuations in your vision throughout the day, with reading for any length of time or when using a computer?' A patient with complaints upon waking in the morning should be evaluated for inadequate lid seal, corneal conditions such as recurrent corneal erosions and even *Demodex* blepharitis. Fluctuations in vision

Ask the Right Questions

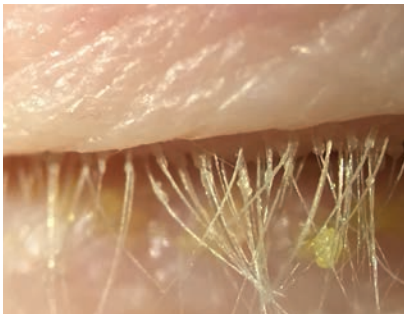
The social history for any contact lens candidate should include queries about alcohol consumption and smoking, as both are associated with lens discomfort. Other important social questions include:

- What is the patient's occupation?
- What do they do for recreation and in their free time?
- Do they suffer from seasonal allergies?
- Have they been formally tested for allergies?

throughout the day is a common symptoms for underlying ocular surface dryness.

Asking patients about their hobbies can clue you in to the potential for environmental hazards that can lead to CL discontinuation. Take a soccer mom for example: exposure to wind and dust while watching kids' sporting events can dry out lenses and lead to foreign body sensation. Many of our patients are active in exercise, biking, running and swimming. Exposure to sand, sweat, water and suntan lotion can also complicate contact lens routines. Riding in a car with either the heat or air conditioning on, or even with the windows down, can also cause discomfort due to evaporative stress to the ocular surface and tear film.

We are also a nation obsessed with appearance and youthful skin. Ask patients what, if any, skin creams they are applying around the eye. Retinol has been found to damage meibomian glands leading to dry eye symptoms.[10] This is present in many OTC and high-end face and eye creams. Eye make-up is another area of concern. Mascara, eyeliners and eye shadows are commonly applied to the lid and sometimes even to the meibomian gland orifices. These contain pigments and talcs that can block the glands and irritate the ocular surface, not to mention deposit on the contact lenses themselves.



Cylindrical debris around lashes, as seen here, is a hallmark of *Demodex* blepharitis.

Eyelash growth products like Latisse, eyelash extensions and false eyelashes give the appearance of extended lashes. However, these products also can lead to ocular surface discomfort and possibly contact lens discontinuation.

Occupational Hazards

One issue to consider when evaluating patients with contact lens discomfort is the patient's job. Some occupations, like those that predispose one to reduced or incomplete blinking, are notorious for the negative impact they can have on contact lens comfort. Spending hours using a computer increases the risk for end-of-day dryness. And one group of professionals you might overlook are staring at you each morning in the mirror and the office—health care workers.

Doctors in most any setting, ranging from routine care to surgical, are a group at risk for MGD. The more concentrated someone is on a task, the less likely they are to blink, resulting in evaporative stress to the ocular surface.[11] Advise patients to take breaks from screen time and follow the "20/20 rule"; that is, for every 20 minutes of computer use, take a 20-second break. Also, start introducing the idea of blink exercises for patients who spend a lot of time in front of computers and have impartial blinks. Instruct the patient to take 10 consecutive, thoughtful blinks, holding each for two seconds.

Air quality also has an impact on comfort. Pilots and flight attendants work in low humidity environments. Construction workers and military personnel are often exposed to large amounts of dust and dirt from their environments.

Another group of patients that might have higher risk of contact lens discontinuation is first responders (e.g., firefighters, EMTs, military personnel and police). These professionals may have to spring into action and feel they cannot be bothered to remove and insert contact lenses. In my practice, I've seen these patients sleep in their lenses frequently for the convenience of being able to see immediately when they awake.

Allergies

Recurring discomfort problems for contact lens wearers can stem from allergies and increased pollen counts.

In my experience, patients blame much of their contact lens discomfort on allergies. But, a proper diagnosis requires more than a patient's intuition.

Ruling allergies in or out can be a tremendous help in patient education and also determining a proper course of treatment. Fortunately, we now have in-office allergy tests (e.g., DoctoRx, new IgE tear analyses, TearScan) that can play a role.

Systemic Disease

Ask contact lens patients, "Do you struggle with dry mouth?" If a patient suffers from both dry eye and dry mouth symptoms, you may

Coding Connection

By John Rumpakis, OD, MBA, Clinical Coding Editor

When Contact Lens Patients Become Medical Patients

Coding visits for end-of-day contact lens discomfort is easier than you think—just follow medical practice guidelines.

Let's see if this sounds familiar: A contact lens patient presents with end-of-day discomfort, a fairly common complaint. Generally, the practitioner first changes the type of contact lens or the modality of lens wear, then perhaps the contact lens care solution. Sometimes this approach resolves the symptoms, but rarely does it solve the problem.

Perhaps it's a philosophical situation—patients' contact lenses are not bothering them; their eyes are bothering them and they happen to be contact lens wearers. To me, these would generally be straightforward medical eye encounters. A patient's primary reason for a visit of this nature would be pain, hyperemia, discomfort, etc. The fact that they wear contact lenses does not change the medical nature of the encounter.

Coding End-of-Day Discomfort

To make the situation worse, practitioners often think of these encounters as refractive in nature because of the patients' initial coverage when the lenses were fit. Consequently, they code in refractive terms, rather than performing an appropriate structural evaluation of the ocular surface and coding the appropriate level of office visit commensurate with the patient's chief complaint—for which the medical carrier is generally responsible.

These visits should be coded for a medical office visit using either the 920XX or 992XX codes (the most appropriate codes based on what was recorded in the medical record and which met the code definition) and billed directly to the medical carrier in accordance with the rules of the patient's medical plan. That means that you will be collecting a copay or the patient will pay out of pocket in order to meet the deductible.

Managing the Medical Visit

Regardless of who is the responsible party financially, this visit is generally a legitimate medical encounter. More importantly, you are evaluating the functional patency of the eye and ocular surface prior to determining the refractive solution for the patient. If the patient's ocular surface is compromised in any way, simply changing the contact lens or the contact lens solution may only be putting a patch on the situation, not truly addressing the problem.

Testing critical components of the eye may be necessary. Perhaps you need to conduct some clinical lab tests such as TearLab (TearLab) or InflammaDry (RPS). But remember, you can perform these tests only if you have your office approved as a Clinical Lab, and an office physician is designated as a Clinical Lab Director. Perhaps you may need to perform meibography, or even prescribe your favorite therapy for lid margin disease.

Far too often, we take the path of least resistance rather than performing the clinically relevant testing and evaluation that the patient requires to truly determine the right diagnosis and treatment algorithm. Contact lens patients represent roughly 34% of a practice's total patient base. With the specificity of the upcoming ICD-10 system, it's more important than ever to properly diagnose your patient and document it appropriately. You will benefit from the consistent and correct application of medical eye care guidelines—not to mention a better profit margin.

Send questions and comments to ROcodingconnection@gmail.com.

1. Rumpakis J. New Data on Contact Lens Dropouts: An International Perspective. Rev Optom. 2010 Jan;147(1):37-42.

consider advising them to explore the potential influence of underlying autoimmune diseases, such as Sjögren's syndrome or rheumatoid arthritis, as a possible cause for this combination of symptoms.

Treatments

Once the root cause of contact lens discomfort is identified, the next step is to develop a treatment plan that will help keep the patient satisfied with the prescribed lenses.

Maintaining Comfort

Treat the underlying condition(s) whenever possible. If aqueous deficient dry eye is present, Restasis is a often great option to maintain comfort in a lens. Remember that clini-

cal improvement may be delayed (taking up to six months in some patients) and initial burning is an acceptable side of effect of treatment. Restasis should be used 10 minutes prior to lens insertion and again after the lens is removed at the end of the day. When MGD is present, treat it aggressively. Controlling any underlying dry eye will help improve comfort.

Lens material, cleaning solutions and replacement schedules are modifiable and easy ways to improve patient comfort. Increasing replacement frequency improves the comfort of the lens. There are many daily lens options available with a wide variety of parameters to assure good comfort and good vision for patients. Preservative-free peroxide-based cleaning systems also improve comfort of the lens when dailies are not an option. This simple change to a daily routine can increase wear time and comfort with little effort on either the patient or doctor's part.

Ask patients how they are washing their hands with before lens insertion. Patients who describe a strong urge to remove lenses at the end of the day and who gain little relief from rewetting drops should be counseled on the type of solution they are using as well as the type of soap to use when handling lenses. Glycerin soaps can be used to help prevent chemical build-up on the lens during instillation. Removing the lenses mid-day to soak and rehydrate in their case, as well as using artificial tears compatible with contact lenses, are also good management methods.

Talk to your patients about their make-up use and removal habits. I recommend avoidance of any waterproof mascara or liners, as they often contain pigments that make them more difficult to remove. Replacing eye make-up on the recommended three-month cycle will also help decrease the risk for bacterial overgrowth. Coconut oil can be used to remove make-up without the exposure to harsh chemicals.

Gadgets Galore

New technology is making it easier than ever to identify dry eye patients. Tear osmolarity testing (TearLab) as well as a quick evaluation for inflammatory mediators (InflammaDry) can add diagnostic specificity to your exam. Measure the tear meniscus and tear break-up time (TBUT). The normal tear meniscus height is 0.34mm above the lower lid margin.[1] TBUT is important at baseline evaluation, as soft contact lenses will dehydrate on most eyes with extended wear. This should be done using only a small quantity of fluorescein dye; the dry eye test strips are ideal. When applying, it is recommended to have the patient look down and inward, placing the strip on the superior-temporal bulbar conjunctiva. Using the slit lamp, have the patient blink a couple of times followed by a blink and hold, until the dye is breaking up on the ocular surface.

1. Bartlett JD, Jannus SD. Clinical Ocular Pharmacology. 5th ed. St. Louis: Butterworth Heinemann; 2008:415-35.

Listening Can Build a Practice

Take the extra time with your patients to discuss the exam findings and the importance of compliance to your treatment plan. Educate all new contact lens patients—and, in the case of juveniles, their parents—about lens discomfort. Let them know that once discomfort begins, it's time to call the office. The earlier we intervene, the better the end result. Educate patients about end-of-day dryness and recommend ways to keep ahead of this to retain contact lens wear late in the day.

Take the time to listen and work with patients to solve their discomfort issues. Not only will it aid you in creating customized solutions that will make a huge difference in their day-to-day life, it will help you develop a strong bond with your patient and give them a reason to refer their friends.

Ensuring comfortable contact lens wear has no "one-size-fits-all" approach. We must offer curated care that takes into consideration how individual patients behave in the real world. Collecting a variety of information during your encounter with the patient, from critical testing to anecdotal interactions, will help you develop a tailored education and treatment plan that will allow patients to remain comfortable long-term in their lenses. ■

Dr. O'Dell is an optometrist at the May Eye Care Center & Associates in Pennsylvania, and a member of the Pennsylvania Optometric Association and the American Optometric Association.

1. Richdale K, Sinnott LT, Skadahl E, Nichols JJ. Frequency of and factors associated with contact lens dissatisfaction and discontinuation. Cornea 2007;26:168-74.
2. Chalmers RL, Begley CG. Dryness symptoms among an unselected clinical population with and without contact lens wear. Cont Lens Anterior Eye 2006;29:25-30.
3. Dumbleton K, Woods CA, Jones LW, Fonn D. The impact of contemporary contact lenses on contact lens discontinuation. Eye Contact Lens. 2013 Jan;39:93-99.
4. Pritchard N, Fonn D, Brazeau D. Discontinuation of contact lens wear: a survey. Int Contact Lens Clin. 1999 Nov;26(6):157-62.
5. Begley CG, Chalmers RL, Mitchell GL, et al. Characterization of ocular surface symptoms from optometric practices in North America. Cornea. 2001 Aug;20:610-8.
6. Young G, Chalmers R, Napier L, et al. Soft contact lens-related dryness with and without clinical signs. Optom Vis Sci. 2012 Aug;89:1125-32.
7. Bartlett JD. Ophthalmic toxicity by systemic drugs. In: GCY Chiou, ed. Ophthalmic Toxicology. 2nd ed. Michigan: Taylor and Francis, 1999:225-83.
8. Jaanus SD. Ocular side effects of selected systemic drugs. Optom Clin. 1992;2(4):73-96.
9. Jaanus SD, Bartlett JD, Hiett, JA. Ocular effects of systemic drugs. In: Bartlett JD & Jaanus SD (eds.). Clinical Ocular Pharmacology, 3rd ed. Boston: Butterworth-Heinemann, 1995:957- 1006.
10. Ding J, Kam W, Dieckow J, Sullivan D. The Influence of 13-cis Retinoic Acid on Human Meibomian Gland Epitheilial Cells. Invest Ophthalmol Vis Sci. 2013 Jun;54:4341–50.
11. Portello JK, Rosenfield M, Chu CA. Blink rate, incomplete blinks and computer vision syndrome. Optom Vis Sci. 2013 May;90(5):482-7.

On the UP and UP: Growing the Contact Lens Practice

Preventing contact lens dropout is only half the battle.

By Mile Brujic, OD, and Jason Miller, OD

Contact lenses are a significant part of the average optometric practice, comprising an estimated one-third of profits.[1] Yet, with an increasing number of patients moving to contact lens wear, the potential for dissatisfaction—and patient dropout and loss of revenue—is of greater concern than ever. On average, one-fourth of contact lens patients cease wearing lenses, with the primary reasons being discomfort and dryness.[2]

Looking to the Past

In the last few years, we have seen the introduction of game-changing technologies that have challenged the way we think about contact lens comfort and the way we correct our patients' vision needs. In our *Review of Cornea & Contact Lenses* column, Derail Dropouts, we have examined the ways in which we can reduce contact lens dropouts since we began the column in 2008. While not a comprehensive list, some of the major topics discussed include:

• ***Improve Care Compliance.*** Patient non-compliance with contact lens care is a significant, ongoing concern. Rates of non-compliance—which is defined as failure to adhere to lens replacement schedules; inadequate lens cleaning and storage practices; and exposure to water or other liquids that may harbor bacteria—historically range from 40% to 91%.[3] Failure to comply can lead to severe complications, including corneal ulcers and sight-threatening bacterial or fungal infections.

39th Annual Contact Lens Report

So, how do you determine what your patients are doing to care for their lenses? The answer is fairly simple: ask them to bring their contact lens cases, solutions and any other care products, as well as any drops they may be using, into the office. Seeing them firsthand gives you the opportunity to educate patients on proper lens care, if needed, and intervene with appropriate clinical solutions if necessary. Interventions might include refitting them into a daily disposable lens to alleviate risk of infection from mishandling, or suggesting an alternate solution that may better interact with the lens material.

• ***Consider the Modality.*** From daily disposable contact lenses to two-week, one-month and

100% PRESERVATIVE-FREE

ZIOPTAN®
(tafluprost ophthalmic solution) 0.0015%

Cosopt® PF
(dorzolamide HCl - timolol maleate ophthalmic solution) 2% / 0.5%

Learn more at zioptan.com and cosoptpf.com

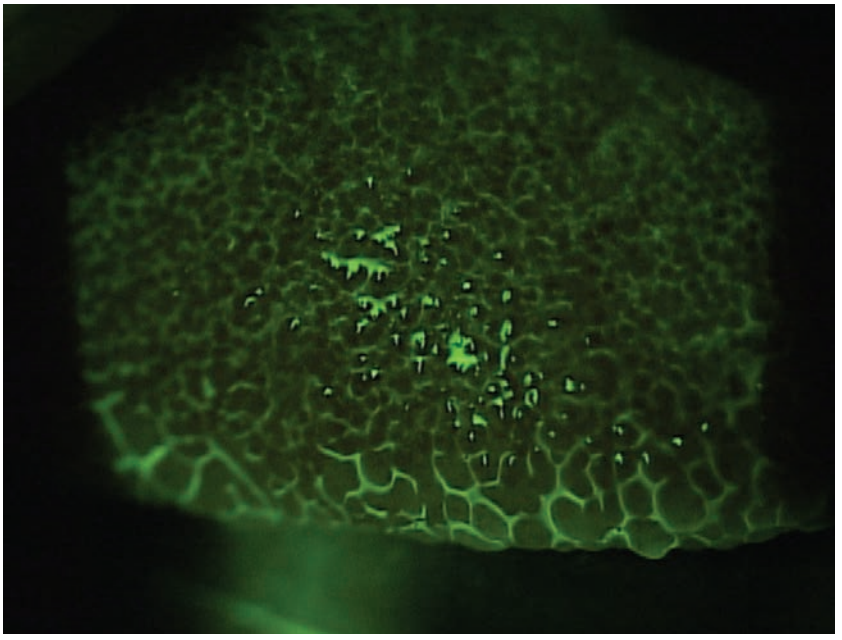
the quarterly or yearly replacement schedules, today's contact lens wearers have many options when choosing a lens modality. Ultimately, however, eye care practitioners are responsible for guiding the selection of a proper contact lens modality, material and solution combination to ensure lens wear success. For patients who are successful extended wearers, high oxygen permeable materials are a good choice, as they ease oxygen transmission to maintain ocular surface health. Those who have difficulty complying with lens care regimens, however, may benefit from daily disposable lenses.

• ***Identify Silent Sufferers.*** Many contact lens wearers will not tell you about their contact lens discomfort. Searching for objectivity in their subjective responses to a series of questions can help expose a significant decline in comfort that might occur throughout the day.

Ask patients to rate their comfort on a scale from zero to 10 approximately five to 10 minutes after the lenses have settled on their eyes in the morning, with zero being the least comfortable and 10 being the most comfortable. Also, ask them to rank the comfort of their lenses at the end of the day, about five to 10 minutes prior to removing the lenses in the evening. If there is a drop in this number, it is up to you to determine why.

The reasons are usually multiple, and can include poor compliance with care and replacement regimens, leading to increased deposits on the lens, which decreases comfort. Certain ocular surface conditions also have a significant effect on comfort.

• ***Discuss Ocular Allergies.*** Eyes experience significant differences in the type of allergic responses. Vernal keratoconjunctivitis and atopic keratoconjunctivitis are often relatively easy to identify, as these presentations typically include itching, photophobia, burning and tearing.



Don't overlook the eyelids. They can be the root cause of contact lens discomfort.

The first and most important step to managing lens dropout due to allergies is identifying those who have seasonal allergies and asking them the right questions. Patients typically experience intermittent, rather than constant, discomfort throughout the year, so be sure to evaluate patients several times annually.

Possible solutions include medical management, switching to a more frequent replacement schedule or peroxide cleaning and disinfecting systems.

• ***Don't Ignore Dry Eye.*** We have looked at this common disease in great detail throughout the years. Contact lenses introduce a specific challenge to the ocular surface, as its health must remain balanced against the interaction of the contact lens and the eye. A healthy tear film provides consistent, comfortable vision for individuals who are not contact lens wearers, as the interaction between the eyelids and the tear film is appropriately balanced in healthy individuals.

Even if the quality of the tear film is compromised, the ocular surface may still be able to provide a symptom-free experience for the individual. Introducing a contact lens to a compromised tear film, however, may lead to dry eye symptoms in individuals who might otherwise have virtually no symptoms, or exacerbate preexisting symptoms.

The eyelids are often overlooked as a potential source of contact lens discomfort. Many eye care providers are relatively quick to change the type of contact lens when a patient complains of discomfort, but this may not treat the underlying cause of the problem. By addressing the issues that may compromise the health of the ocular surface, however, you can increase your chances of improving comfort in lens wearers. Ensuring healthy meibomian gland physiology is

For patients who wear their lenses intensely* and put a priority on the long-term health of their eyes

1-DAY ACUVUE® TruEye®
BRAND CONTACT LENSES

- Embedded PVP mimics the mucin on both the cornea and eyelid, minimizing lens-eye interaction to make 1-DAY ACUVUE® TruEye® Brand Contact Lenses **nearly invisible** to the eye itself
- Clinically shown to be comparable to the natural eye on comfort and 5 of 6 measures of ocular health after 365 days of daily wear‡[1]
- Highest level of UV blocking†§ available in a contact lens

PVP=polyvinylpyrrolidone.

*Intense wear=Patients who wear lenses ≥14 hours a day, ≥5 days a week.

‡Comparable to no lens wear on comfort and 5 out of 6 measures of ocular health (limbal hyperemia, corneal vascularization, corneal staining, bulbar conjunctival hyperemia, and papillary conjunctivitis. The sixth measure was conjunctival staining.)

ACUVUE® Brand Contact Lenses are indicated for vision correction. As with any contact lens, eye problems, including corneal ulcers, can develop. Some wearers may experience mild irritation, itching or discomfort. Lenses should not be prescribed if patients have any eye infection, or experience eye discomfort, excessive tearing, vision changes, redness or other eye problems. Consult the package insert for complete information. Complete information is also available by visiting acuvueprofessional.com or by calling 1-800-843-2020.

†Helps protect against transmission of harmful UV radiation to the cornea and into the eye.

§**WARNING:** UV-absorbing contact lenses are NOT substitutes for protective UV-absorbing eyewear such as UV-absorbing goggles or sunglasses, because they do not completely cover the eye and surrounding area. You should continue to use UV-absorbing eyewear as directed. **NOTE:** Long-term exposure to UV radiation is one of the risk factors associated with cataracts. Exposure is based on a number of factors such as environmental conditions (altitude, geography, cloud cover) and personal factors (extent and nature of outdoor activities). UV-blocking contact lenses help provide protection against harmful UV radiation. However, clinical studies have not been done to demonstrate that wearing UV-blocking contact lenses reduces the risk of developing cataracts or other eye disorders. Consult your eye care practitioner for more information.

Reference: 1. Morgan PB, Chamberlain P, Moody K, Maldonado-Codina C. Ocular physiology and comfort in neophyte subjects fitted with daily disposable silicone hydrogel contact lenses. *Cont Lens Anterior Eye*. 2013;36(3):118-125. Study conducted over 365 days.

 ACU-10352273-E July 2015

critical, as is addressing anterior blepharitis and maintaining the aqueous layer of the tear film.

Incorporate a well-structured examination process for contact lens wearers that includes the use of vital dyes and a systematic assessment of the ocular surface. Identify conditions, such as lid wiper epitheliopathy, that can affect healthy lens wearer, to help improve contact lens comfort.

• ***Consider Lens Characteristics.*** It is important to consider new materials and polymers that may improve contact lens comfort for patients. New materials designed for better comfort have been introduced in the last several years, including delefilcon A, samfilcon A and somofilcon A.

These designs and materials may provide additional comfort to individuals on the verge of dropping out of lens wear, especially patients whose unique visual demands are a limiting factor.

For astigmatic patients who are typically less than 2.50D, a number of disposable lens choices are readily available in diagnostic fit sets. For those whose astigmatism is greater than 2.50D, specialty soft lens designs can be custom-made through a lathing process that offers a higher level of astigmatic correction.

Traditional gas permeable (GP) lenses, including back surface toric and bitoric lenses, provide a remarkably high level of visual quality because of the high quality of the lens optics, the tear film that can be produced between the posterior surface of the lens and the cornea, and also the stability added to a lens when a toric surface is created on the posterior surface of the lens.

However, some patients may have a difficult time wearing small diameter GP lenses comfortably. For these patients, hybrid lenses can offer the visual benefits of a standard GP with the added benefit of being surrounded by a soft lens skirt to minimize lens edge awareness. Scleral lenses, while traditionally reserved for patients with irregular corneas, are another good option for those with high levels of ametropia, specifically astigmatism that has failed with more traditional technologies.

Presbyopic patients can be especially hard to fit, as they require both distance and near correction that is different and distinct in magnitude. Most of the lenses (other than a translating GP lens design) are based on simultaneous vision designs, which simply focus both the distance and near optics on the retina at the same time.

Significant advances have provided clinicians more options to fit their presbyopic patients with daily disposable multifocal contact lenses; however, with all of the advances in lens technologies, there is still a segment of the presbyopic population that cannot wear multifocal contact lenses. The reason behind this is likely multifactorial and may include decreasing pupil size with increasing age; problems adjusting to simultaneous vision; and improper optical alignment of the lens powers with a patient's line of sight.

Additionally, relevant to the topic of comfort, the increase in dry eye that begins to occur around the time of prescription development may also play a role. All of these factors become more challenging with increasing higher add powers. Although lens technologies may address some of these concerns, other technologies are still under investigation to improve these characteristics.

Moving Onward

Our *Review of Cornea & Contact Lenses* column has traditionally focused on helping you prevent patient's from dropping out of lens wear—in effect, plugging the leaky bucket and helping to maintain the wearers you do have. Beginning with the September issue, however, we will be shifting the focus of our column to one that discusses ways to increase the population of contact lens wearers in your practice. We will continue to update readers on new lens technologies, ocular surface disease treatments and other therapeutics that ease the introduction of contact lenses to new patients. Some of these new topics include:

• ***Specialty Contact Lenses.*** Patients who require medically necessary contact lenses, including those with keratoconus and post-traumatic corneas, irregular or highly astigmatism and post-refractive surgery, often require more time and energy to fit. The time involved varies with the condition, depending on the degree of corneal irregularity. However, satisfying these patients can be extremely rewarding, as they often have been unsuccessful in other modalities.

• ***Pediatric Daily Disposable Lenses.*** Because this modality offers patients the convenience of a fresh lens each time without the hassle of cleaning or a replacement schedule, children interested in part-time wear—for example, during physical activity—may represent an underserved but valuable market.

• ***Research and Innovation.*** In health care, research is critical to the growth and acceptance of new materials, treatments and protocols. Breakthroughs within the contact lens field may change your approach as an eye care practitioner, including the way you fit a

Tonometry Done Right

D-KAT Digital
Keeler quality.

Pulsair Desktop
Smallest footprint and simple to use!

Purchase a Pulsair Desktop by September 30, 2015 and get a $1,300 Instant Rebate!

Intellipuff
The standard for hand held mobility.

Buy Online!
keelerusa.com

Keeler
OPTICS

Keeler Instruments, Inc. • 456 Parkway • Broomall, PA 19008 • Tel: (800) 523-5620 • Fax: (610) 353-7814 • email: keeler@keelerusa.com

particular group of patients or how you use a specific medical device. Contact lens material innovation may improve ocular health, treat diseases and improve comfort. Also, new optical designs aim to improve visual outcomes for a variety of refractive errors, including astigmatic and presbyopic patients.

• ***Alternative Uses.*** There are some common alternative uses for contact lenses, including bandage contact lenses for the treatment of ocular surface disease. More will be developed and may become mainstream in many of our practices.

• ***Digital Device Use.*** Now more than ever, digital devices are an integral part of our daily lives. Many patients spend their workdays in front of a computer, supplemented by use of handheld devices such as smartphones or tablets throughout the day. Contact lens wear is complicated by a decreased blink rate and visual fatigue when using these devices, and it is imperative you take the time to address this clinically.

In contact lens practice, we have focus on "change management," i.e., adapting our approach to contact lens care as the patient's visual needs and ocular health change over time. Whether it's new materials, modalities or technologies, it is imperative we offer the best option for our patients' visual well-being.

We look forward to writing about these topics in our new column, Practice Progress, debuting in the September issue of *Review of Cornea & Contact Lenses*, which will focus on *growing*—not just retaining—the contact lens patient base in your clinics. ■

Dr. Brujic is a partner of Premier Vision Group in Ohio. He practices full scope optometry with an emphasis on ocular disease management of the anterior segment, contact lenses and glaucoma.

Dr. Miller is a partner in a private practice in Powell, Ohio and an adjunct faculty member for the Ohio State University College of Optometry. Dr. Miller has lectured on contact lenses, myopia, dry eye, allergic conjunctivitis and practice management.

1. Nichols Jason J. 2014 Annual Report: Contact Lenses 2014. Contact Lens Spectrum. Jan. 2015;(30):22-27.
2. Richdale K, Sinnott LT, Skadahl E, Nichols JJ. Frequency of and factors associated with contact lens dissatisfaction and discontinuation. Corena. 2007 Feb;26(2):168-74.
3. Robertson DM, Cavanagh HD. Non-compliance with contact lens wear and care practices: a comparative analysis. Optom Vis Sci. 2011 Dec; 88(12):1402-8.

WE'VE **GAINED THE CONFIDENCE** OF YOUR PEERS.

#1 Brand

DOCTORS SWITCHED PATIENTS TO, *LESS THAN A YEAR* AFTER LAUNCH[1]

Patients that were switched from ACUVUE OASYS preferred Bausch + Lomb ULTRA® 2-1 for comfort[2]

JOIN YOUR PEERS ACROSS THE COUNTRY AND START SWITCHING TODAY

REFERENCES: 1. Data on file. Bausch & Lomb Incorporated. Fit Data. Q4 2014 **2.** Results from a 22-investigator, non-masked multi-site switching study of Bausch + Lomb ULTRA® contact lenses with MoistureSeal® technology, on 327 current silicone hydrogel lens wearers. After 7 days of wear, subjects completed an online survey. Subjects rated performance across a range of attributes. Preference comparisons represent only those subjects expressing a preference. Ratio is based on the average across the silicone hydrogel lenses represented in the study.

BAUSCH + LOMB
See better. Live better.

2 CE Credits
(COPE approval pending)

Anterior Uveitis: The *Un*usual Suspects

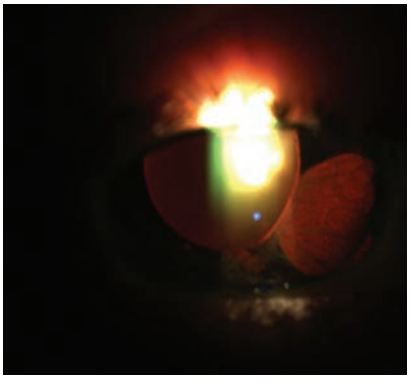
A systemic infection might be the cause of your patient's isolated anterior uveitis. Here's what to look for. **By Tammy Than, MS, OD**

A patient presenting with a red eye secondary to anterior uveitis can usually be diagnosed quickly. Photophobia, circumlimbal hyperemia and an irregular pupil often point to the diagnosis even before a thorough biomicroscopic examination. Cells, flare or both solidify the diagnosis. A dilated fundus exam is necessary to rule out posterior segment involvement but, in the absence of any findings, a patient is diagnosed with isolated anterior uveitis. The challenge is determining the etiology. An infectious cause—although not common—should always be ruled out.[1]

This article reviews some of the less common systemic infections that can cause anterior uveitis.

Uveitis Basics

Acute anterior uveitis accounts for up to 90% of inflammatory ocular disease cases in primary care settings.[2,3] Uveitis is not a single disease entity, but rather the ocular involvement of many different ocular and systemic disorders.[2] Overall, uveitis is associated with a systemic cause approximately 40% of the time, and many of those causes are associated with autoimmune conditions.[4] However, it is important to keep systemic infectious diseases on the list of possible etiologies. Treating the systemic disease is often necessary to eliminate the anterior uveitis, but it is of equal importance to manage the infection to prevent further systemic damage and, in some instances, to prevent spread to other sites. Treating the anterior uveitis may exacerbate some conditions if the systemic infection is not managed concurrently, as corticosteroids may allow the infectious organisms to continue replicating.[5-8]



Iris transillumination, often seen with herpetic diseases, can help optometrists find the etiology of the anterior uveitis.

When discussing how to approach the diagnosis of uveitis, researchers note that the label *idiopathic* for many cases of anterior uveitis is likely misleading and may prevent appropriate treatment. The preferred term for a uveitis that does not fit the known diseases is *undifferentiated*.[5]

Release Date: August 2015
Expiration Date: August 1, 2018
Goal Statement: While diagnosing anterior uveitis is usually a simple task, determining the etiology is not. An infectious cause—although not common—should always be ruled out. This article reviews some of the less common systemic infections that can cause anterior uveitis.
Faculty/Editorial Board: Tammy Than, OD

Credit Statement: COPE approval for 2 hours of CE credit is pending for this course. Check with your local state licensing board to see if this counts toward your CE requirement for relicensure.
Joint-Sponsorship Statement: This continuing education course is joint-sponsored by the Pennsylvania College of Optometry.
Disclosure Statement: Dr. Than has no relevant financial relationships to disclose.

Clinicians should keep a high level of suspicion for some of these less common systemic infections.

Infectious disease may result in two types of anterior uveitis. This article will focus on the first, which is a uveitis that has replicating organisms that result in inflammation and for which anti-infective therapy plays a role. The second form is post-infectious, during which an inflammatory reaction has been triggered by the infection. The infection itself is resolved and typically antiviral and antibacterial agents are not needed. An example of this would be the uveitis seen in reactive arthritis caused by a gastroenteritis, which comes from several organisms including *Salmonella*, or a genitourinary infection often caused by *Chlamydia trachomatis* bacteria.[5,9,10]

Other systemic infections may cause an anterior uveitis, but they are almost always accompanied by posterior segment findings; therefore, the differential diagnoses are more limited and often present with characteristic findings (e.g., histoplasmosis with the ocular triad). Also included in this category would be toxoplasmosis, toxocariasis, onchocerciasis and other parasitic diseases.[9,10]

Syphilis

Recent research has noted a significant increase in the cases of uveitis associated with both syphilis and tuberculosis.[11] Investigators in England discovered this while performing a retrospective review of all patients with uveitis who presented to the Manchester Uveitis Clinic in northwest England from 1991 to 2013. A total of 3,000 patients were seen—46% had anterior uveitis.[11]

Syphilis is an infection of *Treponema pallidum*, a gram-negative spirochete. It is primarily spread through sexual contact. Without treatment, *T. pallidum* can remain in the host for years, resulting in ongoing transmission and progressive end-organ damage.[10] The World Health Organization (WHO) estimates that there are approximately 12 million new cases of syphilis annually.[12] By the end of the twentieth century, the incidence of syphilis in the United States and Europe had dramatically decreased. Unfortunately, the number of cases in the United States has increased in the past 20 years and is up 39% since 2006.[12] The San Francisco Department of Health noted a staggering increase of 1,186% in the number of cases of primary and secondary syphilis from 1999 to 2010.[13]

Ocular Manifestations

Uveitis is the most common ocular manifestation of secondary or tertiary syphilis; it occurs in up to 5% of patients.[13] The location of the inflammation varies considerably, from anterior uveitis to chorioretinitis to panuveitis. Researchers found that 14% of patients with uveitis presented with anterior uveitis, and the majority of the cases were bilateral.[13] Other investigators reviewed 143 patients with syphilitic uveitis and found that anterior uveitis accounted for 20% of cases.[14] In another retrospective study, in which researchers examined patients at the Sydney Eye Hospital who were diagnosed with ocular syphilis, anterior uveitis was noted in 32.4% of patients.[15] Of interest was the fact that 84% of the patients did not have a previous diagnosis of systemic syphilis, and it was only after the ocular examination that laboratory testing was ordered and the systemic diagnosis was made.[15] The British Ocular Syphilis Study—a prospective epidemiological study of intraocular syphilis—found only 10% of patients manifested isolated anterior uveitis.[16] Overall, approximately 70% of patients had anterior uveitis, but they were in conjunction with posterior segment inflammation.[16]

Testing

Anterior uveitis may present as either granulomatous or nongranulomatous. Syphilis is appropriately nicknamed "the great masquerader," and uveitis secondary to syphilis varies greatly in its clinical presentation.[9,10] This etiology should be on your differential list, and you should order appropriate testing to rule it in or out with an anterior uveitis suspect.

Stages of Syphilis

Primary syphilis occurs typically three to four weeks after exposure and is characterized by a solitary, painless chancre at the site of inoculation. These lesions may be associated with lymphadenopathy, but this is also painless and may go unnoticed. The organism begins to spread systemically within a few days of the initial infection.[1,2]

Secondary syphilis typically begins two to four months after the primary lesion appears. The lesions associated with secondary syphilis are variable in their presentation. Mucocutaneous lesions may be noted, and 75% of cases affect the palms and soles of the feet.[1] Systemic findings include fever, malaise, myalgias, arthralgias and lymphadenopathy.[2]

Latent syphilis occurs once the secondary syphilis findings have resolved, but the patient has positive syphilis serology. Some may have recurrences during this period, some remain asymptomatic and a small portion develop tertiary or late syphilis.[1,2]

Tertiary syphilis develops over months to years, resulting in tissue damage secondary to inflammation. This stage is currently quite rare, most often affecting the cardiovascular system, followed by the CNS.[1-3]

1. Read PJ, Donvan B. Clinical aspects of adult syphilis. Intern Med J. 2012 Jun;42(6):614-20.
2. Euerle B. Syphilis. http://emedicine.medscape.com/article/229461-overview#a3. Accessed July 15, 2015.
3. Yanoff M, Duker JS. Ophthalmology. 4th ed. Elsevier Saunders; 2014.

Other Systemic Infections

Rickettsial diseases are caused by intracellular gram-negative bacteria that are transmitted to humans by infected ticks. Rickettsioses are divided into three categories: the spotted fever group (which includes Rocky Mountain spotted fever), the typhus group and the scrub typhus. Ocular involvement is common in these patients, but it also may be asymptomatic and self-limiting. A nongranulomatous anterior uveitis may present unilaterally or bilaterally. Diagnosis of a rickettsial infection is often based on clinical features and history. High antibody titers may take several weeks to occur. As in Lyme disease, doxycycline 100mg is the drug of choice. For rickettsial diseases, it is dosed twice a day for seven to 10 days.[1,24]

Influenza A virus causes acute respiratory illness and can be spread from person to person via respiratory secretions. Ocular complications may include anterior uveitis. Throat swabs can confirm the diagnosis and the course of the infection usually resolves without sequelae.[10]

Dark-field microscopy or immunofluorescent staining of mucocutaneous lesions has a high detection rate of *T. pallidum* of approximately 85% to 92%, allowing diagnosis even before seroconversion. However, these tests lack sensitivity, and serologic testing is considered the standard for all stages of syphilis.

Two different types of antibody tests are available. The nontreponemal tests measure the host's response to antigens, such as cardiolipin and lecithin, from damaged host cells along with lipoprotein material from the *T. pallidum* organisms. The two most frequently used tests are the Venereal Disease Research Laboratory (VDRL) and Rapid Plasma Reagin (RPR).[9,17] The VDRL is standardized with results reported as *reactive*, *weakly reactive*, *borderline* or *nonreactive*.[9,10] These nontreponemal tests usually become nonreactive following treatment, although a small percentage will have a positive test despite effective treatment.

Treponemal tests, which detect antibodies against the treponemal antigens, include the fluorescent treponemal antibody absorption test (FTA-ABS) and the microhemagglutination assay for *T. pallidum* (MHA-TP). One of these tests should be ordered to confirm a positive finding on either VDRL or RPR. The treponemal tests will remain positive for life even post-treatment.

Treatment

Treatment of syphilis usually involves intramuscular penicillin.[9,10] Cases of ocular syphilis should be reported to the CDC via your local or state health department within 24 hours of diagnosis (ocularsyphilis2015@cdc.gov). According to the CDC, the definition for an ocular syphilis case is: a person with clinical symptoms or signs consistent with ocular disease (i.e., uveitis, panuveitis, diminished visual acuity, blindness, optic neuropathy, interstitial keratitis, anterior uveitis and retinal vasculitis) with syphilis of any stage. If possible, pretreatment samples (e.g., whole blood, ocular fluid) should be saved and stored at -80° C for molecular analysis.[18]

Tuberculosis

Tuberculosis (TB) is a chronic infection caused by *Mycobacterium tuberculosis*, which is a gram-positive bacteria. The disease is characterized by necrotizing granulomas and primarily involves the lungs; however, it can involve other structures, especially those tissues with high oxygen tension such as the central nervous system, bones, kidneys and the eyes.[19]

According to the CDC, one third of the world's population is infected with TB.[20] The WHO has declared TB a global emergency, with an annual incidence of approximately nine million. In 2013 there were 1.5 million TB-related deaths worldwide, and TB is the leading killer of HIV-infected patients.[10]

The number of TB cases in the United States is low and is declining.[10] According to the CDC, there were 9,582 TB cases reported in the United States in 2013, a 3.6% decline from 2012.[20,21] TB is a communicable disease that is spread via airborne transmission. It may exist as a latent disease in which the patient is neither sick nor infectious. Should these patients become immunocompromised at a later time, the TB may become active and manifest itself.[20]

Ocular Manifestations

The eye is a well-known site for extrapulmonary TB, which occurs either by spread from active pulmonary TB via the blood stream or as a focal reactivation of a previous localization of TB. According to investigators, TB accounted for as much as 80% of granulomatous anterior uveitis during the 1800s.[22]

Ocular sequelae from a mycobacteria infection may be the only manifestation or may be noted concurrently with pulmonary TB. Tuberculosis can involve any part of the eye, but uveitis appears to be one of the most common manifestations.[10] Research has noted nongranulotomous and granulomatous anterior uveitis.[23] Anterior uveitis secondary to TB is relatively rare in developed countries, although incidence data is limited. TB uveitis in endemic countries, such as India and Saudi Arabia, occurs at a much higher incidence. Tuberculosis accounts for <0.5% of patients with uveitis presenting to tertiary care in the United States compared with 10.5% in areas such as India.[10] Researchers studied uveitis patients in Barcelona, Spain and determined that tuberculosis-related uveitis was found in 5% of all patients.[24]

Other investigators studied 62

patients with uveitis associated with latent TB and compared them to matched controls with uveitis of etiologies other than tuberculosis.[25] The purpose of this study was to characterize the ocular manifestations of the uveitis. Patients were divided into two groups based on whether the uveitis was predominantly anterior or posterior. Approximately a third of patients had anterior uveitis. Of those, 83% had a low-grade anterior chamber reaction, only 50% presented with granulomatous keratic precipitates, 17% had iris nodules and 56% had extensive posterior synechiae. Anterior scleritis was noted concurrently in 44% of the patients. Lesions suggestive of tuberculosis were present in 11% of chest x-rays, and 85% of patients had a positive interferon-gamma release assay.[25]

Testing

The tuberculin skin test (also known as the Mantoux tuberculin skin test) is used to determine whether a patient has been infected with *Mycobacterium tuberculosis*, although patients who have been vaccinated, but have not been infected, will also test positive. Additional testing, including a chest x-ray and sputum sample, is needed to determine whether the disease is latent or active. Interferon-gamma release assay (IGRA) is a blood test used to diagnose TB that relies on the principle that T-lymphocytes will release interferon-gamma when exposed to specific antigens associated with *Mycobacterium tuberculosis*.

Two IGRAs are approved by the FDA for use in the United States: QuantiFeron-TB Gold In-Tube test (Qiagen) and T-SPOT TB test (Oxford Immunotec). A positive IGRA means a patient has been infected with TB bacteria but needs additional testing to determine if the TB is latent or active. IGRA is the preferred method of TB testing for patients who have received bacilli Calmette-Guérin (BCG), which is a TB vaccine, or those who have a difficult time returning for a follow up visit to look for a skin reaction to the tuberculin skin test. You can repeat IGRA, and the test will not yield a false-positive result in patients who have received BCG.[20]

Treatment

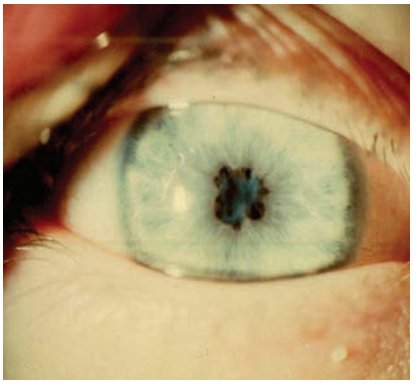
Patients diagnosed with tuberculosis are typically treated with multidrug therapy for six to nine months.[20]

Lyme Disease

Lyme disease accounts for 4.3% of cases of uveitis worldwide.[26] While the most common forms are posterior uveitis and panuveitis, anterior uveitis may be noted.[26]

Lyme disease is a multisystem illness found in the United States and Europe and is caused by infection with *Borrelia burgdorferi*, a gram-negative spiral-shaped bacteria (spirochete) transmitted by the bite of an infected *Ixodes* tick. Many patients who have a tick attachment are unaware that it has occurred, due to the small size of the tick, especially in the nymph stage (1mm to 2mm), and because they often attach to sites where they are not noticed, such as hair-bearing areas.[27] Endemic areas in the United States are the northeast (as far south as Virginia) and upper Midwest. Most cases are diagnosed between April and September; however, a tick-borne disease may present in any month.[27] These ticks have a two-year life cycle and are less active in colder months.[27]

Lyme disease is often broken down into the *early localized*, *early disseminated* and *late* stages. The first stage begins days to weeks after the tick bite with the pathognomonic erythema migrans (a bulls-eye shaped lesion) at the site of the tick bite along with fever, malaise and possible arthralgia. The second stage is manifested by multiple organ involvement and typically occurs weeks to months after the infection. The late stage occurs months to years after the disease-free status. Ocular manifestations may occur in any of the three stages.[10,28]



Significant posterior synechiae in a patient with chronic anterior uveitis.

Ocular Manifestations

The most common ocular manifestation of Lyme disease is a follicular conjunctivitis occurring within the first weeks in at least 10% of patients, but is often transient, self-limiting and thought to be related to flu-like symptoms.[29,30] Intraocular inflammation, including anterior uveitis, has been reported in all stages of Lyme disease.[30]

Testing

Directly detecting the organism with testing is challenging due in part to the low number of bacteria present in most infections. Cultures are not performed routinely due to the low sensitivity, long incubation time and complex growth medium required.[27] Polymerase chain reaction assay has a similar sensitivity to culture and is also not used routinely. Serum antibody response against *B. burgdoferi* is the only FDA-approved diagnostic test for Lyme disease.[27] But, there are often insufficient antibody levels for detection early in the illness.

Another shortcoming of current testing is that assays do not differentiate between active and inactive infections, and even those treated successfully with antibiotics may remain seropositive.[27] Patients may remain seronegative if the organisms remain sequestered in immunologically privileged locations such as intraocular structures.[29,31]

Diagnosis is usually presumptive in that serum antibodies are often not detectable for at least a week and treatment is therefore empiric. In fact, less than half of patients presenting with the characteristic skin lesion (erythema migrans) have positive antibodies at presentation. Lab tests are more helpful in patients in the later stages of Lyme disease.[27,28]

Treatment

Treatment should begin as soon as a diagnosis of a tick-borne infection is made. A single dose of 200mg doxycycline can be used to prevent Lyme disease if given promptly after ticks are removed.[32,33] Doxycycline 100mg BID for 14 to 21 days is considered first-line therapy for an active infection. If doxycycline is contraindicated, amoxicillin 500mg TID for 14 to 21 days may be prescribed.[9]

Herpes

Several of the human herpes viruses belonging to the *Herpesviridae* family are known to cause anterior uveitis, including herpes simplex virus (HSV), varicella zoster virus (VZV) and cytomegalovirus (CMV).[34]

Determining which of the three viruses is the etiology is often challenging, as they all may manifest similarly with ocular hypertension, sectoral iris atrophy and widespread keratic precipitates.[10] More than 70% of the general population will have positive antibodies to HSV, indicating previous exposure, but no information about the current status can be determined with the test.[5]

HSV-associated uveitis is usually unilateral and is easier to diagnose in patients with a known history of recurrent HSV keratitis. The presence of corneal opacification should also heighten the suspicion of HSV etiology. It is not clear if HSV uveitis is an inflammatory response secondary to corneal disease or if it is direct

Work Locally, Think Globally

Other infectious diseases that are traditionally geographically isolated are becoming more widespread due to increased travel abroad, immigration and the globalization of businesses. Investigators recommend you "work locally, but think globally" when determining the etiology of anterior uveitis.[1] Here are several infections emerging as causes of infectious disease with anterior uveitis as a possible ocular sequela:

West Nile virus is an enveloped single-stranded RNA virus with wild birds serving as a reservoir. It is transmitted to humans most often from infected mosquitoes, but can also be transmitted through blood transfusions and breast-feeding.[1] West Nile virus has spread rapidly throughout North America for the past 15 years. Most human infections (~80%) are asymptomatic.[1] Ocular involvement may include anterior uveitis, and there are reports of anterior uveitis occurring in the absence of posterior segment findings. Specific IgM antibodies in serum is the most common diagnostic test for West Nile virus. There is no known treatment for this virus. Management involves supportive, fairly intensive, therapy. Prevention should be the main goal and can be achieved by using personal protection and reducing the number of mosquitos.[1]

Leprosy is caused by *Mycobacterium leprae* and results in chronic granulomatous inflammation affecting the skin and the peripheral nerves. It can be spread from person to person via nasal secretions or respiratory droplets. According to the World Health Organization, most cases are isolated in Asia and Africa, although there are approximately 100 cases in the United States each year.[10] Anterior uveitis is the most common ocular sequelae. Another characteristic ocular finding is edematous corneal nerves, which give the appearance of corneal beading and represents multiplication of the bacteria either in or near the corneal nerves. Diagnosis is based on characteristic findings in patients from endemic areas. Skin biopsy of the lesions and polymerase chain reaction (PCR) may aid in the diagnosis. Systemically, a multidrug treatment regimen is used and patients need to be treated for up to a year, sometimes longer.[9,38]

Brucellosis is an infectious disease caused by gram-negative bacteria resulting initially in fever, malaise and joint pain. Patients can get the disease through contact with infected animals—often sheep, cattle, goats, pigs and dogs—or contaminated animal byproducts. Uncommon in the United States, it is more often found in the Mediterranean basin, Central and South America, the Caribbean, Asia and Africa. Ocular manifestations usually occur later in the disease process. Uveitis is the most common ocular finding and may present as unilateral or bilateral anterior uveitis. It may be either granulomatous or nongranulomatous. Serology to assess antibody titers can help in the diagnosis. Antibiotic therapy is needed, and recovery may take weeks to a few months.[10,39]

Rift valley fever is an arthropod-borne viral disease that mostly affects cattle, and infected mosquitoes transmit the disease to humans. Most cases are localized in Africa. Anterior uveitis was found in 31% of patients presenting with ocular involvement.[40] Serology helps to detect antibodies, and treatment for mild to moderate cases is supportive.[1]

Chikungunya virus is another arthropod-borne disease that recently affected millions in the Indian Ocean region. It is common in Africa and parts of Asia, including India, Sri Lanka and Indonesia. Monkeys and wildlife provide a reservoir for the virus and infected mosquitos transmit it to humans. Ocular symptoms usually occur one to 12 months after the initial infection. It may manifest as unilateral or bilateral uveitis and may be granulomatous or nongranulomatous. Posterior synechiae are not common, but research shows that some eyes can develop intraocular hypertension even prior to topical corticosteroid use.[1] Serology can be used to detect antibodies, and treatment is symptomatic because no antiviral drug appears efficacious.[1]

infection of the uveal tissue by the virus.[9,35,36] The Herpetic Eye Disease Study Group evaluated the benefit of using oral Zovirax (acyclovir, GlaxoSmithKline) along with topical corticosteroid and Viroptic (trifluridine, Monarch Pharmaceuticals) in the management of uveitis.[9] Although it was never completed due to low recruitment numbers, it appeared that the inclusion of oral Zovirax resulted in better outcomes.

Patients diagnosed or suspected of having HSV uveitis should have an oral antiviral added to the typical steroid and cycloplegic treatment regimen. Zovirax 400mg dosed five times a day or Famvir (famciclovir, Novartis) 250mg or Valtrex (valacyclovir, GlaxoSmithKline) 500mg dosed three times a day may be used for seven to 10 days. Topical antiviral therapy is not beneficial in managing herpetic uveitis.[36]

Anterior uveitis has been reported in cases of a primary infection of ***VZV (chicken pox)*** but it is much more common in secondary herpes zoster infections, especially in HZ ophthalmicus. The anterior uveitis may be present at the time of onset of the cutaneous lesions, but more commonly occurs one to two weeks after the skin eruptions.[9] It may manifest as either acutelt or chronically.[4]

Researchers followed a large cohort with a history of herpes zoster for one year to determine the incidence of developing anterior uveitis compared with a comparison cohort.[37] They found the relative risk of developing anterior uveitis to be 1.67 with a history of HZ, which increased to 13.06 with a history of HZ ophthalmicus. The authors propose several possible mechanisms for the development of subsequent ocular inflammation, including spread of VZV via neural or hematologic pathways, reactivation of VZV that changes tissue antigen, or dysfunction in host immunity that fails to keep the latent VZV under control.[37]

Others postulate that HZ uveitis is due to vascular occlusion and secondary ischemia.[9] Regardless of the mechanism, the findings suggest that a patient with a history of HZ should be monitored closely for at least a year following diagnosis.[37]

In addition to typical anterior uveitis management, an oral antiviral, if not already being used, should be included if the uveitis is noted early in the course of the HZ infection. The dose of all antivirals is doubled compared with management of HSV with the same dosing frequency (Zovirax 800mg five times a day; Famvir 500mg TID; Valtrex 1,000mg TID). If the uveitis occurs several weeks or later after the dermatological disease, oral antivirals are likely no longer useful. Zostavax (Merck) is a live attenuated vaccine for the prevention of HZ and is approved for patients over 50, although it is typically administered to patients over 60 due to its relatively short-lived effectiveness of five to seven years. This vaccine can be given to patients with a history of HZ, although the efficacy has not been assessed in this population.[9,10,35]

CMV is a common virus, and 60% to 90% of normal adults have serological evidence of a previous infection.[9] The virus can be spread via body fluids or blood. CMV infections in immune-competent individuals are self-limiting and may be asymptomatic or manifest as a mononucleosis-like illness.[9] CMV may cause an anterior uveitis in immunocompetent patients. The inflammation may be unilateral or bilateral and is often associated with ocular hypertension. Concurrent corneal endotheliitis may manifest as a focal area of stromal edema.[9,36]

While infectious etiologies are uncommon, it is important to rule them out when a patient presents with an isolated anterior uveitis. Screening with appropriate laboratory tests can help eliminate certain diagnoses such as syphilis and Lyme disease, as they may manifest anterior uveitis in any form.[5] Some laboratory tests are not typically used because they offer little information. Knowing when and how to test helps ensure you are treating the right etiology and eliminating your patient's anterior uveitis. ■

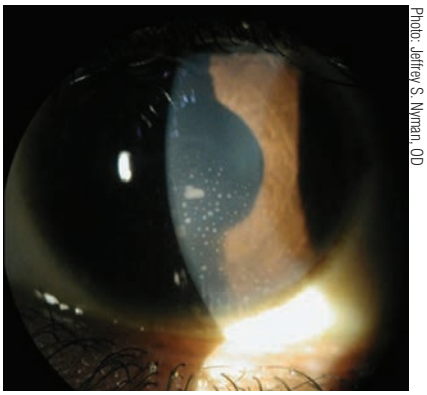


Photo: Jeffrey S. Nyman, OD

Granulomatous keratic precipitates may be noted in anterior uveitis secondary to various systemic infections.

Dr. Than is a professor at the University of Alabama at Birmingham School of Optometry.

1. Khairallah M, Chee SP, Rathinam SR, et al. Novel infectious agents causing uveitis. Int Ophthalmol. 2010 Oct;30(5):465-83.
2. Karaconji T, Maconochie Z, McCluskey P. Acute anterior uveitis in Syndney. Ocul Immunol Inflamm. 2013 Apr;21(2):108-14.
3. Birnbaum AD, Jiang Y, Vasaiwala R, et al. Bilateral simultaneous-onset nongranulomatous acute anterior uveitis: clinical presentation and etiology. Arch Ophthalmol. 2012 Nov;130(11):1389-94.
4. Dunn JP, Nozik RA. Uveitis: role of the physician in treating systemic causes. Geriatrics. 1994 Aug;49(8):27-32.
5. Jabs DA, Busingye J. Approach to the diagnosis of the uveitides. Am J Ophthalmol. 2013 Aug;156(2):228-36.
6. Platnick J, Crum AV, Soohoo S, et al. The globe: infection, inflammation, and systemic disease. Semin Ultrasound CT MR. 2011 Feb;32(1):38-50.
7. Harman LE, Margo CE, Roetzheim RG. Uveitis: the collaborative diagnostic evaluation. Am Fam Physician. 2014 Nov 15;90(10):711-6.
8. Gorroño-Echebarria MB, Guzman-Blazquez J, Teus-Guezala MA, Martin-Villa JM. Anterior uveitis and meningococcemia: a case report. Ocul Immunol Inflamm. 2006 June;14(3):193-4.
9. Smith RE, Nozik RA. Uveitis: a clinical approach to diagnosis and management. 3rd ed. Michigan: Lippincott Williams and Wilkins; 2003.
10. Yanoff M, Duker JS. Ophthalmology. 4th ed. Elsevier Saunders; 2014.
11. Jones NP. The Manchester Uveitis Clinic: the first 3000 patients-epidemiology and casemix. Ocul Immunol Inflamm. 2015 April;23(2):118-26.
12. Cunningham ET Jr, Eandi CM, Pichi F. Syphilitic uveitis. Ocul Immunol Inflamm. 2014 Feb;22(1):2-3.
13. Fonollosa A, Martinez-Indart L, Artaraz J, et al. Clinical manifestations and outcomes of syphilis-associated uveitis in northern Spain. Ocul Immunol Inflamm. 2014 Aug 14:1-6.

14. Amaratunge BC, Camuglia JE, Hall AJ. Syphilitic uveitis: a review of clinical manifestations and treatment outcomes of syphilitic uveitis in human immunodeficiency virus-positive and negative patients. Clin Experiment Ophthalmol. 2010 Jan;38(1):68-74.
15. Northey LC, Skalicky SE, Gurbaxani A, McCluskey PJ. Syphilitic uveitis and optic neuritis in Sydney, Australia. Br J Ophthalmol. 2015 Mar 18. [Epub ahead of print].
16. Mathew RG, Goh BT, Westcott MC. British Ocular Syphilis Study (BOSS): 2-year national surveillance study of intraocular inflammation secondary to ocular syphilis. Invest Ophthalmol Vis Sci. 2014 Jun 12;55(8):5394-400.
17. Naidu NK, Bharucha ZS, Sonawane V, Ahmed I. Comparative study of Treponemal and non-Treponemal test for screening of blood donated at a blood center. Asian J Transfus Sci. 2012 Jan-Jun;6(1):32-35.
18. Centers for Disease Control and Prevention. Clinical Advisory: Ocular Syphilis in the United States. www.cdc.gov/std/syphilis/clinicaladvisoryos2015.htm. Accessed June 29, 2015.
19. Carrol ED, Clark JE, Cant AJ. Non-pulmonary tuberculosis. Paediatr Respir Rev. 2001 Jun;2(2):113-9.
20. Centers for Disease Control and Prevention. Tuberculosis (TB): Data and Statistics. www.cdc.gov/tb/statistics/default.htm. Accessed June 29, 2015.
21. The Centers for Disease Control and Prevention. Tuberculosis (TB). www.cdc.gov/tb/publications/factsheets/statistics/tbtrends.htm. Accessed July 15, 2015.
22. Tognon MS, Fiscon M, Mirabelli P, et al. Tuberculosis of the eye in Italy: a forgotten extrapulmonary localization. Infection. 2014 Apr;42(2):335-42.
23. Sanghvi C, Bell C, Woodhead M, et al. Presumed tuberculous uveitis: diagnosis, management, and outcome. Eye (Lond). 2011 Apr;25(4):475-80.
24. Llorenç V, Mesquida M, Sainz de la Maza M, et al. Epidemiology of uveitis in a Western urban multiethnic population. The challenge of globalization. Acta Ophthalmol. 2015 Feb 15.
25. Ang M, Hedayatfar A, Zhang R, Chee SP. Clinical signs of uveitis associated with latent tuberculosis. Clin Experiment Ophthalmol. 2012 Sep-Oct;40(7):689-96.
26. Howlett JM, Booth AP. Ocular inflammation as a manifestation of Lyme borreliosis. BMJ. 2012 Jul 16;345.
27. Buckingham SC. Tick-borne diseases of the USA: Ten things clinicians should know. J Infect. 2015 Jun;71 Suppl 1:S88-96.
28. Marques AR. Laboratory Diagnosis of Lyme Disease: Advances and Challenges. Infect Dis Clin North Am. 2015 Jun;29(2):295-307.
29. Lesser RL. Ocular manifestations of lyme disease. Am J Med. 1995 Apr 24;98(4A):60S-62S.
30. Mikkilä HO, Seppälä IJ, Viljanen MK, et al. The expanding clinical spectrum of ocular lyme borreliosis. Ophthalmology. 2000 Mar;107(3):581-7.
31. Karma A, Seppälä I, Mikkilä H, Kaakkola S, Viljanen M, Tarkkanen A. Diagnosis and clinical characteristics of ocular Lyme borreliosis. Am J Ophthalmol. 1995 Feb;119(2):127-35.
32. Nadelman RB, Nowakowski J, Fish D, et al. Tick Bite Study Group. Prophylaxis with single-dose doxycycline for the prevention of Lyme disease after an Ixodes scapularis tick bite. N Engl J Med. 2001 Jul 12;345(2):79-84.
33. Piesman J, Hojgaard A. Protective value of prophylactic antibiotic treatment of tick bite for Lyme disease prevention: an animal model. Ticks Tick Borne Dis. 2012 Jun;3(3):193-6.
34. Pleyer U, Chee SP. Current aspects on the management of viral uveitis in immunocompetent individuals. Clin Ophthalmol. 2015 Jun 5;9:1017-28
35. Santos C. Herpes simplex uveitis. Bol Asoc Med P R. 2004 Mar-Apr;96(2):71-4, 77-83.
36. Doran M. Understanding and treating viral anterior uveitis. www.aao.org/eyenet/article/viral-anterior-uveitis?september-2009. Accessed June 27, 2015.
37. Wang TJ, Hu CC, Lin HC. Increased risk of anterior uveitis following herpes zoster: a nationwide population-based study. Arch Ophthalmol. 2012 Apr;130(4):451-5.
38. Deschênes J, Plouznikoff A. Ocular Manifestations of Leprosy. http://emedicine.medscape.com/article/1213853-overview#a2. Accessed June 29, 2015.
39. Centers for Disease Control and Prevention. Brucellosis. www.cdc.gov/brucellosis/index.html. Accessed June 28, 2015.
40. Al-Hazmi A, Al-Rajhi AA, Abboud EB, et al. Ocular complications of Rift Valley fever outbreak in Saudi arabia. Ophthalmology. 2005 Feb;112(2):313-8.

OSC QUIZ

You can obtain transcript-quality continuing education credit through the Optometric Study Center. Complete the test form *(page 73)*, and return it with the $35 fee to: Optometric CE, P.O. Box 488, Canal Street Station, New York, NY 10013. To be eligible, please return the card within one year of publication.

You can also access the test form and submit your answers and payment via credit card at *Review of Optometry* online, www.reviewofoptometry.com.

You must achieve a score of 70 or higher to receive credit. Allow eight to 10 weeks for processing. For each Optometric Study Center course you pass, you earn 2 hours of transcript-quality credit from Pennsylvania College of Optometry and double credit toward the AOA Optometric Recognition Award—Category 1.

Please check with your state licensing board to see if this approval counts toward your CE requirement for relicensure.

1. What is the most common form of uveitis?
a. Anterior.
b. Posterior.
c. Intermediate.
d. Panuveitis.

2. Uveitis is associated with a systemic etiology ____ of the time.
a. 20%.
b. 40%.
c. 60%.
d. 80%.

3. A gastroenteritis caused by *Salmonella* may result in:
a. Posner-Schlossman syndrome.
b. Lyme Disease.
c. Reactive arthritis.
d. Brucellosis.

4. The number of syphilis cases in the United States is currently:
a. Stable.
b. Eradicated.
c. Decreasing.
d. Increasing.

5. Which infectious etiology should be ruled out by laboratory testing on essentially every case of anterior uveitis?
a. Syphilis.
b. Tuberculosis.
c. Lyme disease.
d. West Nile virus.

6. Which test remains positive even after adequate treatment?
a. RPR.
b. MHA-TP.
c. VDRL.
d. Immunofluorescent staining of lesions.

7. Which therapeutic agent is used most frequently to manage syphilis?
a. Doxycycline.
b. Sulfamethoxazole.
c. Penicillin.
d. Azithromycin.

8. Which disease is caused by a gram-positive organism?
a. Tuberculosis.
b. Syphilis.
c. Lyme disease.
d. Rickettsioses.

9. Which test is recommended as the initial test for patients who have had a TB vaccine (bacilli Calmette-Guérin)?
a. TB skin test.
b. Chest x-ray.
c. Sputum analysis.
d. Interferon-gamma release assay (IGRA).

10. Which finding is least likely to occur in association with TB anterior uveitis?
a. Granulomatous keratic precipitates.
b. Iris nodules.
c. Posterior synechiae.
d. Anterior scleritis.

11. The duration of treatment for tuberculosis is typically:
a. Seven to 10 days.
b. Three to four weeks.
c. Three to four months.
d. Six to nine months.

12. What lesion is pathognomonic for Lyme disease?
a. Acrodermatitis chronica atrophicans.
b. Acanthosis nigrigans.
c. Erythema migrans.
d. Erysipelas.

13. _____ is the only FDA-approved diagnostic test for Lyme disease.
a. Culture.
b. Serum antibodies.
c. Polymerase chain reaction.
d. Lesion biopsy.

14. Which of the following is the most common ocular manifestation of Lyme disease?
a. Conjunctivitis.
b. Anterior uveitis.

OSC QUIZ

c. Posterior uveitis.
d. Optic neuritis.

15. What is the appropriate one-time prophylaxis treatment of doxycycline that may be given to prevent Lyme disease if given at the time of the tick removal?
a. 50mg.
b. 100mg.
c. 200mg.
d. No dose is useful.

16. Sectoral iris atrophy is most likely associated with which of the following systemic etiologies of anterior uveitis?
a. Syphilis.
b. Tuberculosis.
c. Herpes zoster.
d. Lyme disease.

17. Corneal beading may be a finding noted in conjunction with anterior uveitis in which of the following systemic infections?
a. Leprosy.
b. Brucellosis.
c. West Nile virus.
d. Cytomegalovirus.

18. What is the most common vector for transmitting West Nile virus?
a. Humans.
b. Ticks.
c. Birds.
d. Mosquitos.

19. Which condition requires antimicrobial therapy?
a. Rift valley fever.
b. Chikungunya.
c. Brucellosis.
d. West Nile virus.

20. What is an appropriate dose of oral antiviral in the management of anterior uveitis secondary to suspected herpes simplex?
a. Zovirax 800mg five times a day.
b. Famvir 250mg three times a day.
c. Valtrex 500mg once a day.
d. Zovirax 400mg twice a day.

TAKE THE TEST ONLINE TODAY!
www.reviewofoptometry.com/continuing_education/

Examination Answer Sheet

Valid for credit through August 1, 2018

This exam can be taken online at www.revoptom.com/continuing_education. Upon passing the exam, you can view your results immediately and download a real-time CE certificate. You can also view your test history at any time from the website.

Anterior Uveitis: The *Un*usual Suspects

Directions: Select one answer for each question in the exam and completely darken the appropriate circle. A minimum score of 70% is required to earn credit.

Mail to: Jobson - Optometric CE, PO Box 488, Canal Street Station, New York, NY 10013

Payment: Remit $35 with this exam. Make check payable to Jobson Medical Information LLC.

COPE approval for 2 hours of CE credit is pending for this course.

This course is joint-sponsored by the Pennsylvania College of Optometry

There is an eight-to-ten week processing time for this exam.

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

1 = Excellent 2 = Very Good 3 = Good 4 = Fair 5 = Poor

Rate the effectiveness of how well the activity:

21. Met the goal statement: ① ② ③ ④ ⑤
22. Related to your practice needs: ① ② ③ ④ ⑤
23. Will help you improve patient care: ① ② ③ ④ ⑤
24. Avoided commercial bias/influence: ① ② ③ ④ ⑤
25. How would you rate the overall quality of the material presented? ① ② ③ ④ ⑤
26. Your knowledge of the subject was increased:
◯ Greatly ◯ Somewhat ◯ Little
27. The difficulty of the course was:
◯ Complex ◯ Appropriate ◯ Basic

How long did it take to complete this course?

Comments on this course:

Suggested topics for future CE articles:

Please retain a copy for your records. Please print clearly.

First Name
Last Name
E-Mail

The following is your: ☐ Home Address ☐ Business Address

Business Name
Address
City State
ZIP
Telephone # - -
Fax # - -

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

Signature _____ Date _____

Lesson 111616 RO-OSC-0815

2015 Office Design Contest

Photo: Eye Elements, Dunwoody Ga.

Objective: *Review of Optometry*'s Office Design Contest recognizes optometric practices that incorporate functionality, optimum use of space and stylistic appeal with up-to-date clinical technology.

Eligibility: Newly built offices and office remodels or expansions completed between July 1, 2013 and July 30, 2015 are eligible to enter the 2015 Office Design Contest.

Judging: Entries will be judged by a panel of fellow optometrists who have been previously recognized for their expertise in office design.

Awards: "Office Design of the Year" will be awarded to the best overall facility, based upon functional design, efficient interior space planning, style and appropriate integration of optometry equipment and technology. Two runners-up will be chosen based on the same standards.

Each winner will receive an engraved office plaque recognizing the practice's achievement, in addition to editorial coverage online and in the November 2015 print edition of *Review of Optometry*.

How to Enter: Send your completed contest entry form and several high-resolution images to Senior Associate Editor Rebecca Hepp. Pre-renovation "before" photos are also welcome. Images should illustrate the contest's four design principles—function, optometric equipment, aesthetics and ergonomics. They must be no less than 300 dots per inch (dpi) and should be saved as .tif or .jpg files. Files can also be sent via Dropbox.

- ***Email:*** rhepp@jobson.com
- ***Mail:*** Review of Optometry
  Office Design Contest
  11 Campus Blvd., Suite 100
  Newtown Square, PA 19073
- ***Online:*** www.reviewofoptometry.com/designcontest

All entries must be received by September 15, 2015.

PLEASE PRINT OR TYPE

Name and Title: _____

Practice Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Project Completion Date: _____

Website: _____ Email: _____

DESIGN BASICS

Category: ☐ Renovation of Existing Office ☐ New Office/Expansion

Practice Size: ☐ Small (Gross Revenue < $400,000) ☐ Large (Gross Revenue > $400,000)

Estimated Total Project Cost: _____

Total Net Square Footage of Practice: _____

Entries that do not meet all requirements or are not received by the deadline of September 15, 2015 will be disqualified.

Submission of an entry constitutes consent to use the entrant's name and/or photograph, including posting on the *Review of Optometry* website and/or related print and electronic publications, without compensation unless prohibited. All photos become property of *Review of Optometry* and will not be returned. Only one entry per office will be accepted.

Entries must be composed of original, authentic, unpublished material and must be the sole property of the entrant, not previously submitted in any other contest. *Review of Optometry* is not responsible for lost, late, misdirected, incomplete, or postage-due entries. Submission of your photo gives consent for *Review of Optometry* to place the image in its image bank on a nonexclusive basis for noncommercial use.

Signature: _____ Date: _____

2015 Office Design Contest Entry Form (1 of 2)

Questions or Concerns: Please contact Rebecca Hepp, Senior Associate Editor, at rhepp@jobson.com or (610) 492-1005.

DESIGN OBJECTIVES

Explain how your office design incorporates these concepts and explain any obstacles you overcame. Please submit your responses to each of the following four questions, limiting each response to 150 words.

1. Function: How does your new office/remodel improve efficiency for your staff and effectiveness with your patients?

2. Optometric Equipment: How was currently installed optometric equipment integrated into the overall design of your facility? List pertinent upgrades that were made and/or additional components that will be added in the future.

3. Ergonomics: How has your new office improved the ease of providing eye care? Consider specific design decisions made regarding the layout of your business and clinical work areas (especially the exam rooms and front desk), placement of equipment and computer components, and positioning of doctor(s) and staff.

4. Aesthetics: How does the look of your new office/remodel affect or improve your staff and patient experience? How has your new office design attracted new business and/or expanded your patient base?

What she's really searching for is comfort.

What happens when she looks at digital screens all day long?

She blinks 5 times less, her tear film is destabilized, and she experiences dryness.[1] HYDRACLEAR® PLUS Technology helps stabilize the tear film by mimicking the eye's natural mucins, allowing her to live more of the digital life she wants.

It's no wonder patients like her report **ACUVUE OASYS® Brand Contact Lenses has superior comfort** vs Air Optix® Aqua and Biofinity® after 8 hours on digital screens.

Provide exceptional performance for her digital life with ACUVUE OASYS® Brand.

ACUVUE®
OASYS
BRAND CONTACT LENSES

Reference: 1. Patel S, Henderson R, Bradley L, Galloway B, Hunter L. Effect of visual display unit use on blink rate and tear stability. *Optom Vis Sci.* 1991;68(11):888-892.

OCULAR SIGNS OF NEUROFIBROMATOSIS

Patients with this rare genetic abnormality struggle with a variety of eye health issues.

By Amber Louprasong, OD, and Kevin J. Mercado, OD

Neurofibromatosis (NF) is a genetic abnormality that affects the cell growth of neural tissue, leading to tumor growths that impact the skin, nervous system, eyes and other organs. NF is divided into two primary subgroups: neurofibromatosis type 1 (NF1), also known as von Recklinghausen or peripheral neurofibromatosis; and neurofibromatosis type 2 (NF2), also known as bilateral acoustic neurofibromatosis and central neurofibromatosis.[1]

NF1 and NF2 vary based on location of chromosome mutation, tumor type and location, non-tumor manifestations and management techniques; however, clinical presentations of both subtypes may overlap, making diagnosis difficult (see, "*Diagnosing Neurofibromatosis*," page 80.) Other research has indicated NF can manifest in other variants including a mosaic (i.e., segmental) form, which only

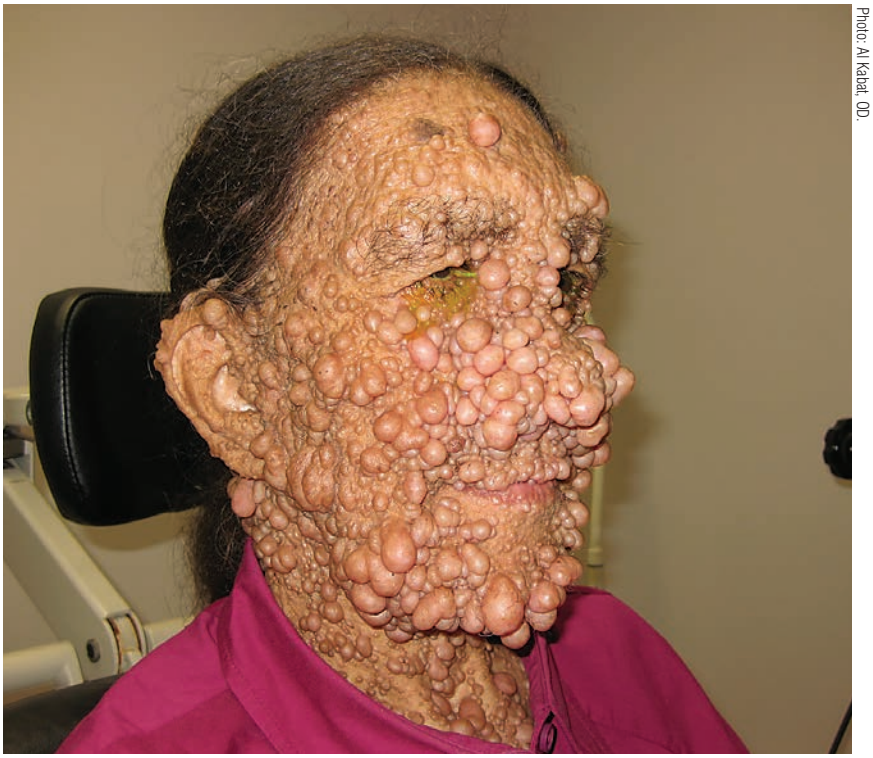


Photo: Al Kabat, OD.

This patient's neurofibromas are significant, but the ocular presentations, such as Lisch nodules or retinal astrocytic hamartomas, may be more difficult to identify.

Size matters.

extremeH2O® weekly

Stop drop out rates and gain more referrals along the way. With three lens diameters for a perfect fit and long lasting comfort, you'll gain a contact wearer for life. Someone who loves their contacts, brings referrals, and stays with the program. It's simple, without Extreme H2O you're leaving money on the table.

Extreme H2O Weekly is the ONLY disposable available in three diameters: 13.6, 14.2 and 14.8. This enables you to successfully fit your small, medium and large cornea patients with the right fit, the first time, to ensure comfort.

13.6 14.2 14.8

X-CEL
SPECIALTY CONTACTS

Contact X-Cel Specialty Contacts to learn more.
Main: 877.336.2482 | www.xcelspecialtycontacts.com

occurs in a localized area or organs in a linear, patchy or circumscribed area.[2]

Both NF1 and NF2 are acquired through an inherited autosomal dominant transmission or sporadic mutation, with presentation of NF1 more common than NF2.[2] As such, members of the same family with NF may have different disease presentations from each other, as they do not always carry the same gene mutations. These can vary from complete gene deletion to insertion, stop and splicing mutations, making the exact severity of the disease difficult to predict.[3] Onset of NF during childhood typically indicates a more severe progressive disease course can be expected; no sex or race predilection exists.[2,4] Table 1 compares NF1 and NF2.

Neurofibromatosis 1 (NF1)

NF1 is caused by a gene mutation that affects the production of the tumor suppressor protein neurofibromin by inhibiting cell division, increasing risk of benign and malignant tumor development. Clinical features of NF1 include skin fold freckles, neurofibromas, optic pathway gliomas, Lisch nodules and the most common finding associated with the disease: café au lait spots. These hyperpigmented lesions are either seen at birth or by two years of age and increase in both size and number as the patient grows. Note, however, the presence of café au lait spots alone is not enough for a diagnosis if the child does not have a family history of the disease; he or she should instead be watched closely for additional signs of NF1 to confirm.[2]

In the Eye

With respect to ocular findings, the most common diagnostic criteria in NF1 patients are Lisch nodules, which appear smooth and elevated with a clear to brownish-yellow coloration on slit lamp examination. Often, these asymptomatic lesions present inferiorly and bilaterally; however, there have been reports of unilateral presentations in segmental NF patients.[7] Lisch nodules rarely cause ocular complications and patients are typically asymptomatic.[8]

NF1 patients may also present with plexiform neurofibroma, retinal tumors and optic nerve pathway gliomas. Plexiform neurofibromas are soft swellings with indistinct borders located underneath the skin that can infiltrate the orbit and temporal regions or the eyelids. Eyelids with neurofibromas typically feel like a 'bag of worms' when palpitated. Orbital neurofibromas can cause strabismus or proptosis, leading to alterations in globe length, and have been associated with infantile glaucoma secondary to narrow angle.[1,8] Patients younger than 10 years of age should be monitored for amblyopia, which can result from ptosis or anisometropia. Other causes of amblyopia in NF patients include lens opacity, retinal abnormalities and intracranial tumor growth.

Retinal astrocytic hamartomas are benign tumors of the retinal nerve fiber layer that can present bilaterally involving the optic nerve and posterior pole, with multiple peripheral lesions extending to the anterior retina.[8,9] If the optic nerve or macula are involved, patients may exhibit decreased vision or a strabismus, while leukocoria may present if the tumor is located in the posterior pole. Glaucoma, while rare, has also been associated with anterior chamber hamartomas.[9] Note, retinal astrocytic hamartomas are more commonly associated with tuberous sclerosis (TS) than NF1 and present in one of three ways: flat and semitransparent tumors in periphery with poorly defined borders; elevated, nodular, opaque white lesions with well-defined borders similar in appearance to white

Diagnosing Neurofibromatosis

1. Two or more of the following must be present to confirm NF1.[1-3,5,6]
   - Six or more café au lait macules greater than 5mm in diameter in prepubertal individuals and greater than 15mm in postpubertal individuals.
   - Two or more neurofibromas of any type or one plexiform neurofibroma.
   - Freckling in the axillary or inguinal region.
   - Optic pathway glioma.
   - Two or more Lisch nodules (iris hamartomas).
   - Distinctive osseous lesion such as sphenoid dysplasia or thinning of long bone cortex with or without pseudarthrosis.
   - A first-degree relative (i.e., parent, sibling, offspring) with NF1 by the above criteria.
2. To confirm an NF2 diagnosis, bilateral vestibular schwannomas or a family history of NF2 must be present, as well as:
   - Unilateral vestibular schwannoma or
   - Two of the following: neurofibroma, meningioma, glioma, schwannoma or juvenile posterior subcapsular opacities.

Other criteria include:

- Unilateral vestibular schwannoma and
- Any two of: neurofibroma, meningioma, glioma, schwannoma, juvenile posterior subcapsular opacities or
- Multiple meningiomas and
- Unilaterial vestibular schwannoma or
- Any two of: schwannomas, glioma, neurofibroma, juvenile posterior subcapsular opacities.

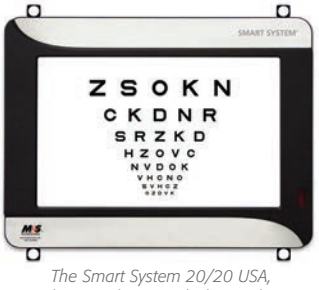
Always Evolving

Move Forward and Thrive with Robust Technology

We've been working with eyecare professionals for 25 years and we know how important it is to be on the fore-front of vision testing developments. Modern technology in your clinic can increase throughput while offering the most advanced testing methods.

Smart System® 20/20 interfaces with the automated refractors from ALL the major brands and we are constantly collaborating with leaders in the industry to keep us on the cutting edge. Your investment in our computerized visual acuity system will grow with you and give you peace of mind as you move forward.

We take your business as seriously as you do. If you're looking for a high-quality, comprehensive visual acuity testing system that is not only robust but comes with the best customer service and most attentive technical support in the industry, give us a call.



The Smart System 20/20 USA, shown with optional Glare Lights

MANUFACTURED IN THE **USA**

See us at Vision Expo West in Las Vegas! Booth 11039

M&S TECHNOLOGIES 25 YEARS

M&S holds US Patents 7,354,155; 7,926,948; 8,425,040; 8,167,429; 8,419,184 & 8,550,631. Other Patents Pending.

M&S® TECHNOLOGIES

The First Choice in Vision Testing Systems

www.mstech-eyes.com
1-877-225-6101

CAN'T WAIT UNTIL NEXT MONTH?

Optometric Physician delivers UP-TO-DATE news and research to your inbox every Monday morning, allowing you to view all of the latest clinical information on a convenient and consistent basis.

Subscribing to Optometric Physician is an efficient and easy way to stay current with all of the information and events going on in the field. To order your free subscription, e-mail: optometricphysician @jobson.com today.

Optometric Physician™

Table 1. Comparison Features of NF1 and NF2[11]

Feature	NF1	NF2
Frequency	1:2,500-4,000 (more common).	1:40,000-50,000 (rare).
Inheritance	Parent with autosomal dominant condition has a 50% chance of passing onto child; 50% de novo mutations without family history.	Parent with autosomal dominant condition has a 50% chance of passing onto child; 50% de novo mutations without family history.
Tumor types	Neurofibroma; glioma; malignant peripheral sheath tumor; nonlymphocytic leukemia; phenochromocytoma; Increased risk of breast cancer; gastrointestinal stromal tumors in 4% to 25% of patients.	Schwannoma; ependymoma; meningioma; glioma; malignant transformations are rare.
Non-tumor manifestations	Learning difficulties; skeletal dysplasia; vascular stenosis; café-au-lait macules are common; cardiovascular anomaly in 27% of patients.	Posterior subcapsular cataract/cortical wedge opacity; café au lait macules are less common.
Mutation location	Chromosome 17.	Chromosome 22.
Gene	Neurofibromin.	Merlin (schwannomin).
Management	Take medical history; examine skin, skeleton, cardiovascular system and neurological system; perform ophthalmic evaluation biannually until age 8, then annual if stable. Gliomas that cause visual problems tend to present early in childhood; perform developmental assessment in children; perform genetic consultation; perform MRI scan for suspected cases.	Perform MRI scan of head; perform hearing evaluation; perform ophthalmic evaluation; perform cutaneous evaluation; perform genetic consultation.

mulberries; or a combination of these two types.[9]

In the Brain

Optic nerve pathway gliomas (OPGs) are serious, but curable, brain tumors that arise in and around the optic nerve. Half of patients with optic nerve gliomas are NF1 patients; NF1-associated OPGs are typically less aggressive than non-associated NF1 OPGs.[10] Many patients with OPGs are asymptomatic; however, OPGs may cause unilateral, bilateral or color vision loss; optic nerve pallor or atrophy; proptosis; nystagmus; or strabismus. Chiasm or adjacent brain involvement may cause endocrine and neurological symptoms.[6] Typically, NF1 OPGs are stable for years and may slowly progress or spontaneously regress.[11] Treatment is rarely needed.

Symptomatic OPGs typically present by age six, with most children diagnosed by age three. Often, visual acuity can be assessed by age three, color vision by age five and visual fields by age eight.[6] MRI screenings are recommended every two years in patients with known OPG.[12,13] Upon identification of an optic glioma, current recommendtions include ophthalmological and MRI studies quarterly for the first year, and at gradually lengthening test intervals over the next two to three years.[14] Optical coherence tomography (OCT) is useful tool to monitor OPG. This noninvasive test is performed quickly and provides repeatable data. OCT will show a decrease in retinal nerve fiber layer (RNFL) when an OPG is present. MRI scanning is controversial in asymptomatic patients. The OCT detected RNFL loss in one patient before the patient had a decrease in vision.[15] Providers should use the OCT if one is available.

One less common finding is choroidal abnormalities: multiple pigmented nevi and flat ill-defined choroidal hamartomas that may be light tan, yellowish-white or black in color; one to two disc diameters in size; and numbering from two to 20. They are typically located in the posterior pole and increasing in number with aging. Fluorescein angiography reveals avascular patches of hypofluorescence, similar to multiple choroidal nevi.[3,16] Choroidal abnormalities with patchy appearance can also be seen using infrared monochromatic light. One study found 79% prevalence in near-infrared reflectance detected choroidal nodules in a pediatric population; however, the study population was limited, as near-infrared is not easily applied during the first years of life.[16] Less common ocular findings associated with NF1 include retinal vasoproliferation tumors, prominent corneal nerves, heterochromia, café au lait spots on the eyelids, conjunctiva choristoma, optic nerve drusen, multifocal choroidal nevi, uveal melanoma and congenital or infantile glaucoma.[1,3,12]

Neurofibromatosis 2 (NF2)

NF2 is caused by a gene mutation that codes for a tumor suppressor protein known as merlin or schwannomin, resulting in an overproduction of schwann cells and tumor growth.[5] As such, the hallmark sign of NF2 is bilateral vestibular schwannomas (VS), also

THE RICK BAY FOUNDATION

for Excellence in Eyecare Education

www.rickbayfoundation.org

Support the Education of Future Healthcare & Eyecare Professionals

Scholarships will be awarded to advance the education of students in both ***Optometry*** and ***Ophthalmology***, and will be chosen by their school based on qualities that embody Rick's commitment to the profession, including integrity, compassion, partnership and dedication to the greater good.

About Rick

Rick Bay served as the publisher of The *Review* Group since 1991.

To those who worked for him, he was a leader whose essence was based in a fierce and boundless loyalty.

To those in the industry and the professions he served, he will be remembered for his unique array of skills and for his dedication to exceeding the expectations of his customers, making many of them fast friends.

Interested in being a partner with us?

Visit www.rickbayfoundation.org

(Contributions are tax-deductible in accordance with section 170 of the Internal Revenue Code.)

THE RICK BAY FOUNDATION
for Excellence in Eyecare Education

(The Rick Bay Foundation for Excellence in Eyecare Education is a nonprofit, tax-exempt organization under section 501(c)(3) of the Internal Revenue Code.)

known as acoustic neuromas, which present in 90% of NF2 patients and grow in size over time.[2] Initial symptoms of NF2 in adults include tinnitus, hearing loss or balance dysfunction, or both, secondary to VS.

Patients may also exhibit skin tumors and physical weakness, though some may be entirely asymptomatic. Note, in younger NF2 patients, the VS may not be large enough to cause these same symptoms. Diagnosis of NF2 is typically made between 18 and 24 years of age; however, 18% of NF2 patients present before the age of 10.[4]

Juvenile posterior subcapsular lenticular opacity and peripheral cortical cataracts present bilaterally in 80% to 85% of NF2 patients and, in most cases, may be the first sign of NF2.[2] Most patients are asymptomatic, but 20% experience a decrease in visual acuity; however, surgery is rarely required.[4] Note, cataracts may be missed in children if a dilated examination is not performed. Obtaining a good family history can help with making an early diagnosis.

While rare in the general population, optic nerve sheath menigiomas (ONSMs) are another sign of NF2 found in up to 27% of NF2 patients.[17] These benign tumors can lead to compression or vascular compromise of the optic nerve's axons, causing progressive visual loss, color vision loss and optic atrophy or disc swelling; the triad of visual loss, optic atrophy and optociliary shunt vessels are pathognomonic for ONSMs.[10] Other findings characteristic of ONSMs include proptosis and gaze evoked amaurosis at later stages. Many patients with ONSMs also have reduced ocular motility due to restriction of orbital tumor mass or paresis of oculomotor nerves caused by compression or schwannomas.[10,17] ONSMs are typically unilateral and bilateral only in 5% of cases.[10]

Retinal hamartomas are nonmalignant focal growths that typically present unilaterally in an abnormal configuration. If they are bilateral, consider phakomatous etiologies, especially NF1, NF2, tuberous sclerosis or Gorlin syndrome.[18]

Combined pigment epithelium and retinal hamartomas (CPERH) are benign congential retinal tumors located typically in the posterior pole that involve the retinal pigment epithelium, neurosensory retina, retinal vessels and adjacent vitreous.[19] Traction at the vitreoretinal interface may be present, producing prominent preretinal gliosis and vessel tortuosity. Vision loss can occur depending on the location and stability. CPERH has been identified in a one-year-old child who was diagnosed with NF2 six years later.[20]

Epiretinal membranes (ERMs) can co-occur with CPERH in 78% of cases.[20] Adults presenting with ERM

are typically older than 50, and etiology is typically idiopathic or secondary to ocular disease. Isolated ERMs in children are likely congenital; however they can further affect vision clarity. Bilateral ERMs may indicate a more severe NF2 phenotype.[21]

Less common ocular findings of NF2 include ocular motor deficits due to direct or indirect compression of cranial nerves or of brainstem or cerebellum, or both. The deviation can change as the tumor grows and should be measured when examined.[17] Optic atrophy may be seen in patients with papilledema, recurring papilledema or direct optic nerve compression typically secondary to increased intracranial pressure (ICP).[17] Some NF patients may exhibit recurring tumor formation, resulting in recurring episodes.[17] Optic atrophy can also be seen in patients presenting with ONSMs. Lid dysfunction, exophthalmous, corneal hypothesia and neurotropic keratopathy, disc edema and cranial nerve palsy have also been reported.[1,2,4,22,23]

Neurofibromatosis is a serious systemic disease causing tumor growth than can negatively affect the entire body. While the diagnostic criteria may not be always be met in younger patients, clinicians who are suspicious should follow them closely. In time, they may develop other NF signs that satisfy the criteria.

Both NF1 and NF2 have ocular signs that may lead to an earlier diagnosis; however, these findings are rare in the normal population, especially if diagnosed at a young age. The severity of ocular involvement and disease course can vary from patients, even members of the same family.

Patients should be referred to appropriate specialist to be monitored for any current or future complications that may arise. Patients should be educated on the fact that NF can be a progressive disease and the importance of being followed regularly by appropriate specialists, including neurosurgeons, otolaryngologists, audiologists, optometrists/ophthalmologists, neuroradiologists and geneticists. ■

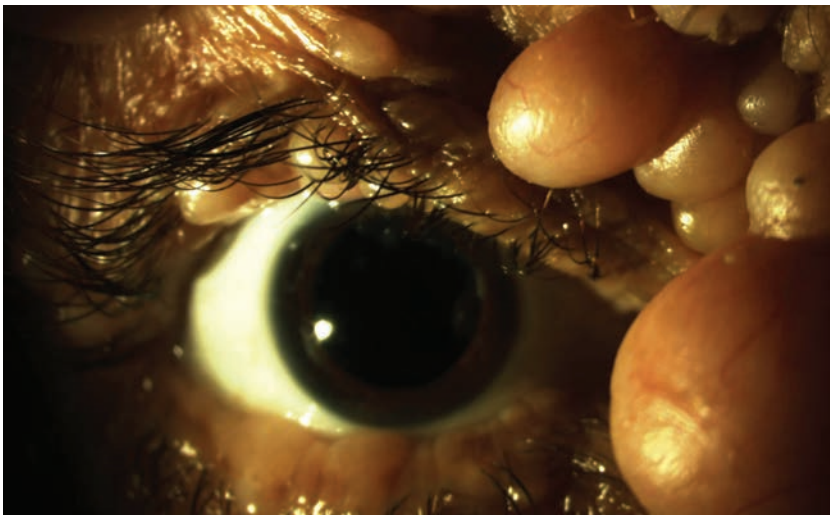


Photo: Al Kabat, OD.

A slit lamp evaluation is an important part of monitoring the visual health of patients living with neurofibromatosis. However, eye care professionals must also be aware of the disease's impact on retinal health, ocular motor deficits, optic atrophy and, in some cases, glaucoma risk.

Dr. Louprasong is a staff optometrist at the Cincinnati VA Medical Center.

Dr. Mercado is a staff optometrist at the Salisbury VA Medical Center. He is also an adjunct faculty member at the Illinois College of Optometry and the Southern College of Optometry.

1. Marks E, Adamczy D, Thomann K. Primary Eyecare in Systemic Disease. Norwalk:Appleton and Lange;1995.
2. Evans D. Medial management of neurofibromatosis. Paediatr Child Health. 2001;21(10):459-465.
3. Huson S, Jones D, Beck L. Ophthalmic manifestations of neurofibromatosis. Br J Ophthalmol. 1987;71:235-238.
4. Ruggieri M, Iannetti P, Polizzi A, et al. Earliest clinical manifestations of natural history of neurofibromatosis type 2 (NF2) in childhood: a study of 24 patients. Neuropediatrics. 2005;36:21-34.
5. Antnôio JR, Goloni-Bertollo, Trídico LA. Neurofibromatosis: chronological history and current issues. An Bras Dermatol 2013;88(3):329-43.
6. Ruggieri M. The different forms of neurofibromatosis. Child's Nerv Syst. 1999;15:295-308.
7. Adams EG, Stewart KMA, Borges OA, Darling T. Multiple unilateral Lisch nodules in the absence of other manifestations of neurofibromatosis Type 1. Case Rep Ophthal Med. Vol 2011, Article ID 854784, 2 pages.
8. Kreusel KM. Ophthalmological manifestations in VHL and NF 1: pathological and diagnostic implications. Fam Cancer 2005;4:43-47.
9. Martin K, Rossi V, Ferrucci S, Pian D. Retinal astrocytic hamartoma. Optometry. 2010;81:221-233.
10. Bosch MM, Wichmann WW, Boltshauser E, Landau K. Optic nerve sheath meningiomas in patients with Neurofibromatosis Ttype 2. Arch Ophthalmol. 2006;124:379-385.
11. Korf B. Malignancy in neurofibromatosis Type 1. Oncologist. 2000;5:477-485.
12. Ferner RE, Huson, Thomas N, et al. Guidelines for the diagnosis and management of individuals with neurofibromatosis type1. J Med Genet. 2007;44:81-88.
13. Segal L, Darvish-Zargar M, Dilenge ME, et al. Optic pathway gliomas in patients with neurofibromatosis type 1: Follow-up of 44 patients. J AAPOS 2010;14:155-158.
14. Hirbe AC, Gutmann DH. Neurofibromatosis type 1: a multidisciplinary approach to care. Lancet Neurol. 2014;13:834-43.
15. Parrozzani R, Clementi M, Kotsaffio O, Miglionico G, Trevisson E, Orlando G, Pilotto E, Midena E. Optical Coherence Tomography in Diagnosis of Optic Pathway Gliomas. Invest Ophthalmol Vis Sci. 2013 Dec 17;54(13):8112-8.
16. Makino S, Tampo H, Arai Y, Obata H. Correlations between choroidal abnormalities, Lisch nodules, and age in patients with neurofibromatosis type 1. Clin Ophthalmol. 2014;8:165-168.
17. Bosch MM, Boltshauser E, Harpes P, Landau K. Ophthalmologic Findings and Long-Term Course in Patients with Neurofibromatosis Type 2. Am J Ophthalmol. 2006;141(6):1068-1077.
18. Grant EA, Trzupek KM, Reiss J, et al. Combined retinal hamartomas leading to the diagnosis of neurofibromatosis type 2. Ophthalmic Genet. 2008;29:133-138.
19. Vianna RNG, Pacheco DF, Vasconcelos MM, De Laey JJ. Combined hamartoma of the retina and retinal pigment epithelium associated with neurofibromatosis type-1. Int Ophthalmol. 2002;24:63-66.
20. Landau K, Yasargil GM. Ocular fundus in neurofibromatosis type 2. Br J Ophthalmol. 1993;77:646-649.
21. Siwiec-Proscinska J, Gotz-Wieckowska A, Pawlak, Kociecki J. Epiretinal membrane and cataract in a 5-year-old boy with the suspicion of neurofibromatosis type 2. Cent Eur J Med. 2013;8(1):80-83.
22. Ragge NK. Clinical and genetic patterns of neurofibromatosis 1 and 2. Br J Ophthalmol. 1993;77:662-672.
23. Ragge NK, Baser ME, Riccardi VM, Falk RE. The ocular presentation of neurofibromatosis 2. Eye. 1997;11:12-18.

INTERNATIONAL VISION EXPO & CONFERENCE LAS VEGAS

Vision Expo West: A CE Jackpot in Vegas

Optometrists will gather to catch up on the latest in contact lens care, glaucoma, anterior segment and so much more. **By Jane Cole, Contributing Editor**

Las Vegas may be known as the gambling mecca of the United States, but it's also getting a reputation for exceptional CE, as Vegas will once again host Vision Expo West (VEW), which will be held from Sept. 16 to 19. This year's meeting will offer 320 CE credits for attendees and up to 31 credit hours per optometrist.

Paul Karpecki, OD, and David Geffen, OD, discussed innovations in technology at last year's Vision Expo West.

Course Highlights

Recognizing that sports vision is a growing specialty, VEW has a dedicated track for ODs interested in learning more about this niché. The courses will cover how to test, treat and train weekend warriors, little league coaches and even the elite pros. Topics include techniques to enhance athletes' visual skills, testing of sports-related visual performance and how to correctly screen, diagnosis and manage a concussion. This track offers up to six hours of CE credit.

The glaucoma track will offer a total of 16 CE credit hours this year, and boasts courses taught by world-class experts designed help you advance your ability to detect and monitor glaucoma without referring out to a specialist. "One of the most frequent comments I hear from my colleagues is, 'I want to start getting involved with glaucoma, but there are so many new drugs, diagnostic instruments and treatment philosophies since I left school, it's hard to know where to start,'" says Kirk Smick, OD, past chairman of Vision Expo's Conference Advisory Board. "Well, this year's Vision Expo West program committee has heard your remarks and has put together a super program with several new courses regarding the treatment of glaucoma," says Dr. Smick. "We suggest you begin making plans now to take a whole list of courses, and then, when you return to your busy clinic, begin implementing several of the new ideas that you learned at Expo."

Another clinical highlight: 35 hours of anterior segment courses, which will include "Red Eye Round-Up," by Paul Ajamian, OD, and Daryl Mann, OD; "Amniotic Membrane Workshop," presented by Doug Devries, OD, and Greg Caldwell, OD; and "Anterior Segment OCT Applications in Contact Lens Evaluations," by Jeffrey Sonsino, OD.

OSD Symposium

Another can't-miss event is the Ocular Surface Disease (OSD) and Wellness Symposium, which will

VEW Glaucoma at a Glance

Wednesday, September 16
11C2 **Building a Specialty Glaucoma Practice Within Your Practice** (2 CE), 1:30pm – 3:30pm
Speakers: Ben Gaddie, OD, and John Rumpakis, OD, MBA
12C2 **New Directions in Glaucoma Diagnostics & Treatments** (1 CE), 3:45pm – 4:45pm
Speaker: Ben Gaddie, OD

Thursday, September 17
22C2 **Understanding the Structure/Function Duo in Glaucoma** (1 CE), 8:30am – 9:30am
Speaker: Murray Fingeret, OD
23C2 **Progression in Glaucoma** (1 CE), 9:45am – 10:45am
Speaker: Murray Fingeret, OD
24C3 **Clinical Conundrums in Glaucoma** (1 CE), 11:00am – 12:00pm
Speaker: Joseph Sowka, OD
24C4 **Growing Your Practice with VEP Testing & Automated Pupillography** (1 CE), 11:00am – 12:00pm
Speaker: Craig Thomas, OD
25C2 **Glaucoma Pearls & Grand Rounds** (2 CE), 2:45pm – 4:45pm
Speakers: Murray Fingeret, OD, Joseph Sowka, OD, and Ben Gaddie, OD

Friday, September 18
31C7 **Enlarged Optic Nerve Cupping: Differentiating Between Glaucoma & Compressive Optic Neuropathy** (1 CE), 8:30am – 9:30am
Speaker: Andrew Mick, OD
33C1 **Separating the Good, the Bad & the Ugly: Is it Glaucoma or Not?** (2 CE), 2:45pm – 4:45pm
Speaker: Ron Melton, OD, and Randall Thomas, OD
33C2 **Laser Procedures for the Management of Glaucoma & More** (2 CE), 2:45pm – 4:45pm
Speaker: Nate Lighthizer, OD,
34C4 **The Other Glaucoma** (1 CE), 5:00pm – 6:00pm
Speaker: Andrew Mick, OD

Saturday, September 19
43C4 **Anterior Segment Disease & Glaucoma Jeopardy** (1 CE), 11:00am – 12:00pm
Speaker: David Sendrowski, OD

help attendees realize why an OSD practice should mirror a preventative care model. The symposium will also help you better recognize dry eye diseases and allow you to expand the quality and consistency of care you are providing by following easy-to-use dry eye disease recommendations. Jack Schaeffer, OD, Scot Morris, OD, and Marc Bloomenstein, OD, will present two courses during the symposium. The first—"Ocular Wellness and the Ocular Surface: Where Do We Go From Here?"—walks you through a plan, developed by 30 optometric leaders, for a dry eye strategy for all optometrists. The course will cover the processes of developing a strategy in your office, doctor and staff responsibilities and basic diagnostic and treatment modalities. The second course, "Ocular Surface Disease: Developing a Strategy for Diagnosis and Treatment of OSD," will use case studies and a rapid fire approach to cover the advanced diagnostic and treatment strategies for a dry eye specialty practice. The presenters will also discuss the wellness initiative and its relation to OSD prevention. The symposium will offer three CE credit hours.

Contact Lens Forum

A Global Contact Lens Forum will offer six free credit hours and will cover profitability, disease management and technology, as well as forecast the future of contact lens care. The forum will include:

- *State of the Contact Lens Industry in 2015* by Barry Eiden, OD, Robert Davis, OD, Clarke Newman, OD, and Scot Morris, OD.
- *Contact Lens Practice—A Survival Guide Q&A Debate* moderated by Louise Sclafani, OD, and panelists Dr. Davis, Dr. Newman and Dr. Eiden.
- *Contact Lens Challenges—Evaluation and Management Strategies* by Michael A. Ward, MMSc, FCLSA.
- *A Practical Guide to Contact Lens Practice* by Drs. Morris and Newman.

Other clinical courses during the conference will focus on pharmacology (11 hours), posterior segment and macular degeneration (30 hours), and systemic disease and neuro (16 hours).

"There is not a better way to celebrate the beginning of fall than being in Las Vegas in September for Vision Expo West," says Mark Dunbar, OD, co-chair of Vision Expo's Conference Advisory Board. "Vision Expos educate more optometrists than any other optometric meeting. There is a smorgasbord of interesting topics delivered by the top lecturers in the country, more exhibitors than any other meeting and a great venue in which to learn and have a great time. Come join us—it will be the best meeting you attend all year."

For more information, go to www.visionexpowest.com. ■

Throughout-the-Day Variability in Soft Contact Lens Performance: Are We Asking the Right Questions?

Kieron Mathews BSc, MBA, Ben Daigle, Jordin Alford MBA, MA, and Anne Marie Jedraszczak, MA

Despite nearly 60% of wearers experiencing decline in lens performance, often with fluctuations during the day, patients may under-report problems which can lead to contact lens drop out. A closer look at what happens, not only at insertion of a contact lens and end-of-day removal, but at the moments in between, uncovers a varied set of experiences that contact lens wearers go through. A deeper understanding and empathy for the various challenges lens wearers face from moment to moment during the day could lead to improved lens design and fitting.

Independent market research specialists Kadence International recently conducted a quantitative longitudinal study of 243 soft contact lens wearers to better understand the lens-wearing experience.

Study methodology

To participate in the study, contact lens wearers had to be between the ages of 18 and 39 and planning to wear their lenses for a full day on the day of the study. Wearers of both reusable soft lenses (n=142) and daily disposable contact lenses (n=101) participated.

Researchers used mobile research techniques to chronicle the wear day. Subjects were asked to respond to short surveys pushed to them every two hours via a mobile app, beginning with insertion and ending just after they remove lenses. Each mini survey asked the same set of questions in order to track responses throughout the day:

- Lens comfort (5-point scale)
- Lens satisfaction (5-point scale)
- Vision quality (5-point scale)

- Activities in past two hours (selected from a list of 18 activities such as "using a computer or laptop," "typing a message/email on a smart phone," "exercising", etc.)
- Environments experienced in past two hours (selected from a list of 8 environments such as "outside on a humid day," "inside in air conditioning," etc.)
- Symptoms experienced in past two hours (selected from a list of 14 symptoms such as "eye tiredness feeling," "eye dryness feeling," "fluctuating vision," etc.)

The activities, environments and symptoms included in the survey came from a list of clinically validated measures for the contact lens experience. The first three metrics (comfort, satisfaction, and vision quality) were combined with equal weight to create a single performance metric that summarizes the experience of the patient at each moment throughout the day.

Performance decline

The survey measured a general downward trend on all three measures of lens performance from insertion to end of day (Fig 1).

However, not all lens wearers had the same experience. 41% of survey participants ("Maintainers") had lenses that maintained performance across the entire day, while 59% ("Decliners") experienced an overall decline in performance throughout the day.

The percentage of Maintainers vs. Decliners was the same for both lens modalities, indicating that daily disposable wearers are just as susceptible to lens performance declines as two-week or monthly wearers.

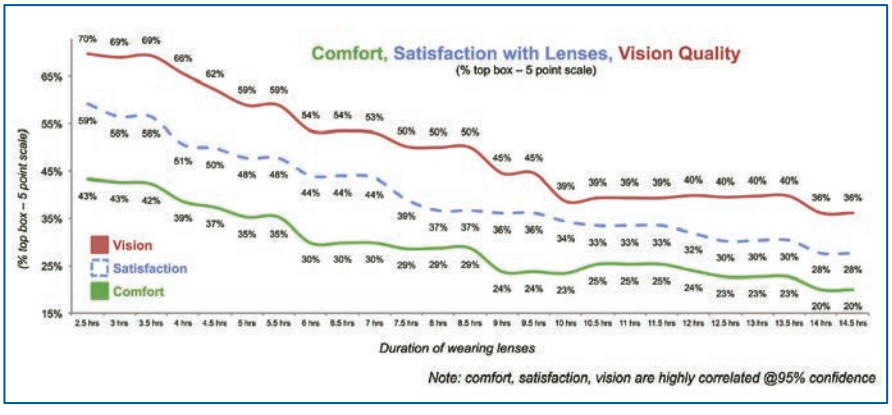


Fig 1: Percentage of respondents who gave top ratings (extremely comfortable/ completely satisfied/ excellent vision) in each of the three lens performance areas.

The most common performance decay pattern is one of fluctuating decline, affecting one in every four contact lens wearers or nearly half of the Decliners. One in every five contact lens wearers or 31% of Decliners experienced a continuous decline in lens performance from insertion to end of the day. Smaller percentages of wearers experienced a slight decline in performance (14% of Decliners) or a sharp drop at the end of the day (13% of Decliners) (Fig 2).

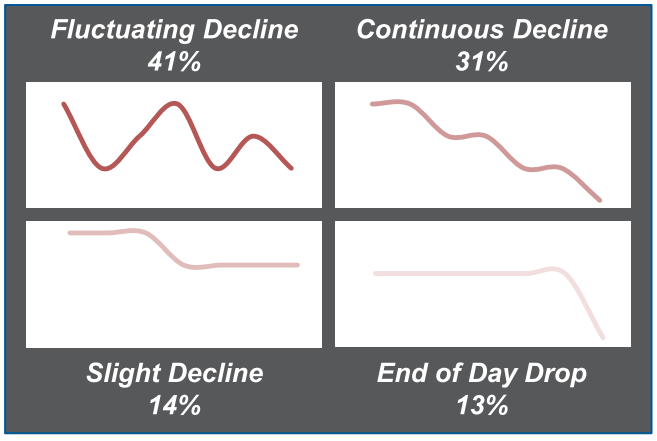


Fig 2: Performance decay pattern within the Decliners group. Fluctuating and continuous declines were the most common patterns of performance decay.

The two most common symptoms articulated by the 59% of wearers who experienced a performance decline over the day are feelings of tired eyes and eye dryness. Moreover, these symptoms are also the most highly correlated with lens performance (Fig 3).

According to the study data, there is no specific 'tipping point' or activity that causes lens performance to decline. However, Decliners were more likely to engage in 10 or more activities throughout the day, such as working on their laptop or PC, sending emails or text on their phone, using apps or doing homework. They were also more likely to shift between different environments throughout the day.

In conclusion, this study shows that regardless of contact lens modality, six in ten contact lens wearers experience a decline in lens performance over the course of the day. Although the trend is a downward one, actual performance often fluctuates considerably throughout the day. Many patients, namely daily disposable wearers, are "silent sufferers."

Eye care practitioners have an opportunity to offer better solutions to these patients before they drop out with small tweaks in how lens performance questions are asked. By listening for specific language ("tired eyes," for example), and digging deeper into the environments and variety of activities patients are exposed to, doctors can uncover a need for a change. ■

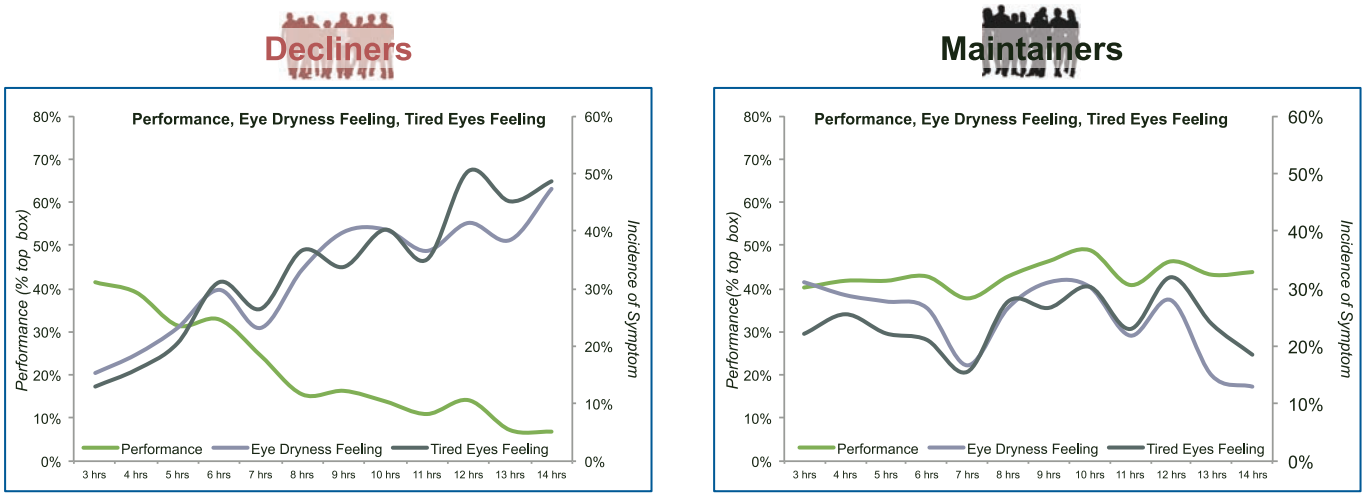


Fig 3: Correlation between lens performance and symptoms of eye dryness and tired eyes feeling amongst Decliners and Maintainers.

Sponsored by Johnson & Johnson Vision Care, Inc. K. Mathews and B. Daigle are employees of an independent market research firm and J. Alford and A. Jedraszczak are employees of Johnson & Johnson Vision Care, Inc.

Drug of Choice

Is there a preferred topical antibiotic to use with a bandage contact lens?

Edited by Joseph P. Shovlin, OD

Q Do you have recommendations for antibiotic prophylaxis when using a bandage contact lens (BCL)? I've never had an infection while using a BCL in more than 30 years of practice until I switched to generic Polytrim (trimethoprim/polymyxin B). However, I've had two infections while using a BCL in the past year. Is there concern regarding use of the generic? Should I be using a different topical treatment?

A "Bandage contact lenses are used for a variety of reasons, not all involving an epithelial defect," says Aaron Bronner, OD, of the Pacific Cataract and Laser Institute. "However, in cases dealing with an epithelial defect, compounding risk with BSL necessitates the use of topical antibiotic prophylaxis." When using prophylaxis along with a BCL, Dr. Bronner notes, it's important to keep the antibiotic at therapeutic dosage levels to prevent drug-resistant infectious ulcers. "Dosing an antibiotic BID when it's meant to be dosed at QID does nothing but select out for the highly succepible colonies, thereby directly selecting for growth of more resistant colonies."

Polytrim has good coverage against certain pathogens, including MRSA, *Haemophilus influenzae* and even *Pseudomonas aeruginosa*, says Paul Karpecki, OD, of Koffler Vision Group in Kentucky; however, the decades-old approval of its formulation has led to bacterial resistance over time. For example, methicillin-resistant coagulase negative *Staph.* (MRCoNS) is no longer susceptible to trimethoprim. Manufacturers of generics must also show bioequivalence to branded medication, but can alter preservatives, additives and pH levels, further impacting the drug's effectiveness. Dr. Karpecki uses the drug to treat children who have not been previously exposed to it, but combines it with the fluoroquinolone Besivance (besifloxacin 0.6%, Bausch + Lomb) when treating MRSA conjunctivitis in adults.

So what similar topical treatments exist? Broad-spectrum antibiotics are the best choice, Dr. Karpecki says. He suggests besifloxacin for treating MRSA, MRSE, *P. aeruginosa* and even fluoroquinolone-resistant *Staphylococcus* strains. The high cost of besifloxacin may be a limiting factor for patients without a drug plan, however. "Other fluoroquinolones such as moxifloxacin, gatifloxacin or ofloxacin don't have quite the broad coverage of besifloxacin," Dr. Karpecki says, "but still have very broad coverage and other attributes—like moxifloxacin being preservative-free." Generic tobramycin or gentamycin are also good possibilities; however, long-term use can result in corneal toxicity.

Dr. Bronner adjusts his selection depending on risk level. "In lower risk eyes," he says, "I often use generic ofloxacin 0.3% QID, [though] in eyes where the induced trauma is more likely to carry infectious material or where pre-existing ocular surface disease increases risk, I'll use a newer generation agent, typically Vigamox (moxifloxacin, Alcon) rather than Moxeza (moxifloxacin hydrochloride, Alcon). I like the lack of preservative for these eyes, and the thinner Vigamox dovetails with BCL usage better than Moxeza, in my opinion." Eyes with epithelial defects that do not respond to conventional therapy should be evaluated for second-line therapy such as amniotic tissue or autologous serum and, if both are unsuccessful and visual potential is limited, a conjunctival flap.

J. James Thimons, OD, of Ophthalmic Consultants of Connecticut, notes if the patient exhibits a sulfa allergy and cannot afford a fourth-generation fluoroquinolone, Neosporin QID offers inexpensive coverage. Ciprofloxacin is also a reasonable alternative. "If no epithelial defect exists, I typically do not cover the eye with a prophylactic antibiotic, but I do use non-preservative artificial tears QID to maintain moisture," he says. ■

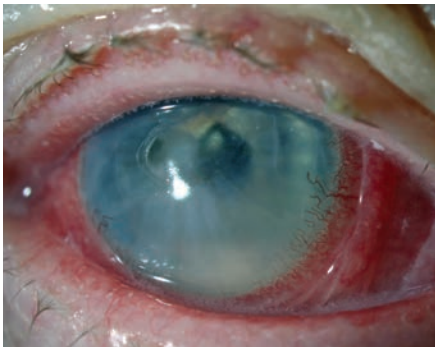


Photo: Aaron Bronner, OD

A perforated and highly resistant infectious corneal ulcer, which developed in an eye with neurotrophic disease and chronic BCL and antibiotic therapy.

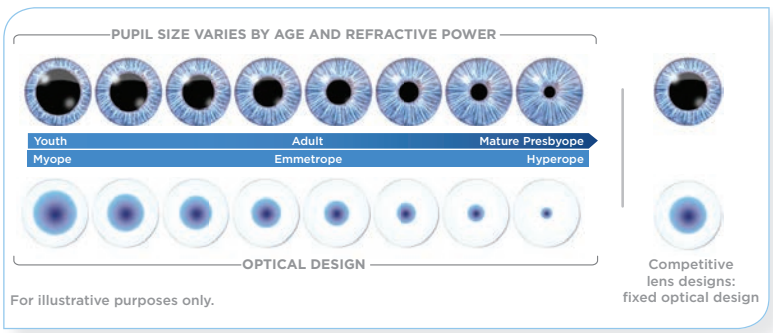
NEW **Built on the ACUVUE® MOIST Platform—**
the #1 prescribed daily disposable brand around the globe*

Her **Vision** Will Change.
Her **Experience** Won't.

Now you can **continue excellent care** as her vision evolves into presbyopia

NEW 1-DAY ACUVUE® MOIST Brand MULTIFOCAL Contact Lenses:
Advancing multifocal lenses with pupil optimization: INTUISIGHT™ Technology

The **ONLY MULTIFOCAL LENS** that uniquely optimizes the optical design to the pupil size for a predictable performance across the refractive range and ADD powers.



For illustrative purposes only.

Continue providing the care you've always delivered with the multifocal lens you can rely on.

www.acuvueprofessional.com/moist-multifocal-contact-lenses

*Based on independent third-party data, December 2014.

ACUVUE® Brand Contact Lenses are indicated for vision correction. As with any contact lens, eye problems, including corneal ulcers, can develop. Some wearers may experience mild irritation, itching or discomfort. Lenses should not be prescribed if patients have any eye infection, or experience eye discomfort, excessive tearing, vision changes, redness or other eye problems. Consult the package insert for complete information. Complete information is also available by visiting acuvueprofessional.com or by calling 1-800-843-2020.

 10363295-D July 2015

A Tale of Two Troubles

Two noncompliant glaucoma patients on the same day; how do you approach the situations? **By James L. Fanelli, OD**

Early last month, on an uneventful clinic day full of glaucoma patients, a 67-year-old white male presented for a follow up related to his glaucoma. He was scheduled for threshold visual field testing, HRT 3 optic nerve imaging and stereo disc photography. The problem was, he was scheduled for these tests 20 months earlier.

On the same day, a 64-year-old black female presented for a cataract evaluation. She was scheduled for a refraction, dilation and evaluation of her cataracts. The problem this time? She is also a glaucoma patient who was last seen in the office approximately two years earlier.

When looking at each of the patients more closely, we observed the following pertinent information.

Case One's Diagnostic Data

The 67-year-old white male was initially diagnosed with open angle glaucoma four years earlier due to elevated intraocular pressure (IOP) and characteristic optic nerve damage. Specifically, his pretreatment IOP was in the upper 20s in both eyes, central corneal thickness measured 522µm OD and 511µm OS. His cup-to-disc ratio at the initial evaluation was 0.55 x 0.65 OD and 0.6 x 0.7 OS. Thinning of the neuroretinal rims was observed superiorly and inferiorly in both eyes, with corresponding field defects in the arcuate regions, not involving fixation. Gonioscopy demonstrated open angles in both eyes.

After an initial trial period, the patient was stabilized on Lumigan (Allergan) HS in both eyes. In the subsequent two years of therapy, the fields, neuroretinal rims and structural indices all remained stable, with post medicated pressures averaging 16mm Hg OU. He was then lost to follow up and presented to the office last month because he "felt it was time to come back."

At this most recent visit, his IOP was 24mm Hg OD and 25mm Hg OS at 10:15am. When queried about his use of glaucoma therapy, he admitted that he ran out of medications about a year earlier. He was maintaining close liaison with his primary care physician and continued his hypertensive and GERD medications regularly. By the time I saw him, the patient already had his visual field and HRT 3 testing. Both the visual fields and the HRT 3 results revealed progression of his disease in both eyes. Neuroretinal rim loss had progressed, and the fields had worsened accordingly. No disc hemorrhages were noted. Other than early nuclear sclerotic cataracts, the remainder of his ophthalmic evaluation was unremarkable.

Case Two's Diagnostic Data

The 64-year-old black female had a lengthy and complex medical record. She was initially diagnosed with bilateral uveitic glaucoma seven years earlier. This time around, I reviewed her records from the past, both electronic and paper. Three visits were recorded in EMR and 12 visits in the paper record. In reviewing the paper records, it became evident that she had been seeing no less than four different eye care providers, one of whom was my partner. She was pseudophakic in the right eye, and there was information from a cataract surgeon regarding referral to a glaucoma surgeon for elevated IOP following cataract surgery.

Sometime after the cataract surgery (approximately eight years earlier), my partner and I both became involved in her care. The patient also continued to see a glaucoma surgeon, and one other provider in town.

Compliance Do's and Don'ts

DO (while maintaining standard of care):

- Simplify the medication regimen
- Try to make the testing as simple and as infrequent as possible
- Try to have the patient understand the nature of the disease
- Encourage patients to "buy in" to care
- Communicate in a way that makes patients comfortable
- Express your expectations firmly
- Be confident in your care and plan
- Understand the patient expectations
- Document, document, document

DON'T:

- Dismiss a patient's concerns
- Forget to communicate with the patient
- Make them feel insignificant in the patient care encounter
- Become complacent in your care
- Frighten a patient to foster compliance
- NOT care about the patient

LOMBART CS-5 CHAIR & STAND

Quality, Style & Value

Package includes:

- The ***Lombart CS-5*** Chair & Stand
- ***Topcon VT-10*** Refractor
- ***Topcon SL-2G*** Slit Lamp

- ***Lombart CVS Essential Visual Acuity System*** with RF Remote Control
- Additional upgrades & configurations available.

$13,995

Or lease for $277/mo. for 60 months*

*Lease rate subject to credit approval, 1st payment is due at signing with 59 remaining rental payments of $265 and a $1.00 purchase option. Taxes, freight and installation additional. Hand Instruments optional. Subject to change without notice.

1-800-566-2278

Call 1-800-Lombart

Or Your Local Lombart Representative

Corporate Office - 5358 Robin Hood Road, Norfolk, VA 23513-2430
757-853-8888 | FAX 757-855-1232 | 800-566-2278
www.lombartinstrument.com
lombart@lombartinstrument.com

Sales and Service Centers Coast to Coast

ATLANTA • BALTIMORE/WASHINGTON D.C. • BOSTON • BOYNTON BEACH/MIAMI • BRADENTON • CHARLOTTE • CHICAGO • CINCINNATI • DALLAS • DENVER • DETROIT • GREENSBORO • HOUSTON
JACKSON • KANSAS CITY • KNOXVILLE • LOS ANGELES • MILWAUKEE • MINNEAPOLIS • NEW JERSEY/NEW YORK/PENNSYLVANIA • NORFOLK • PORTLAND • SAN ANTONIO • SAN DIEGO • SAN FRANCISCO

DOWNLOAD LAYAR APP FOR INTERACTIVE EXPERIENCE

layar INTERACTIVE PRINT

SCAN

First 150 app downloads & completed forms will be entered into a drawing for ***FREE MEETING & REGISTRATION VALUED AT $495***

REGISTRATION OPEN!

REVIEW OF OPTOMETRY
EDUCATIONAL MEETINGS OF CLINICAL EXCELLENCE

New Technologies and Treatments

N T & T

IN VISION CARE 2015

PHILADELPHIA, PA
NOVEMBER 6-8
SHERATON PHILADELPHIA DOWNTOWN HOTEL
201 NORTH 17TH STREET PHILADELPHIA, PA

$75 OFF BY SEPTEMBER 6TH

SAVE THE DATE

Our New Technologies and Treatments faculty of thought leaders captivate attendees as they share their expertise on cutting edge technology and the latest pharmaceuticals.

NEW! DRY EYE AND GLAUCOMA WORKSHOPS AVAILABLE

layar INTERACTIVE PRINT

Watch video with meeting chair, Paul Karpecki for more reasons to attend!

FACULTY

Paul Karpecki, OD
Program Chair

Douglas Devries, OD

Jeffry Gerson, OD

Blair Lonsberry, OD

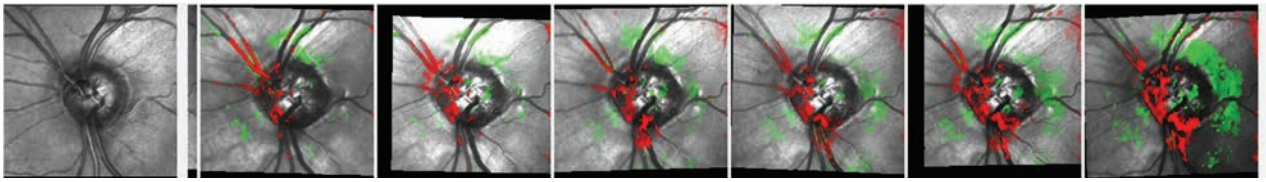
3 WAYS TO REGISTER

ONLINE: WWW.REVOPTOM.COM/PHILADELPHIA2015
EMAIL LOIS DIDOMENICO: REVIEWMEETINGS@JOBSON.COM
PHONE: 866-658-1772

Administered By
Review of Optometry®

cope® Approval pending

Up to 17 CE Credits
(COPE approval pending)



This topographical change analysis shows progressive loss of neuroretinal rim and perioptic nerve fiber layer in a 67-year-old white male glaucoma patient who skipped out on his scheduled testing and didn't return for nearly a year.

Her chart and care had become so confusing and complicated by so many people providing care that, when I saw her earlier in July, I was uncertain about her stability. Interestingly, and not surprisingly, while reviewing the paper charts, I noticed a post-it note that I had attached to one of my partners' office notes from five years ago, addressed to him, simply asking: "who is driving this bus?" Not remembering the exact nuances of her case, seeing this note reaffirmed that, even years ago, I was concerned that there were too many cooks in the kitchen.

To complicate it further, she was an unreliable historian. She did affirm that she was taking Travatan Z (Alcon) HS for both eyes and Alphagan-P (Allergan) BID for her right eye and TID for her left eye. Otherwise, she was not clear on when she had seen any other eye doctor in the past six to nine months, but mentioned that she saw the glaucoma surgeon "several months ago."

To complicate an already muddy case, the surgeon's notes clearly mentioned that she was being treated for uveitic glaucoma bilaterally, yet she had two laser peripheral iridotomies in her left eye, one at 10 o'clock and one at 2 o'clock, both of which were patent. In this phakic left eye, angles were wide open, the chamber was quiet and the natural lens was characterized by moderate nuclear sclerosis. The anterior segment of the right eye was essentially unremarkable, with a well-centered posterior chamber IOL, a clear posterior capsule and a clear anterior chamber. Both discs were characterized by 0.5 x 0.55 cup-to-disc ratios, and relatively healthy neuroretinal rims, with no frank evidence of focal loss.

Discussion

Two patients with varying degrees of noncompliance are presented here. At the end of the day, our responsibility is to make an accurate diagnosis and offer an acceptable and sound medical plan, but it is ultimately up to the patient to comply. Unfortunately for us, we may face blame even for noncompliant patients. And unfortunately for the patient, if they're noncompliant, they may lose vision.

So how do we deal with noncompliance? Individualize your approach based on the case specifics and the likelihood of the patient truly understanding the necessity for compliance. There are some caveats on what not to do, but how you approach a noncompliant patient will differ in the same number of ways that patients manifest their noncompliance.

Some ways to proceed are more subtle, such as getting patients to "buy in" to their own care. Other ways are more dramatic, such as covering patients' eyes and telling them this is what they will see if they don't comply—nothing.

For the 67-year-old white male, I chose to lay it all out on the line, in frank terms, that he has worsened in the past 20 months and will continue to do so if we don't make a change in his compliance. Yes, I did tell him he will lose vision as time progresses. But unfortunately for him, I had evidence that he already lost vision. I assumed that because he "thought it was time" to return, that meant he actually does have an interest in his care. This was my opportunity to say, in essence, "OK, you worsened, you get a pass this time, you will get worse if we don't change anything, so I need your help to prevent that from happening."

For the 64-year old-black female, I took an entirely different approach. I looked her squarely in the eyes and said that we have been down this path before and that too many people are involved in her eye care—and that she needs to pick one. It didn't matter to me who she chose; it was in her best interest that one person was driving her care, not several people. Things weren't adding up (multiple providers, LPIs with open angles and deep chambers, etc.). I told her, if she wanted me to be that provider, then she was to return in one to two months for specific testing and that if she didn't return, which was certainly her prerogative, we would no longer be able to see her. And I documented it clearly in her chart.

Different scenarios and patients require different approaches. At the end of the day, if you care more about your patient's health than they do, there is little you can do for the patient.

You can't protect them from themselves, but you must protect yourself. ■

VISIONARIES

IN EDUCATION, FASHION AND TECHNOLOGY

REGISTER TODAY!

INTERNATIONAL VISION EXPO 2015

EDUCATION: WEDNESDAY, SEPTEMBER 16–SATURDAY, SEPTEMBER 19
EXHIBITION: THURSDAY, SEPTEMBER 17–SATURDAY, SEPTEMBER 19
SANDS EXPO & CONVENTION CENTER | LAS VEGAS, NV

VisionExpoWest.com | #VisionExpo

INTERNATIONAL VISION EXPO & CONFERENCE
LAS VEGAS

PROUD SUPPORTER OF: thinkaboutyoureyes.com

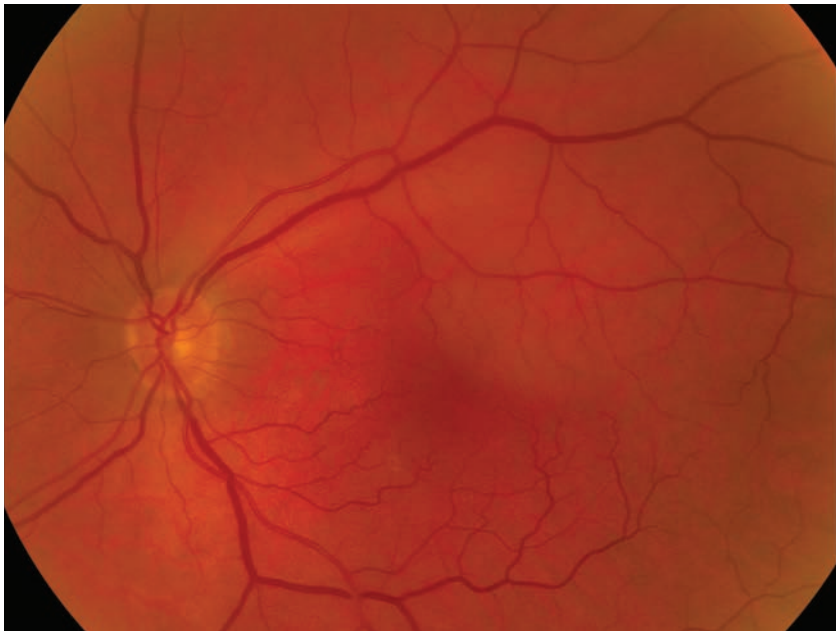
20/20, But Not Okie Dokie

A patient's blurry vision and field loss indicates an underlying condition.

By Mark T. Dunbar, OD

A 63-year-old Hispanic male presented with a sudden onset of blurred vision and inferior visual field loss in the left eye that started about one hour before coming in. Because he was scared, he came immediately. His past ocular history was unremarkable. He began wearing OTC reading glasses approximately 15 years ago, and his medical history was significant for hypertension, coronary artery disease and back pain.

On examination, best-corrected visual acuity was 20/20 OU. Confrontation visual fields were full to careful finger counting in the right eye. In the left eye, there was an obvious inferior depression. This was also seen on Amsler grid testing. His pupils were equally round and 3+ reactive with a trace afferent pupillary defect on the left side. The anterior segment was unremarkable in both eyes. Dilated fundus exam of the right eye was normal. Exam of the left eye showed changes (*Figure 1*). An OCT and fluorescein angiogram (FA) were obtained and an early frame of the angiogram is available for review (*Figure 2*).



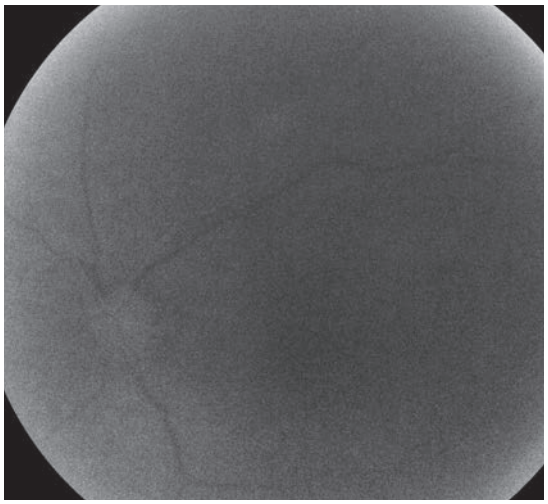


Fig. 1. Above, fundus image shows the 63-year-old Hispanic male patient's left eye. The patient reported sudden onset of blurred vision beginning one hour prior.
Fig. 2. At left, a fluorescein angiogram of the same eye.

Take the Retina Quiz

1. What is the significant finding on the FA?
a. The FA is normal.
b. It shows a branch retinal vein occlusion (BRVO).
c. It shows a branch retinal artery occlusion (BRAO).
d. There is a delay in the arterial phase.

2. What is the correct diagnosis?
a. Anterior ischemic optic neuropathy.
b. BRVO.
c. Central retinal artery occlusion (CRAO).
d. BRAO.

3. How should this patient be managed?
a. Observation only.
b. Carotid artery work up, including Doppler studies.
c. CRP and sed rate.

d. Anti-VEGF injection.

4. What is the prognosis?
a. Return to normal visual function.
b. Painless progressive vision loss.
c. Will likely develop optic atrophy.
d. Has a good chance of developing neovascular glaucoma.

For answers, see page 114.

Diagnosis

It appears our patient has a BRAO involving the superior temporal artery of the left eye, although this may also represent a reperfused CRAO. The clinical findings are consistent with a BRAO because there is an area of retinal whitening superotemporal to the macula that begins along the arcade and extends inferiorly and stops adjacent to the macula. We observed a clear delineation of the retinal whitening—which represents ischemia and swelling of the photoreceptors—and the normal retina. Because it does not directly involve the fovea, the acuity remained 20/20, although threshold visual field testing shows a relative paracentral scotoma corresponding to the area of retinal whitening.

It is possible this may have started out as a CRAO and reperfused itself before it had a chance to cause massive retinal ischemia, as is usually seen in a CRAO. The FA shows a significant delay in the arterial phase of the angiogram.

The image provided was shot at 30 seconds, and you can see the fluorescein dye just beginning to fill the arteries. In a normal patient, this happens by about 10 seconds.

Discussion

Both BRAO and CRAO develop as a result of emboli that pass from other parts of the body, most commonly the carotid artery, into the eye and, depending on the size of the embolus, blocks blood flow to the retina, resulting in ischemia to the tissues. Larger emboli may completely block perfusion into the central retinal artery, whereas a smaller one may pass through the central retinal artery and occlude a branch or even a smaller arteriole. In some instances, the plaque may be visible on clinical exam, although we were not able to see the plaque in our patient, which is not unusual because the occlusion is not always permanent, but instead may last for only a few seconds or minutes. Though often transient, the damaging effects of the ischemia may be permanent. That's why the diagnosis and management of BRAO and CRAO are time-sensitive. The duration of the occlusion is the most critical factor in determining visual recovery; the window of opportunity for recovering useful vision in a CRAO is between 90 minutes and 240 minutes.[1] If it is less than 90 minutes, the retina may suffer no significant damage; more than 240 minutes, the retina will suffer massive irreversible damage. Our patient presented within 60 minutes from the time he noted visual changes, and it appears the embolus passed through the retinal circulation with only mild damage to the retinal tissue.

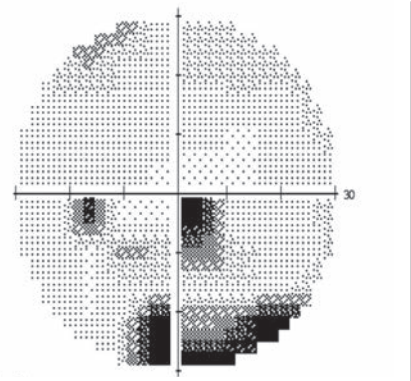


Fig. 3. Above, the patient's visual fields test results.

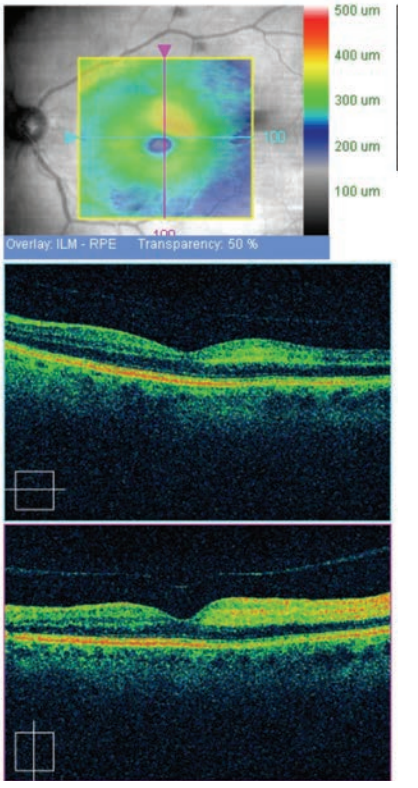


Fig. 4. At right, images from the patient's OCT evaluation.

Treatment

If discovered at the earliest stage, ocular massage or re-breathing carbon dioxide may help to dislodge the embolus or provide enough dilation of the retinal artery to allow the plaque to pass.

Most BRAOs do not require any treatment, and visual recovery is dependent on the location and duration of the occlusion.

Our patient was lucky, since he maintained 20/20 acuity; however, his inferior visual field depression remained persistent.

He was referred to his cardiologist, and carotid artery studies were obtained and came back with minimal blockage. ■

1. Hayrey, SS. Prevalent misconceptions about acute retinal vascular occlusive disorders. Progress in Retinal and Eye Research, 2005;24:493-519.

REVIEW® OF OPTOMETRY

CONTINUE YOUR EDUCATION WITH REVIEW

OUR FLAGSHIP TITLE, *REVIEW OF OPTOMETRY*, IS THE MARKET'S LEADING RESOURCE FOR ALL OF YOUR OPTOMETRY NEEDS.

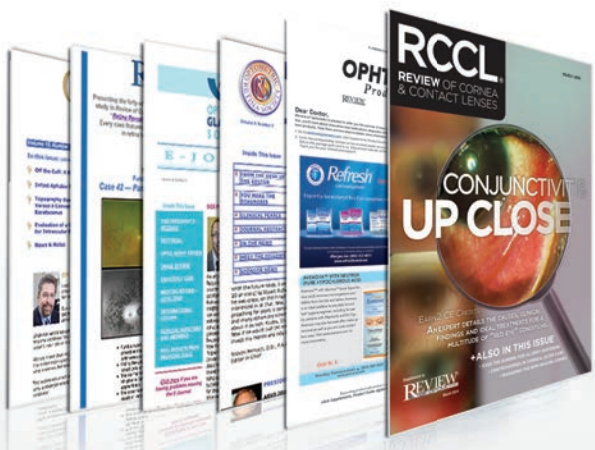
Review of Optometry is your primary source for ground-breaking clinical information as well as timely news, market trend information and continuing education programs.

Review of Cornea & Contact Lenses serves as a valuable resource for all practitioners and features detailed articles focusing on various fitting methods, solutions and corneal cases. Also available is the ***Review of Cornea & Contact Lenses "Annual Contact Lenses & Lens Care" Guide***, a yearly publication detailing the newest lenses and lens care products.

The ***Review*** Group's ***Ophthalmic Product Guide*** brings you the newest and most innovative products on the market. Published every February and July, the guide provides concise information about new literature, drugs and equipment designed to help your practice thrive.

The ***Review*** Group also offers valuable **continuing education** sessions in both print and online formats, allowing a convenient way for you to earn **CE credits**. In addition, *Review* also offers an impressive fleet of ***free e-newsletters***, such as Optometric Physician, the Optometric Retina Society quarterly e-newsletter and the Optometric Glaucoma Society E-Journal, so you can keep up to date on breaking news and the latest research online.

The *Review* Group is dedicated to the constant growth and education of the profession. *Review* offers many different publications and services to help enhance your practice and patient care.



On top of these products, the *Review* Group also spearheads meetings and conferences, bringing together experts in the field and providing a forum for practitioners to earn CE credits and learn from others in the profession.

www.reviewofoptometry.com

jmi

Jobson Medical Information LLC
The *Review* Group

2015 REVIEW OF OPTOMETRY MEETINGS

up to 12 CE Credits*

MEETINGS CO-CHAIRS:

MURRAY FINGERET, OD

ROBERT N. WEINREB, MD

CE CONFERENCES

7th Annual

EAST COAST OPTOMETRIC GLAUCOMA SYMPOSIUM

September 11-12, 2015
Hyatt Regency Bethesda
1 Bethesda Metro Center
BETHESDA, MD

Up to 12 CE Credits*

Up to 12 COPE Credits for $225! www.revoptom.com/ECOGS
Please call the hotel directly at 888-421-1442 and identify yourself as a participant of the East Coast Optometric Glaucoma Symposium.

SAN FRANCISCO OPTOMETRIC GLAUCOMA SYMPOSIUM

October 17, 2015
Marriott Union Square
480 Sutter St
SAN FRANCISCO, CA

Up to 6 CE Credits*

Up to 6 COPE Credits for $120! www.revoptom.com/SFOGS
Please call the hotel directly at 866-912-0973 and identify yourself as a participant of the Northwest Optometric Glaucoma Symposium.

7th Annual

WEST COAST OPTOMETRIC GLAUCOMA SYMPOSIUM

December 11-12, 2015
Hilton Waterfront
21100 Pacific Coast Hwy,
HUNTINGTON BEACH, CA

Up to 12 CE Credits*

Up to 12 COPE Credits for $225! www.revoptom.com/WCOGS
Please call the hotel directly at 800-822-7873 and identify yourself as a participant of the Southwest Optometric Glaucoma Symposium.

For faculty & more information, go to
www.revoptom.com/Meetings
call 1-866-658-1772, or email ReviewMeetings@Jobson.com

Partially supported by an unrestricted educational grant from
Alcon Bausch + Lomb

cope® *Approval pending


The Lasting Legacy of Herpes Zoster

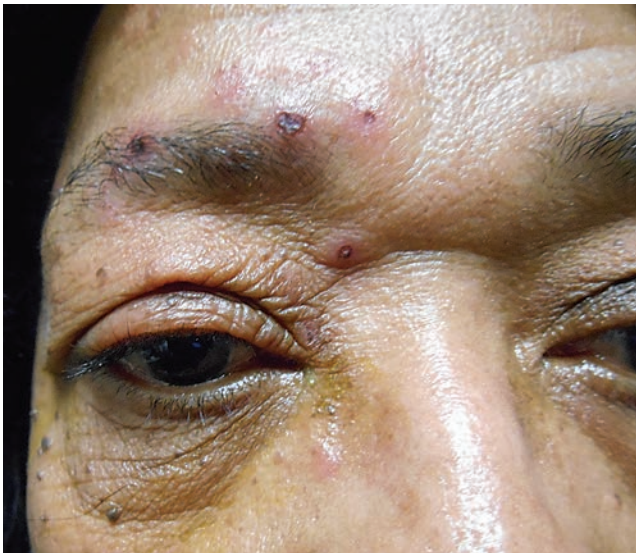
Post-herpetic neuralgia is a painful—but preventable—condition.

By Alan G. Kabat, OD, and Joseph W. Sowka, OD

A 66-year-old black male presented with a chief complaint of unilateral ocular itching in his right eye. He claimed that the itch involved his lower eyelid and cheek, radiating back to his right ear, and that the condition had persisted for at least a year. His ocular history was positive for a "lazy" right eye since childhood which had never received any treatment. Six years earlier, he had been diagnosed with and treated for herpes zoster involving the right side of his face. The patient's medical history was positive for hypertension and generalized seizure disorder. Medications included amlodipine, phenobarbital and Dilantin (phenytoin, Pfizer).

Diagnosis

An evaluation revealed his best-corrected acuity as 20/50 OD and 20/20 OS. A constant, right exotropia of 40 prism diopters was noted, consistent with the patient's amblyopic history. Pupils were equal and reactive in both eyes without afferent defect. Motilities and confrontation visual fields were grossly full, in both eyes. Physical examination revealed no focal lesions, edema or discoloration of the "itchy" areas. Both eyes were white and quiet, with clear media and unremarkable fundus examination. Based upon the history and presentation, he was diagnosed with post-herpetic itch (PHI), a less-common and under-reported form of post-herpetic neuralgia (PHN).



Active herpes zoster ophthalmicus (as seen in another patient). Prompt intervention is required to prevent post-herpetic neuralgia.

Shingles Background

Herpes zoster, or "shingles," results from reactivation of dormant varicella zoster virus (VZV) in the regional nerve ganglia. This viral infection first manifests clinically as chickenpox, a relatively common infection of childhood. Researchers believe that 99% of adults in the United States are seropositive for VZV.[1] Immune stress, often seen with advancing age or illness, allows the virus to emerge from dormancy and begin replication.[2] This secondary infection is not disseminated like chickenpox, but rather limited to a single neural dermatome in most cases. The term *herpes zoster ophthalmicus* (HZO) is used when the first branch of the trigeminal nerve (i.e. ophthalmic nerve, V1) is involved.

Ocular involvement may also be seen when the second branch (i.e., maxillary nerve, V2) is implicated, although this is much less common and, in such cases, the severity of ocular sequelae tends to be far less substantial. In the acute stage, herpes zoster presents with painful vesicular eruptions of the skin, corresponding to the terminal points of sensory innervation along the involved dermatome. While the lesions of herpes zoster are transient and will typically resolve within several weeks, the associated neuropathic irritation may continue well beyond the resolution of the dermatitis. We refer to this persistent discomfort as PHN.

Post-Herpetic Neuralgia

PHN is believed to affect roughly 20% of those with herpes zoster, although older age at onset, a more intense prodrome, greater severity of presentation and a history of

chronic illness (e.g., respiratory disease, diabetes) are associated with an increased likelihood of PHN.[2-5]

By convention, this phenomenon exists when clinically significant pain or painful abnormal sensation endures for more than 90 days beyond the first appearance of the vesicular rash.[2,6] PHI, sometimes called post-herpetic pruritis, represents a smaller subcategory of PHN. It was first described in 1974 and has since been reported sporadically.[4,7-14] In one retrospective study, PHI was found to occur in only six of 178 (3.4%) patients with herpes zoster in a three-year period.[10] Another study found eight of 113 (7.1%) patients with recent herpes zoster to have experienced PHI.[11] The phenomenon appears more commonly in those who suffer from shingles of the head, face and neck as compared with those who manifest the disease on their torso or elsewhere.[15]

Prevention and Treatments

Since the management of PHN and PHI is often challenging, maximal effort should be exercised to prevent it from occurring in the first place. The current recommendation requires initiation of systemic antiviral medications within 72 hours of herpetic rash onset. Although early antiviral therapy does not ensure PHN prevention, numerous studies have demonstrated reduced rates or duration, or both, of subsequent neuralgia, and expert consensus still greatly favors this clinical practice.[16-20]

Currently accepted drug regimens for immunocompetent adults include:

- Oral acyclovir, 800mg five times daily for seven to 10 days;
- Oral famciclovir, 500mg three times daily for seven days;
- Oral valacyclovir, 1000mg three times daily for seven days.[19]

Unfortunately, systemic antiviral therapy has not been shown to be of value in ameliorating the discomfort of PHN after the critical 72-hour period.[21,22] Similarly, vaccination with live, attenuated varicella-zoster virus (Zostavax, Merck) in patients 60 years and older has been shown to diminish the subsequent incidence of PHN by more than 50%.[23] However, Zostavax is not effective in PHN treatment.

Numerous other pharmaceuticals have been investigated for the relief of PHN, all with varying degrees of success. Oral NSAIDs are generally ineffective for neuropathic pain.[2] Topical Lidoderm (5% lidocaine, Endo Pharmaceuticals) and 0.075% capsaicin cream both represent treatment options for those with mild discomfort from PHN.[2]

Unfortunately, neither of these is ideal for ocular or adnexal tissues. For those with more pronounced or persistent neuropathic pain, the use of oral tricyclic antidepressants—such as amitriptyline or nortriptyline—as well as the anticonvulsant medications Neurontin (gabapentin, Pfizer) and Lyrica (pregabalin Pfizer), have demonstrated fairly good efficacy in controlled clinical trials.[2,24-26] A once-daily formulation, Gralise, (gabapentin 1800mg, Depomed), is now specifically approved for PHN.

Antidepressants and anticonvulsants may also be combined to yield a greater analgesic effect (e.g., amitriptyline and pregabalin).[27] The use of opioids such as hydrocodone or oxycodone is generally discouraged due to the potential for abuse and limited evidence of benefit; these drugs have been relegated to third tier in the treatment of PHN and should only be used under the supervision of a pain management specialist.[2,28]

Persistent Discomfort

Post-herpetic itch is a more complex disorder than typical post-herpetic neuralgia, and prone to greater complications. One of the primary concerns is the risk of self-injury. Because the affected neurons have diminished ability to sense pain, the stimulus to cease scratching of the area may be lost. Bizarre and gruesome cases have been reported, including one woman whose persistent scratching resulted in a wound that completely penetrated her scalp and part of her skull.[9] PHI is often more resistant to the above mentioned treatments than PHN as well.[4] Antihistamines, used widely for conditions with symptomatic itching, appear to be comparatively ineffective for PHI.[4,12] Likewise, topical steroids provide seemingly little relief.[12] Topical anesthetic patches and capsaicin may be helpful, but suffer the same limitations as in PHN.

Clinical improvement has been documented with the use of both amitriptyline and gabapentin in several case reports, although there have yet to be any prospective clinical trials involving their use specifically for post-herpetic itch.[13,14] A published report showed resolution of PHI in a 22-year-old patient using hydroxyzine (an antihistamine that is also indicated for the treatment of anxiety) in combination with carbamazepine (an anticonvulsant, though in a different class than gabapentin and pregabalin).[4]

Other systemic agents—including oxycarbazepine, diphenylhydantoin, mexiletine and mirtazapine—have also been proposed as alternatives for PHI.[4,12] Failing oral therapy, doctors may turn to serial ganglionic block injections with bupivacaine and even surgical amputation of the involved nerve.[4,34]

PHN is arguably the worst potential complication of herpes zoster, resulting in persistent discomfort that is difficult to mitigate. Despite numerous treatment modalities and ongoing research, no single therapy has emerged as universally effective. The optometrist's role involves early detection and treatment of herpes zoster, education regarding the nature and prevention of PHN, and appropriate intervention for the unfortunate few who develop persistent neuralgias.

Knowledge of the various therapeutic options can help to minimize suffering and subsequent complications for the victims of PHN and PHI. ■

Drs. Kabat and Sowka have no financial interest in any products mentioned in this article.

1. Kilgore PE, Kruszon-Moran D, Seward JF, et al. Varicella in Americans from NHANES III: implications for control through routine immunization. J Med Virol. 2003;70 Suppl 1:S111-8.
2. Johnson RW, Rice AS. Clinical practice. Postherpetic neuralgia. N Engl J Med. 2014 Oct 16;371(16):1526-33.
3. Gnann JW Jr, Whitley RJ. Clinical practice. Herpes zoster. N Engl J Med. 2002 Aug 1;347(5):340-6.
4. Semionov V, Shvartzman P. Post herpetic itching--a treatment dilemma. Clin J Pain. 2008 May;24(4):366-8.
5. Drolet M, Brisson M, Schmader K, et al. Predictors of postherpetic neuralgia among patients with herpes zoster: a prospective study. J Pain. 2010 Nov;11(11):1211-21.
6. Johnson RW. Herpes zoster and postherpetic neuralgia. Expert Rev Vaccines. 2010 Mar;9(3 Suppl):21-6.
7. Liddell K. Letter: Post-herpetic pruritus. Br Med J. 1974 Oct 19;4(5937):165.
8. Darsow U, Lorenz J, Bromm B, Ring J. Pruritus circumscriptus sine materia: a sequel of postzosteric neuralgia. Evaluation by quantitative psychophysical examination and laser-evoked potentials. Acta Derm Venereol. 1996 Jan;76(1):45-7.
9. Oaklander AL, Cohen SP, Raju SV. Intractable postherpetic itch and cutaneous deafferentation after facial shingles. Pain. 2002 Mar;96(1-2):9-12.
10. Ozdemir M, Tüzün Y. Herpes zoster and pruritus. Int J Dermatol. 2004 Oct;43(10):779-80.
11. Oaklander AL, Bowsher D, Galer B, et al. Herpes zoster itch: Preliminary epidemiologic data. J Pain. 2003 Aug;4(6):338-43.
12. Wood GJ, Akiyama T, Carstens E, et al. An insatiable itch. J Pain. 2009 Aug;10(8):792-7.
13. Jagdeo J, Kroshinsky D. A case of post-herpetic itch resolved with gabapentin. J Drugs Dermatol. 2011 Jan;10(1):85-8.
14. Griffin JR, Davis MD. Amitriptyline/Ketamine as therapy for neuropathic pruritus and pain secondary to herpes zoster. J Drugs Dermatol. 2015 Feb;14(2):115-8.
15. Ständer S, Steinhoff M, Schmelz M, et al. Neurophysiology of pruritus cutaneous elicitation of itch. Arch Dermatol. 2003 Nov;1399(11):1463-70.
16. Crooks RJ, Jones DA, Fiddian AP. Zoster-associated chronic pain: an overview of clinical trials with acyclovir. Scand J Infect Dis Suppl. 1991;80:62-8.
17. Jackson JL, Gibbons R, Meyer G, et al. The effect of treating herpes zoster with oral acyclovir in preventing postherpetic neuralgia. A meta-analysis. Arch Intern Med. 1997 Apr 28;157(8):909-12.
18. Gopal MG, Shannoma, Kumar B C S, et al. A comparative study to evaluate the efficacy and safety of acyclovir and famciclovir in the management of herpes zoster. J Clin Diagn Res. 2013 Dec;7(12):2904-7.
19. Dworkin RH, Johnson RW, Breuer J, et al. Recommendations for the management of herpes zoster. Clin Infect Dis. 2007 Jan 1;44 Suppl 1:S1-26.
20. Kempf W, Meylan P, Gerber S, et al. Swiss recommendations for the management of varicella zoster virus infections. Swiss Med Wkly. 2007 May 5;137(17-18):239-51.
21. Klenerman P, Luzzi GA. Acyclovir and postherpetic neuralgia. Biomed Pharmacother. 1990;44(9):455-9.
22. Acosta EP, Balfour HH Jr. Acyclovir for treatment of postherpetic neuralgia: efficacy and pharmacokinetics. Antimicrob Agents Chemother. 2001 Oct;45(10):2771-4.
23. Oxman MN, Levin MJ; Shingles Prevention Study Group. Vaccination against Herpes Zoster and Postherpetic Neuralgia. J Infect Dis. 2008 Mar 1;197 Suppl 2:S228-36.
24. Moore RA, Derry S, Aldington D, et al. Amitriptyline for neuropathic pain and fibromyalgia in adults. Cochrane Database Syst Rev. 2012 Dec 12;12:CD008242.
25. Achar A, Chakraborty PP, Bisai S, et al. Comparative study of clinical efficacy of amitriptyline and pregabalin in postherpetic neuralgia. Acta Dermatovenerol Croat. 2012;20(2):89-94.
26. Chandra K, Shafiq N, Pandhi P, et al. Gabapentin versus nortriptyline in post-herpetic neuralgia patients: a randomized, double-blind clinical trial--the GONIP Trial. Int J Clin Pharmacol Ther. 2006 Aug;44(8):358-63.
27. Achar A, Chatterjee G, Ray TG, Naskar B. Comparative study of clinical efficacy with amitriptyline, pregabalin, and amitriptyline plus pregabalin combination in postherpetic neuralgia. Indian J Dermatol Venereol Leprol. 2010 Jan-Feb;76(1):63-5.
28. McNicol ED, Midbari A, Eisenberg E. Opioids for neuropathic pain. Cochrane Database Syst Rev. 2013 Aug 29;8:CD006146.
29. Peterson RC, Patel L, Cubert K, Gulati A. Serial stellate ganglion blocks for intractable postherpetic itching in a pediatric patient: a case report. Pain Physician. 2009 May-Jun;12(3):629-32.

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

Transplants, Transformed

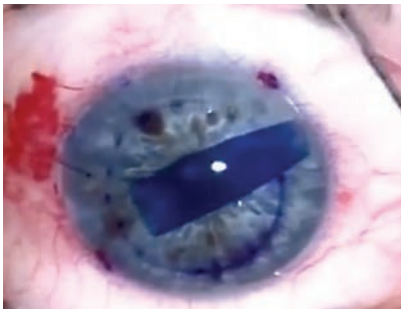
DMEK, the latest iteration of posterior lamellar keratoplasty, might be the best solution for your patient's endothelial dysfunction. **By Aaron Bronner, OD**

Patients with intractable corneal disease no longer have to submit to penetrating keratoplasty and tolerate its many compromises. Lamellar procedures that remove only diseased tissue have reshaped the field. Descemet's membrane endothelial keratoplasty, or DMEK, is the latest incarnation in the evolution of posterior lamellar keratoplasties in the treatment of endothelial dysfunction. Because its development can best be understood relative to its predecessors, a brief review of these forbearers is instructive.

Evolution of DMEK

Posterior lamellar keratoplasty (PLK) and deep lamellar endothelial keratoplasty (DLEK, essentially PLK adapted for use in the United States) were the earliest posterior keratoplasties. Though these two procedures represented the first successful sutureless corneal transplants, they were too technically difficult to gain widespread adoption. Descemet's stripping endothelial keratoplasty (DSEK) eliminated the most difficult step of the PLK and DLEK procedures—dissection of the host posterior stroma—thereby bridging the gap between postoperative success and intraoperative simplicity. With this step out of the way, DSEK was widely embraced by corneal specialists.

To see a narrated video of this procedure, visit www.reviewofoptometry.com, or scan the QR code.



A DMEK graft is stained with trypan blue to allow intraoperative visualization.

DSEK uses donor tissue that's comprised of Descemet's membrane, endothelium and a small amount of posterior stroma. The latter, while not necessary for the function of the graft, helps surgeons handle the graft intraoperatively and insulates the endothelium to some degree from surgical trauma. However, while 20/20 and 20/25 outcomes were not unheard of with DSEK, and subsequently Descemet's stripping automated endothelial keratoplasty (DSAEK), it was much more common for best-corrected outcomes to hover around 20/40. Investigators believed this limitation on vision was due to optical interference at the donor/host stromal interface. To get around this limitation, DMEK—in which the graft has no posterior stroma—was developed.[1]

Benefits of DMEK

The new procedure has delivered better BSVA outcomes than its predecessors, with 20/25 outcomes the reported average.[2] Further, while DSEK and DSAEK generate an average hyperopic shift of 1D to 2D, the very thin DMEK graft does not. An interesting and unexpected benefit of DMEK is the significantly lower rate of immunologic rejection compared with DSEK and DSAEK.[3] An early prospective study on DMEK reported just a 1% rate of rejection compared to 12% with DSAEK—a surprising finding given the two transplants are close to identical from an immunologic standpoint.[2] DSAEK only carries additional posterior keratocytes, which have very little potential to generate rejection on their own.

DMEK Downfalls

These improvements come with a cost, however. Due to "elastic" behavior of the thin DMEK graft, it rolls into a scroll once removed from donor stroma. Unrolling the graft in the anterior chamber can be difficult, as directly handling the graft can lead to failure of the transplanted endothelium. Surgeons must therefore rely on indirect manipulation to unroll the transplant (e.g., via use of percussive waves and irrigation).

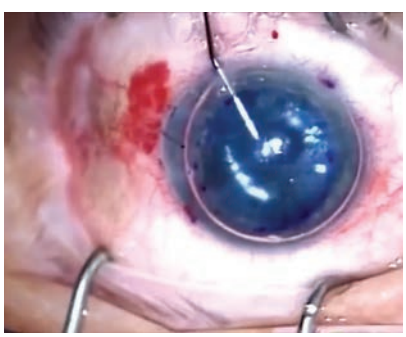
Further, these grafts have a tendency to dislocate from the host stroma early in the postoperative course at higher rates than DSEK and DSAEK. To get around this complication, larger air fills are typically used with DMEK; in our facility we use a 90% air fill with sulfur hexafluoride (SF_6) high-den-

sity gas (with an inferior peripheral iridotomy to avoid pupillary block).

The Comanaging Optometrist's Role

Preservation of the transplant and visual rehabilitation are integral to managing these patients. Because DMEK has rapid visual recovery and the least risk of immunologic rejection, these goals occur over a compressed timeline compared with other forms of keratoplasty. While the steroid tapering strategy will vary between surgery centers, we typically taper over a 12 to 18 month period. Visual recovery is less predictable, and comanaging optometrists should be aware that while DMEK usually provides recovery of vision by three to six months, some eyes won't fully stabilize for the first year. If vision is not as good as expected, yet the graft appears healthy and the cornea is clear, patience is advised; many of these eyes will continue to improve well beyond the first months.

While DMEK's surgical complexity and potential for early graft dislocation has slowed its dissemination to some degree, its potential for superior visual outcomes and reduced risk of corneal graft rejection create a place for its use in the treatment of our patients with endothelial disease. ■



Once the graft is positioned, a mixture of air and SF_6 is put into the anterior chamber to help hold the graft in place.

Dr. Bronner is a staff optometrist at the Pacific Cataract and Laser Institute in Kennewick, Wash. He has no financial interest in any products described in this article.

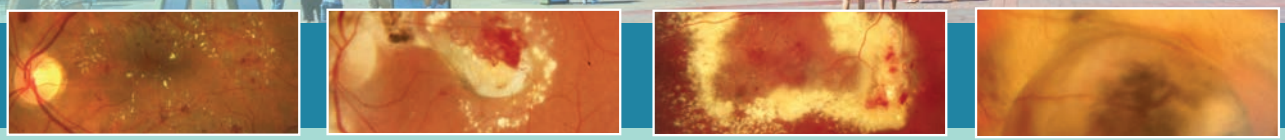
1. Melles GR, Ong TS, Ververs B, van der Wees J. Preliminary clinical results of Descemet membrane endothelial keratoplasty. Am J Ophthalmol. 2008;145:222-7.
2. Price MO, Giebel AW, Fairchild KM, Price FW Jr. Descemet's membrane endothelial keratoplasty: Prospective multicenter study of visual and refractive outcomes and endothelial survival. Ophthalmology. 2009;116:2361-8.
3. Anshu A, Price MO, Price F. Risk of corneal transplant rejection significantly reduced with DMEK. Ophthalmology. 2012;119:536-40.

Up to 12 CE Credits (COPE approval pending)

REGISTRATION OPEN: DECEMBER 4-5, 2015 ANAHEIM, CA

THE OPTOMETRIC RETINA SOCIETY AND *REVIEW OF OPTOMETRY* PRESENT:

RETINA UPDATE2015



Co-Chairs

Joseph Pizzimenti, OD

Brad Sutton, OD

Featured Faculty

Hajir Dadgostar, MD, PhD
Distinguished Retinal Surgeon

Stuart Richer, OD

Blair Lonsberry, OD

Jeffry Gerson, OD

Steve Ferrucci, OD

ORS Mission Statement

"The mission of the Optometric Retina Society (ORS) is to promote the advancement of vitreoretinal knowledge for clinicians, ophthalmic educators, residents, and students. The ORS is dedicated to posterior segment disease prevention, diagnosis, management and co-management."

Sheraton Park Hotel

At the Anaheim Resort
1855 S. Harbor Boulevard
Anaheim, CA 92802

For hotel reservations call: 866-837-4197
Standard Room Rate: $149/night

3 Ways to Register

Online:
www.revoptom.com/ORSRETUPDATE2015

Email Lois DiDomenico:
ReviewMeetings@Jobson.com

Phone:
877-451-6510

Course Topics

- Nutrition and Genetics in Retinal Wellness
- New Paradigms in Retinal Vascular Disease
- Vitreoretinal Grand Rounds
- Medical and Surgical Retina Update
- Macular Holes and Epiretinal Membranes
- What's New in Retinal Imaging

Stock Image: ©iStock.com/JobsonHealthcare

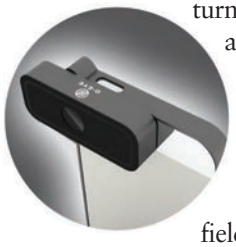
Administered By
Review of Optometry®

cope® Approval pending

Retinal Imaging

Portable Retinal Imaging System

Doctors who want to use their smartphone for clinical imaging can now get a phone case-sized add-on that turns an iPhone or Android phone into a fundus camera capable of taking high-definition images and video of the eye for health screening and evaluation, according to the manufacturer, D-Eye.



The camera offers a 20-degree field of view for easy visualization of ocular structures, including the optic nerve, without corneal glare, the company says. A HIPAA-compliant subscription-based cloud service allows storage and sharing of images among medical professionals, the company says.

Visit www.d-eyecare.com.

Contact Lenses

New Lens for Post-RK Patients

A second-generation hybrid lens for post-RK patients and those with oblate corneal surfaces is now available, in a limited release, from SynergEyes. UltraHealth FC is designed for post-surgical, refractive error and trauma cases, and is being prescribed primarily for post-RK patients, the company says.

The updated lens and landing zones are designed to improve tear exchange and comfort, while the new reverse geometry GP design has twice the lift of previous designs, accommodating a broader range of corneal irregularities, SynergEyes says.

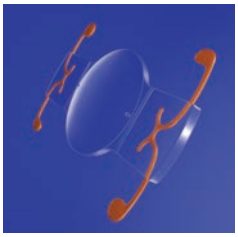
SynergEyes anticipates wide release later this year.

Visit www.synergeyes.com/professional.

Intraocular Lenses

Toric IOL in Full Diopter Range

Eye care practitioners can now offer the full range of Bausch + Lomb's Trulign toric IOL for cataract patients, according to a company release. B+L recently added 10.0 to 16.5 powers (in half diopter steps), to meet the needs of cataract patients who desire a broader range of vision for their everyday life.



The Trulign toric IOL corrects for astigmatism, and offers an option to address visual acuity at intermediate and distance, according to Bausch + Lomb.

Visit www.trulign.com.

Contact Lens Care

Cleaning, Disinfecting—and Wetting—Solution

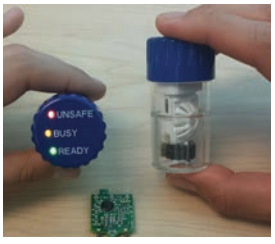
Clear Care Plus, a new generation of Alcon's Clear Care contact lens solution, combines the product line's traditional preservative-free 3% hydrogen peroxide cleaning and disinfecting solution with the wetting agent HydraGlyde, also found in the company's Opti-Free PureMoist solution. Adding HydraGlyde, says Alcon, provides patients with sustained contact lens moisture throughout the day.

The Clear Care and Clear Care Plus Cleaning & Disinfecting Solutions are indicated for use with both soft and gas permeable contact lenses.

Visit www.novartis.com.

FDA Approves High-Tech CL Cleaning Case

Contact lens wearers will soon be able to use a 'smart' contact lens case when disinfecting lenses with hydrogen peroxide.



The intelli-case, which was recently cleared by the FDA, uses electronics embedded in the cap to monitor the neutralization of hydrogen peroxide during the disinfection cycle, according to manufacturer NovaBay.

The cap has three LED lights, labeled "unsafe," "busy" and "ready." Once lenses are placed into the case with hydrogen peroxide solution, the green light blinks when lenses are safe to insert into the eyes and continues to blink green until the contact lenses are removed from the case.

Visit www.novabay.com.

Education

OCT Training

If you and/or your staff would like advice on how to use OCT to provide better clinical care, Optovue Academy—a new online learning portal—offers clinicians and staff clinical education, technician training and practice development tracks, the company says.

The educational opportunities include video PowerPoint presentations, recordings of live presentations, a library of research documents, a forum where learners can comment and a calendar of live events supported or hosted by Optovue Academy, the company says.

Visit www.optovueacademy.com. ■

August 2015

■ **19.** *AAO-NJ Conference*. Jumping Brook Country Club, Neptune, NJ. Hosted by: American Academy of Optometry New Jersey Chapter. CE hours: 6. To register, email Dennis Lyons at Dhl2020@aol.com or call (732) 920-0110.

■ **20-23.** *108th SCOPA Annual Meeting*. Westin Hilton Head Island Resort and Spa, Hilton Head Island, SC. Hosted by: SC Optometric Physicians Association. CE hours: 21. To register, email Jackie Rivers at jrivers@sceyedoctors.com, call (803) 799-6721 or go to www.sceyedoctors.com.

■ **27-29.** *International Vision Conference*. Hyatt Manchester, San Diego. Hosted by: OD Excellence, PFO Global. Key faculty: John McGreal, Jim Grue, Bob Schultz, Jim Riverson, Nathan Lighthizer. CE hours: 17. To register, go to www.ivisionconf.org.

■ **28-30.** *Alumni Weekend*. UAB School of Optometry, Birmingham, AL. Hosted by: UAB School of Optometry. Key faculty: Ian Gaddie, Marie Bodack, Diana Shechtman, Scot Morris, Sunny Sanders. CE hours: 18. To register, go to www.uab.edu/optometry.

September 2015

■ **2-13.** *Adventure CE Italy*. Siena/Sorrento/Rome, Italy. Hosted by: Tropical CE. Key faculty: Jill Autry, Ian Ben Gaddie. CE Hours: 20. To register, email Stuart Autry at sautry@tropicalce.com or go to www.tropicalce.com.

■ **9-12.** *Envision Conference 2015*. Grand Hyatt Denver. Hosted by: Envision University. CE hours: 90+; 23 per OD. To register, email Bonnie Harrell at bonnie.harrell@envisionus.com or go to www.envisionuniversity.org.

■ **10-13.** *GWCO Congress 2015*. Oregon Convention Center, Portland, OR. Hosted by: Great Western Council on Optometry. Key faculty: Paul Karpecki, April Jasper, Mile Brujic. CE hours: 71 total; 26 per OD. To register, email Tracy Oman at gwco@gwco.org or go to www.gwco.org.

■ **16-19.** *International Vision Expo West*. Sands Expo & Convention Center, Las Vegas. Hosted by: International Vision Expo & Conference. CE hours: 390+; 31 per OD. To register, email Rachel Spencer at Rachel@visitaccess.com, call (540) 344-8499 or go to www.visionexpowest.com.

■ **17-20.** *EyeFlyFish 2015*. Allenberry Resort on the Yellow Breeches, Boiling Springs, PA. Hosted by: Charles Griffen and Mark Boas. CE hours: 6. To register, email Mark Boas at mboas56852@aol.com or go to www.eyeflyfish.com.

■ **17-20.** *2015 IOA Annual Convention*. Westin Chicago Northwest Hotel, Itasca, IL. Hosted by: Illinois Optometric Association. CE hours: 24 total; 15 per OD. To register, go to www.ioaweb.org.

■ **17-21**. *VT/Visual Dysfunctions*. The Holiday Inn, Baltimore, MD. Hosted by: OEP Foundation. Key faculty: Paul Harris. CE hours: 35. To register, email Theresa Krejci at TheresaKrejciOEP@verizon.net or go to www.oepf.org.

■ **18-20.** *Colorado Vision Training Conference*. YMCA of the Rockies, Estes Park, CO. Hosted by: OEP Foundation. Key faculty: Paul Harris. CE hours: 12. To register, go to www.oepf.org.

■ **18-20.** *Vermont Optometric Association Fall Conference*. Woodstock Inn and Resort, Woodstock, VT. Hosted by: Vermont Optometric Association. CE hours: 16. To register, email vtcecoordinator.@gmail.com or go to vtoptometrists.org.

■ **23-25.** *CE in Italy*. Hotel Silla, Florence, Italy. Hosted by: James Fanelli. Key faculty: James Fanelli, Joseph Pizzimenti. CE hours: 12. To register, email James Fanelli at jamesfanelli@CEinItaly.com or go to www.CEinItaly.com.

■ **24-26.** *Idaho Optometric Physicians 2015 Annual Congress*. The Coeur d'Alene Conference Center, Coeur d'Alene, ID. Hosted by: Idaho Optometric Physicians. Key faculty: Jill Autry, Blair Lonsberry, Lynn Lawrence. CE hours: 32. To register, email Randy L. Andregg at execdir@iopinc.org, call (208) 461-0001 or go to www.idaho.aoa.org.

■ **24-27.** *2015 WOA Convention & Annual Meeting*. Kalahari Resort & Conference Center, Wisconsin Dells, WI. Hosted by: Wisconsin Optometric Association. CE hours: 26 total; 22 per OD. To register, email Joleen Breunig at joleen@woa-eyes.org or go to www.woa-eyes.org.

■ **25-27.** *NOA Fall Convention*. Younes Conference Center, Kearney, NE. Hosted by: Nebraska Optometric Association. CE hours: 12. To register, email Alissa Johnson at noa@assocoffice.net or go to www.nebraska.aoa.org.

■ **25-27.** *2015 KOA Fall Conference*. Embassy Suites Hotel, Lexington, KY. Hosted by: Kentucky Optometric Association. CE hours: 20. To register, email Sarah Unger at sarah@kyeyes.org, call (502) 875-3516 or go to www.kyeyes.org.

■ **25-29.** *Forum on Optometry*. Marriott Hotel, Mystic, CT. Hosted by: PSS EyeCare. CE hours: 18. To register, email education@psseyecare.com or visit www.psseyecare.com.

■ **26-27.** *CE in Austin*. Omni Austin Hotel Downtown, Austin, TX. Hosted by: University of Houston College of Optometry. Key faculty: Pat Segu. CE hours: 16. To register, email optce@uh.edu or go to ce.opt.uh.edu/.

■ **26-27.** *Forum on Optometry*. Marriott Hotel, Mystic, CT. Hosted by: PSS EyeCare. Key faculty: Deepak Gupta, Leonard Messner, Elliott Kirstein, William Jones, Kristen Brown. CE hours: 18. To register, go to www.psseyecare.com.

■ **26-28.** *CE in Italy*. Castiglion Fiorentino, Tuscany, Italy. Hosted by: James Fanelli. Key faculty: James Fanelli, Joseph Pizzimenti. CE hours: 12. To register, email James Fanelli at jamesfanelli@CEinItaly.com or go to www.CEinItaly.com/.

■ **30-Oct. 2.** *CE in Italy*. San Domenico Palace on the Sea, Taormina, Sicily. Hosted by: James Fanelli. Key faculty: James Fanelli, Joe Pizzimenti. CE hours: 12. To register, email James Fanelli at jamesfanelli@CEinItaly.com or go to www.CEinItaly.com/.

October 2015

■ **1-4.** Kansas Optometric Association Fall Eyecare Conference. DoubleTree by Hilton Wichita Airport, Wichita, KS. Hosted by: Kansas Optometric Association. CE hours: 13. To register, email Todd Fleischer at todd@kansasoptometric.org or go to www.kansasoptometric.org.

■ **1-4.** *EastWest Eye Conference*. Cleveland Convention Center, Cleveland. Hosted by: Ohio Optometric Association. CE hours: 250+; 27 per OD. To register, email Linda Fette at linda@ooa.org or go to www.eastwesteye.org.

■ **5-6.** *AFOS at Academy 2015*. New Orleans Marriott, New Orleans. Hosted by: Armed Forces Optometric Society. CE hours: 6. To register, email Gina Borgognoniv at execdir@afos2020.org or go to www.afos2020.org.

■ **6.** *Optometric Glaucoma Society Annual Scientific Meeting*. New Orleans Morial Convention Center, New Orleans. Hosted by: OGS & AAO. CE hours: 8. To register, email Michael Chaglasian at MChaglas@ico.edu or go to www.optometricglaucomasociety.org.

■ **6.** *ONS Fall 2015 Educational Symposium*. New Orleans Morial Convention Center, New Orleans. Hosted by: Ocular Nutrition Society. CE hours: 6. To register, email info@ocularnutrtionsociety.org or go to www.ocularnutritionsociety.org.

■ **6.** *OCRT 12th Annual Education Symposium*. New Orleans Morial Convention Center, New Orleans. Hosted by: Optometric Council on Refractive Technology. Key faculty: Paul Karpecki, David Geffen, Tracy Swartz, Chris Freeman. CE hours: 8. To register, email jcfreeopt@yahoo.com or go to www.ocrt.org.

■ **7-8.** *IOA Fall Seminar*. Indiana Memorial Union, Bloomington, IN. Hosted by: Indiana Optometric Association. CE hours: 14. To register, email Bridget at blsims@ioa.org or go to www.ioa.org.

■ **7-10.** *Academy 2015*. New Orleans Morial Convention Center, New Orleans. Hosted by: American Academy of Optometry. CE hours: 300+; 35 per OD. To register, email Helenv@aaoptom.org or go to www.aaopt.org. ■

To list your meeting, please send the details to:
Rebecca Hepp, Senior Associate Editor
Email: rhepp@jobson.com
Phone: (610) 492-1005

Advertisers Index

For advertising opportunities contact:
Michele Barrett (215) 519-1414 or mbarrett@jobson.com
James Henne (610) 492-1017 or jhenne@jobson.com
Michael Hoster (610) 492-1028 or mhoster@jobson.com

Merchandise Offered

Software

Merchandise Offered

Storage and Design

Certification

to work for you.

Become Board Certified by the AMERICAN BOARD OF OPTOMETRY

American Board of Optometry

Exam held each January & July

Apply at americanboardofoptometry.org

The American Board of Optometry Board Certification program is certified by the National Commission for Certifying Agencies, and its Maintenance of Certification process is approved by the Centers for Medicare and Medicaid Services.

Products and Services

ACCESS HEALTHCARE CAPITAL

The key to making Professional Healthcare Practice Financing simple. Whether you are buying, starting, or updating your practice, Access Healthcare capital is here to help you with your financing needs with one common goal. We want to help you maximize your cash flow. Let us help you unleash your Entrepreneurial Spirit:

Easy App Up To $250,000

- 100% Financing plus working capital
- Simplified Processing for loans up to $350,000
- Partnership Buy-In Programs
- * Terms up to 15 years
- Application Only for equipment and technology purchases

www.accesshealthcarecapital.com • info@narxeye.com

Access Healthcare Capital • 1-888-727-4470 • P.O. Box 349, Gladwyne, PA 19035

Do you have CE Programs?

CONTACT US TODAY FOR CLASSIFIED ADVERTISING

Toll free: 888-498-1460
E-mail: sales@kerhgroup.com

Practice For Sale

Practice Consultants

Practice Sales • Appraisals • Consulting
www.PracticeConsultants.com

PRACTICES FOR SALE NATIONWIDE

Visit us on the Web or call us to learn more about our company and the practices we have available.

info@PracticeConsultants.com

800-576-6935

www.PracticeConsultants.com

Continuing Education

Dr. Travel Seminars, LLC
In Partnership With The NJ Society of Optometric Physicians

President's Week Cruise

Special Pricing - Save Up To $362.50 Per Person

RCCL Oasis Of The Seas - Sailing From Ft. Lauderdale, FL - W. Caribbean Cruise

Febuary 13, 2016 - Febuary 20, 2016

Deluxe Ship *Special Group Pricing*

NJSOP Society of Optometric Physicians
All Programs Are in Partnership With the New Jersey Society of Optometric Physicians

COPE
Dr. TRAVEL SEMINARS, LLC is a COPE approved provider
Course approved for 16 CE

Celebrating 20 years *Continuing Education*

Innovations in Eye Care- *by* Robert Wooldridge, O.D., F.A.A.O.

Additional Seminar Cruises (12-16 C E):

Christmas / New Year's Week - Dec. 26, 2015 - Jan. 2, 2016 - Ed Paul - OD, PhD - Free Drinks

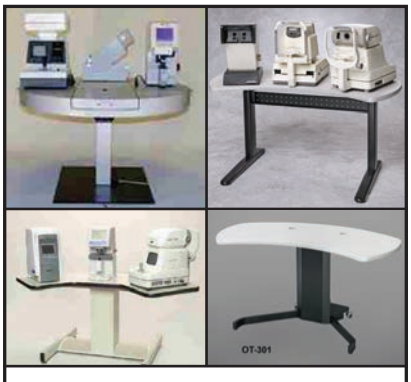
Mediterranean Cruise - July 3 - 10, 2016 - Leo Semes, OD, FAAO

Roundtrip Barcelona - Royal Caribbean's New Ship - Harmony Of The Seas

Greek Isles Cruise - July 23 - 30, 2016 - Ron Melton, OD, FAAO - Free Drinks

www.DrTravel.com 800-436-1028

Equipment and Supplies



OPTINOMICS Pretesting Solutions

It's What the Best Pretest on!

(800) 522-2275

www.optinomics.com

sales@optinomics.com

Career Opportunities

Here we grow again!

TWO MOTIVATED OPTOMETRISTS
ILLINOIS

One of the largest eye care providers to extended care and assisted living residents in our great state of Illinois needs two motivated Optometrists to join our practice!

Both positions are in the Springfield and Central Illinois areas. One position is full time and one position is part time.

Our physicians are proficient in refracting, diagnosing & treating ocular pathology, and dispensing spectacles on-site. If you are proficient in these areas and you are comfortable driving, here are your benefits: Excellent Pay + bonuses (=145K+), travel bonuses that will exceed expenses incurred, new optical equipment, a personal assistant, but most important helping people in need of our professional services.

Interested? Contact Michael at
Michael@ovitskyvisioncare.com
or at 773-588-3090.

Only serious inquiries please. We will help with relocation expenses, if necessary.

STAFF OPTOMETRIST

Bard Optical is a leading Midwest vision care organization in business for over 70 years and we are still growing. The company is based in Peoria, IL with 20 retail offices throughout the central Illinois area, as far north as Sterling and as far south as Jacksonville. Once again this year we were named to the Top 50 Optical Retailers in the United States by Vision Monday – currently ranking 37th. A progressive optometric staff is vital to the continued growth of our organization whose foundation is based on one-on-one patient service. We are currently accepting CV/resumes for optometrists focused on full scope primary medical patient care. The candidate must have an Illinois license with therapeutics. The practice includes (but is not limited to) general optometry, contact lenses, and geriatric care. Salaried, full-time positions are available with excellent growth programs and benefits. Some part-time opportunities may be available also. Please email your information to **hr@bardoptical.com** or fax to **309-693-9754**. Mailing address if more convenient is **Bard Optical, Attn: HR, 8309 N Knoxville Avenue, Peoria, IL 61615**. Ask about opportunities within Bard Optical. *We have openings in several existing and new offices opening soon in central Illinois.*

Bard Optical is a proud Associate Member of the Illinois Optometric Association.

BARD OPTICAL

www.bardoptical.com

Contact us today
for classified advertising:
Toll free: **888-498-1460**
E-mail: **sales@kerhgroup.com**

TRAN VISION CENTER

ASSOCIATE OPTOMETRIST
LAREDO, TEXAS

5000-sq.ft, state-of-the-art facility with an emphasis on contact lenses and pathology.
New Grads Welcome!

EXCELLENT starting salary and benefit package:

- SIX-FIGURE starting salary
- Three weeks of paid time off.
- Paid medical, dental, vision and malpractice insurance
- Paid continuing education with one week off paid
- Paid major holidays
- Paid relocating expense

Our office hours are terrific for our industry! Opportunities for career development are also available.

Please email your resume and/or inquiry to
Dr. Paul K. Tran at contact@tranvisioncenter.com.

OPTOMETRIST - MI

Optometrist to share fully equipped office and optic shop with lab in Dearborn, MI, must speak Arabic

313-581-3888

Optometrist Wanted in KY

LEXINGTON, LOUISVILLE AND OWENSBORO

I am looking for Doctors for a busy and fast growing Optometric practice. Excellent salary plus commission and benefits. Hire on bonus available as well!

Please contact
Dr. Mark Lynn O.D. at
drmarklynn@drmarklynn.com
for more information.

Place Your Ad Here!
Toll free: **888-498-1460**
E-mail: **sales@kerhgroup.com**

FULL- TIME ASSOCIATE OPTOMETRIST

Full-time opportunity as associate optometrist in DC Metro Area, MD, and VA. We practice full scope optometry. Outstanding compensation package, benefits and incentives.

Send CV to
schwartzberg1@doctorsonsight.com
or call Ed 301.843.1000

Practice For Sale

PRACTICE SALES

Featured Practices for Sale

CALIFORNIA – ALAMEDA COUNTY
Long established practice in a busy retail center with national tenants. Grossing $800,000+/year, projected $900,000 in 2015. Newly remodeled, spacious 3800 sq.ft office with upscale dispensary.

FLORIDA – SPACE COAST
32-year practice grossing $700,000 in 2014 with lots of growth potential. Freestanding building with three fully equipped exam rooms. EMR in place.

VIRGINIA – RICHMOND METRO
Long established, full scope primary care practice. Average annual gross of $550,000 on 4 OD/days per week with a strong net.

Call for Complimentary Practice Evaluation

100% FINANCING AVAILABLE
(800) 416-2055
www.TransitionConsultants.com

Diagnostic **Quiz**

Postoperative Rise in Pressure

By Andrew S. Gurwood, OD

History

A 76-year-old black male was referred to our group practice for cataract extraction due to decreased vision. The patient had a documented history of mild primary open angle glaucoma, which was being monitored by the referring doctor. The patient was known to be noncompliant with topical therapy and had a history of laser trabeculoplasty performed in both eyes twice before. The patient had a systemic medical history of hypertension, controlled with anti-hypertensive medications. He reported no allergies to medications or food.

Gonioscopy image of a 76-year-old black male patient with glaucoma drainage implant.

Diagnostic Data

His best-corrected visual acuity measured 20/100 OD, 20/40 OS; interferometer acuity was 20/25 OU. External examination was unremarkable. Pupils were equal, round and reactive to light with a negative APD. Anterior segment evaluation revealed corneal arcus 360 degrees in both eyes, clear conjunctiva, flat and round iris and a deep and quiet anterior chamber. Upon evaluation of the lenses, the patient had grade two nuclear sclerosis in both eyes, along with cortical spoking greater in the right eye than in the left. Intraocular pressures were measured as 22mm Hg OD and 21mm Hg OS. Posterior segment findings revealed mild attenuation of vessels secondary to hypertension. Optic nerve head, macula, posterior pole and periphery were unremarkable. The patient was referred for a combination procedure and underwent phacoemulsification of the lens with IOL implant and the insertion of an iStent (Glaukos) in each eye.

Postoperative visits begin by checking for patient compliance regarding the postoperative regimen; we make sure the patient takes the prescribed topical drops, engages in no activities that involve bending or lifting and wears an eye shield or sunglasses, or both, outdoors. The examination usually includes a measurement of visual acuity, checking pupils, checking the anterior segments, measuring IOP and an undilated inspection of the posterior poles. Postoperative evaluations traditionally occur at one day, one week, three weeks and eight weeks.

Upon a second postoperative evaluation, approximately two weeks after the procedure, the patient's IOP was measured to be 28mm Hg OD.

Your Diagnosis

Does this case require any additional tests? What is your diagnosis? How would you manage this patient? What's the likely prognosis? To find out, please visit *Review of Optometry* online at www.reviewofoptometry.com.

Retina Quiz Answers *(from page 97):* 1) d; 2) d; 3) b; 4) a.

REVIEW OF OPTOMETRY (ISSN 0147-7633) IS PUBLISHED MONTHLY, 12 TIMES A YEAR BY JOBSON MEDICAL INFORMATION LLC, 100 AVENUE OF THE AMERICAS, NEW YORK, NY 10013-1678. PERIODICALS POSTAGE PAID AT NEW YORK, NY AND ADDITIONAL MAILING OFFICES. POSTMASTER: SEND ADDRESS CHANGES TO REVIEW OF OPTOMETRY, PO BOX 81, CONGERS, NY 10920-0081. SUBSCRIPTION PRICES: US: ONE YEAR $56; TWO YEARS $97, CANADA: ONE YEAR $88, TWO YEARS $160, INT'L: ONE YEAR $209, TWO YEARS $299. FOR SUBSCRIPTION INFORMATION CALL TOLL-FREE (877) 529-1746 (USA); OUTSIDE USA, CALL (845) 267-3065. OR EMAIL US AT REVOPTOMETRY@CAMBEYWEST.COM. PUBLICATIONS MAIL AGREEMENT NO: 40612608. CANADA RETURNS TO BE SENT TO BLEUCHIP INTERNATIONAL, P.O. BOX 25542, LONDON, ON N6C 6B2.

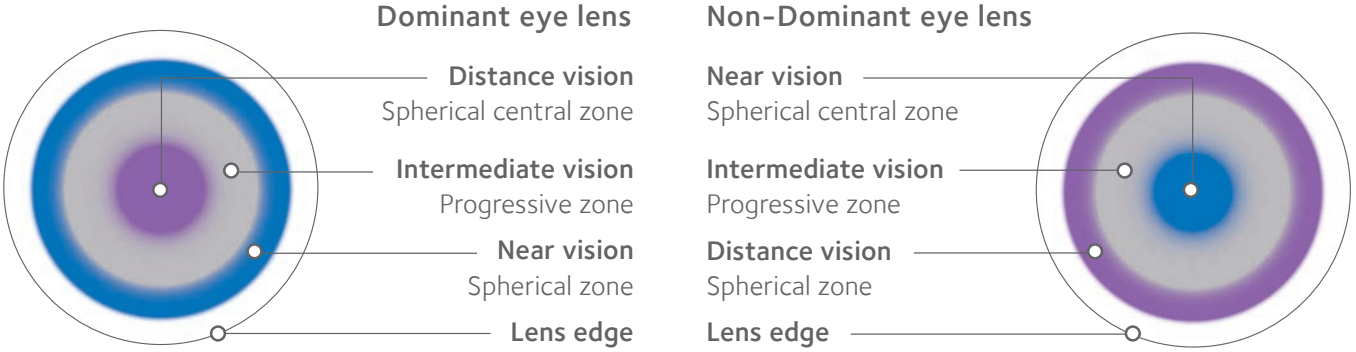
BIOFINITY MULTIFOCAL LENSES

An easy fit

for you and your presbyopic patients.

CooperVision Biofinity® multifocal lenses combine a high-performing 3rd generation material with a streamlined fitting process. Now even your most challenging presbyopic patients can enjoy the freedom of **all-distance clarity and lasting comfort.**

Balanced Progressive™ Technology enhances vision near, far and intermediate.
It also allows for an individualized fitting for each wearer and each eye.



Biofinity & Biofinity XR | Biofinity toric | **Biofinity multifocal**

Download your Biofinity multifocal 3-step fitting guide at
coopervision.com/fitting-guide

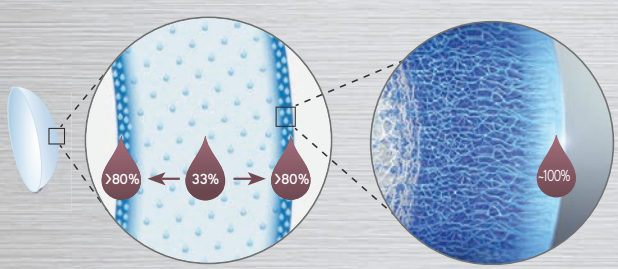
CooperVision®
Live Brightly.®

PREFERRED
13 TO 1

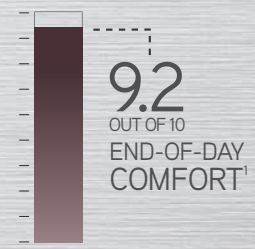
THIS IS WHY more patients prefer our lenses.

DAILIES TOTAL1® Water Gradient Contact Lenses feature a unique water gradient for lasting lubricity and end-of-day comfort.[1] No wonder patients preferred DAILIES TOTAL1® Contact Lenses 13 to 1 over their habitual lenses.[2*]

The First and Only Water Gradient Contact Lens



Contact Lens Cross-Section | Enlarged Water Gradient



9.2
OUT OF 10
END-OF-DAY COMFORT[1]

UNIQUE WATER GRADIENT

Features different surface and core water content

LASTING LUBRICITY

Ultrasoft surface gel approaches 100% water at the outermost surface[3**]

ALL DAY COMFORT

Outstanding comfort from beginning to end of day[1]

Let your patients experience the DAILIES TOTAL1® contact lens difference today.

PERFORMANCE DRIVEN BY SCIENCE™

*Percentage of wearers agreeing with the statement "I prefer these lenses to my previous contact lenses" among those with a preference.
**Based on *in vitro* measurement of unworn lenses.

1. In a randomized, subject-masked clinical study, n=40. Alcon data on file, 2011.
2. Based on an ongoing survey in Europe of 24 ECPs fitting 280 customers in DAILIES TOTAL1® contact lenses. Alcon data on file, 2012.
3. Angelini TE , Nixon RM, Dunn AC, et al. Viscoelasticity and mesh-size at the surface of hydrogels characterized with microrheology. ARVO 2013; E-abstract 1614872.

Alcon®
a Novartis company