New Technology: Good for Patients, Good for Business, p. 30

jmi

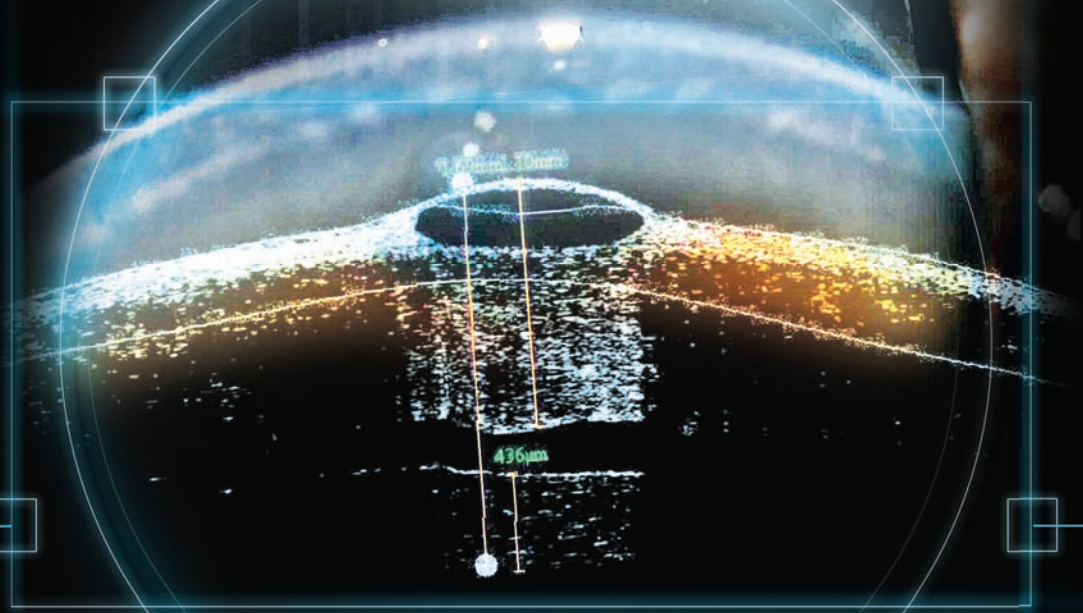
August 15, 2013

REVIEW® OF OPTOMETRY

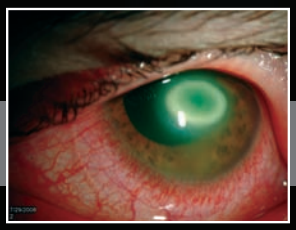
www.revoptom.com

AS-OCT Illuminates A Deeper Layer

Four cases reveal its newfound role in clinical decision-making, p. 36



ALSO INSIDE



For new wearers with astigmatism:

WHY THAT FIRST PAIR MEANS EVERYTHING.

You, Kyle, and Kyle's Mom

+

1-DAY ACUVUE® MOIST® BRAND CONTACT LENSES FOR ASTIGMATISM

Fact: 31% of new contact lens wearers report experiencing vision issues with their lenses.* That's why 1-DAY ACUVUE® MOIST® Brand Contact Lenses for ASTIGMATISM have BLINK STABILIZED™ Design. Giving new lens wearers stable and clear vision, exceptional comfort, easy handling, and UV protection.† No wonder 88% of parents with teens in 1-DAY ACUVUE® MOIST® Brand said they were likely to refer others to you.

Start new wearers off right and grow your practice.

*According to an aggregate, multi-sponsor 2008, 2009, and 2011 Gallup Study of the US Consumer Contact Lens Market.

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 VISTAKON® Division of 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.

Kyle and Mom

Kyle's Classmate

Mom's Dentist

Mom's Plumber

Mom's Friend

Kyle's Best Friend

Kyle's Cousin

Mom's Mechanic

Kyle's Coach

Mom's Neighbor

Kyle's Uncle

Kyle's Sister

Kyle's Friend

Mom's Co-worke

Visit **acuvuepro.com** to learn more about 1-DAY ACUVUE® MOIST® Brand Contact Lenses for ASTIGMATISM.

VOL. 150 NO. 8 ■ AUGUST 15, 2013

IN THE NEWS

Researchers using data from the **Blue Mountain Eye Study** have identified a **common genetic marker for elevated intraocular pressure**. Published in *Human Molecular Genetics* online, "our study identified that 99% of people will have the variant on at least one strand of their DNA, while 77% will have it on both," says lead investigator Ananth Viswanathan, MD, PhD. "We estimated that each copy of the variant increases the **risk of developing glaucoma** by 8%. In established glaucoma, each copy gives an extra 6% likelihood of significant visual loss."

New legislation in **Manitoba, Canada**, expands the **scope of practice** to allow ODs in the province to prescribe and administer drugs to treat eye infections, glaucoma, uveitis, dry eye and ocular allergies. Qualified optometrists will also be able to remove superficial foreign bodies from the eye, order and receive screening and diagnostic tests, and work collaboratively with ophthalmologists to treat serious eye disease.

Optometry school news:

- The **Accreditation Council on Optometric Education** has granted accreditation to **Western University of Health Sciences' College of Optometry**, retroactive to February 2013.
- **Jennifer Smythe, OD, MS, dean of Pacific University College of Optometry**, has been elected president of the **Association of Schools and Colleges of Optometry**. She is the first woman to be elected president of the association.
- **Rod W. Nowakowski, OD, PhD,** will retire as dean of the **University of Alabama at Birmingham School of Optometry**.

Poorer Americans Less Likely to Seek Eye Care

American adults with less education also visit the eye doctor less often. **By Michael Hoster, Managing Editor**

American adults near or below the poverty line are significantly less likely to seek vision care services than their wealthier counterparts, according to a study in *JAMA Ophthalmology* online. Lower education levels also mean fewer visits to the eye doctor.

In this analysis, National Institutes of Health senior epidemiologist Xinzhi Zhang, MD, PhD, and associates evaluated data from 6,690 total participants in the 2002 and 2008 National Health Interview Survey. Respondents were at least 40 years old and had one age-related eye disease—including macular degeneration, cataracts, diabetic retinopathy or glaucoma. The researchers also documented participants' poverty-income ratio (PIR) and education level.

In 2002, 62.7% of respondents with the lowest PIR scores (<1.50) visited an eye care provider within the previous 12 months, compared to 80.1% of those with the highest PIR scores (>5.00). The 2008 results were similar (61.4% with a PIR less than 1.50 vs. 78.3% with a PIR greater than 5.00).

Further, 62.9% of 2002 study participants with less than a high school degree saw an eye care provider within the prior 12 months, compared to 80.8% of those with a college degree. Again, comparable results were documented in the 2008 study (58.9% with less than a high school degree vs. 78.2% with a college degree).

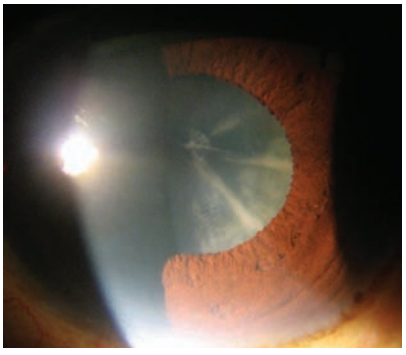


Photo: Andrew S. Gurwood, OD

Low income Americans are less likely to seek eye care for age-related eye diseases, such as cortical cataracts.

"Given that income and educational level are important social determinants of health, both society and individuals have the responsibility and capability to influence and help reduce such disparities," Dr. Zhang wrote in an email communication to *Medscape Medical News*. "Eye care providers, as well as primary care providers, should more proactively educate patients with low socioeconomic status about the importance of regular eye examination. More community-participated public health interventions to reduce eye care disparities are needed to further engage both patients and physicians."

Zhang X, Beckles GL, Chou CF, et al. Socioeconomic disparity in use of eye care services among US adults with age-related eye diseases: National Health Interview Survey, 2002 and 2008. JAMA Ophthalmol. 2013 Jul 18. [Epub ahead of print]

LET'S TALK SOLUTIONS

We understand that space is critical in today's modern eye care facilities. The Accutome B-Scan and UBM Plus are portable, high-definition probes that provide remarkable image quality. The units link directly to a PC, laptop or tablet. We also offer unlimited software licenses, so you can be ready to scan in any exam room.

SKU 24-6300

SKU 24-6100

Visit Us at Vision Expo West Booth# MS6050

www.accutome.com/product/ubm-plus
www.accutome.com/product/b-scan-plus

ACCUTOME®
A HALMA COMPANY

3222 Phoenixville Pike, Malvern, PA 19355 USA • 800-979-2020 • 610-889-0200 • FAX 610-889-3233 • www.accutome.com

Astronomy Technology Detects AMD

Engineers at the UK Astronomy Technology Centre (UK ATC) are used to applying their expertise to develop instruments capable of studying light from distant galaxies. But now they have collaborated with scientists at Cardiff University's School of Optometry and Vision Sciences to create an instrument that could potentially revolutionize the detection and treatment of age-related macular degeneration.

Photo: UK Astronomy Technology Centre

Tom Margrain, PhD, MCOptom, of Cardiff University School of Optometry, helped develop this retinal densitometer, which can measure early AMD with great accuracy.

The instrument, known as a retinal densitometer, is capable of detecting early signs of AMD by measuring how the eye responds to light.

Retinal densitometry itself is not a new concept, but the novel, video-based device developed by the UK ATC and Cardiff University's Macular Disease Study Group is the first of its kind. The instrument uses technology typically associated with astronomy to measure reflectance of light in the retina, giving it the potential to provide doctors with a map of retinal function.

Reduced sensitivity to light is one of the early signs of AMD. By exposing rod and cone photopigments to bright light, and then shutting off the light, the retinal densitometer measures the duration of "dark adaptation"—the recovery of visual function in the dark.

Preliminary tests on 10 control subjects and 10 patients with early-stage AMD have shown that this technology can measure light changes with great accuracy, and that it has a high ability to distinguish between affected and non-affected groups.

AOS Ordered to 'Cease Operations'

The American Optometric Society (AOS) must liquidate its assets and cease operations, following a judge's ruling in US Bankruptcy Court in mid-July.

The decision came as a result of American Board of Optometry's (ABO) petition to convert the AOS's bankruptcy case from a Chapter 11 bankruptcy to one under Chapter 7.

Generally, Chapter 11 bankruptcy allows an organization to restructure its debt and continue operations. But a Chapter 7 bankruptcy requires an organization to liquidate all of its assets to pay off its debt.

In this case, the AOS's bankruptcy stems from a court order to pay the ABO's attorney fees (to the tune of $462,508), which were incurred from the AOS's false advertising lawsuit against the ABO last year.

In that earlier suit, the AOS had argued the ABO's use of the term "board certification" is "false, misleading, confusing, deceptive or unfair." But, the US District Court decided that the AOS had failed to prove its case, and in August 2012 ruled in the ABO's favor—all of which led up to the Chapter 7 bankruptcy ruling in July 2013.

"We are pleased with the judge's decision," said Paul Ajamian, OD, ABO chairman of the board. "This verdict, along with the prior court ruling that the AOS lawsuit was 'groundless and unreasonable,' highlights the impropriety of [the AOS's] divisive conduct, justifying strong and swift action by the ABO. The hostile and acrimonious rhetoric generated by a handful of individuals set on slowing the progress of our profession has failed, and their organization has been ordered to cease operating."

The AOS board of directors said in a statement that, although it must cease operations, its spirit will continue through its members.

"Less than 5% of all ODs have pursued board certification," said Pamela Miller, OD, JD, AOS board president. "The majority of ODs will continue to make their opposition to board certification known. Individually, we are not going away."

800.787.5426
haag-streit-usa.com

The source of more twinkling eyes.
The Haag-Streit LED.

Need to amp up the twinkle in your eye? Enter the Haag-Streit LED slit lamp powered by blue-shift illumination. It visualizes your subject in stunning detail with our celebrated optics. Plus, LED is now standard on select Haag-Streit slit lamps.

But don't just take our word for it. See for yourself. Call 800.787.5426 for more information, or visit haag-streit-usa.com

The Superior Practice.

HAAG-STREIT USA

Recap: World Glaucoma Congress

By 2020, the number of people with glaucoma is expected to grow to 79.6 million worldwide.[1] With that sobering reality in mind, thousands of glaucoma experts from across the globe convened on Vancouver last month for the fifth annual World Glaucoma Congress (WGC), to share and absorb new insights in glaucoma research and patient care.

The WGC, hosted by the World Glaucoma Association, is an inclusive meeting where optometrists are given a seat at the table with ophthalmologists and other eye care professionals, says Murray Fingeret, OD, past president of the Optometric Glaucoma Society (OGS).

"The World Glaucoma Congress allows optometrists to learn about glaucoma from the world's experts," says Dr. Fingeret. "The breadth of the courses allows one to hear about every facet in glaucoma in one meeting."

Members of OGS presented a symposium on "Normative Databases for Imaging Instrumentation." The OGS panel offered insights on which individuals should be included in the construction of glaucoma databases, and the difficulty in developing one pertinent database for all population groups. OGS experts also reviewed the current normative database in OCTs used in the United States, and discussed whether specific reference sets are needed based upon ethnicity.

Another key symposium was "Biomechanics of the Eye," which included compelling new data showing that the laminar microstructure is highly variable, and that new 3D reconstruction and analysis techniques are beginning to challenge the prevailing views on the relationship between regional laminar pore size and focal axon loss in glaucoma.

Other highlights of this symposium included:

• New computer simulations demonstrate that mechanical strain is the signal that drives remodeling in the lamina in glaucoma.

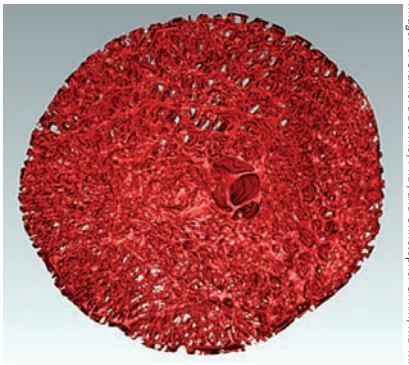


Image: J. Crawford Downs, PhD, and Christopher Girkin, MD MPSH

3D reconstruction of the connective tissue of the optic nerve head shows the pores through which the retinal axons must weave on their path from the eye to the brain. These axons transmit visual information, and get damaged in the optic nerve head in glaucoma.

• Anatomic data shows why high myopes might be more susceptible to damage from IOP than normal eyes.

• New data indicates that the peripapillary sclera stiffens with age in donor eyes from persons of European descent, and even more quickly in persons of African descent.

• New IOP telemetry data from primates shows that up to 10% of the IOP energy that the eye must absorb comes from spikes in IOP.

Other noteworthy symposia included:

• *Advances in Glaucoma Genetics.* Experts presented an overview of recent advances in glaucoma, including research that has led to the successful identification of genes and genetic risk factors for primary open-angle glaucoma, primary angle-closure glaucoma, congenital glaucoma and pseudoexfoliation. These discoveries are critical for the future development of gene-based screening and novel therapeutic approaches based on molecular genetics.

• *IOP Around the Clock.* In this symposium, attendees were reminded that IOP has a circadian rhythm, and that a single IOP measurement is insufficient to show the true nature of an individual's IOP. Experts also hit on lessons from IOP monitoring in both humans and primates. The utility of office diurnal IOP measurement, results of continuous IOP monitoring among various types of glaucoma, and 24-hour IOP data using a contact lens sensor were also highlighted.

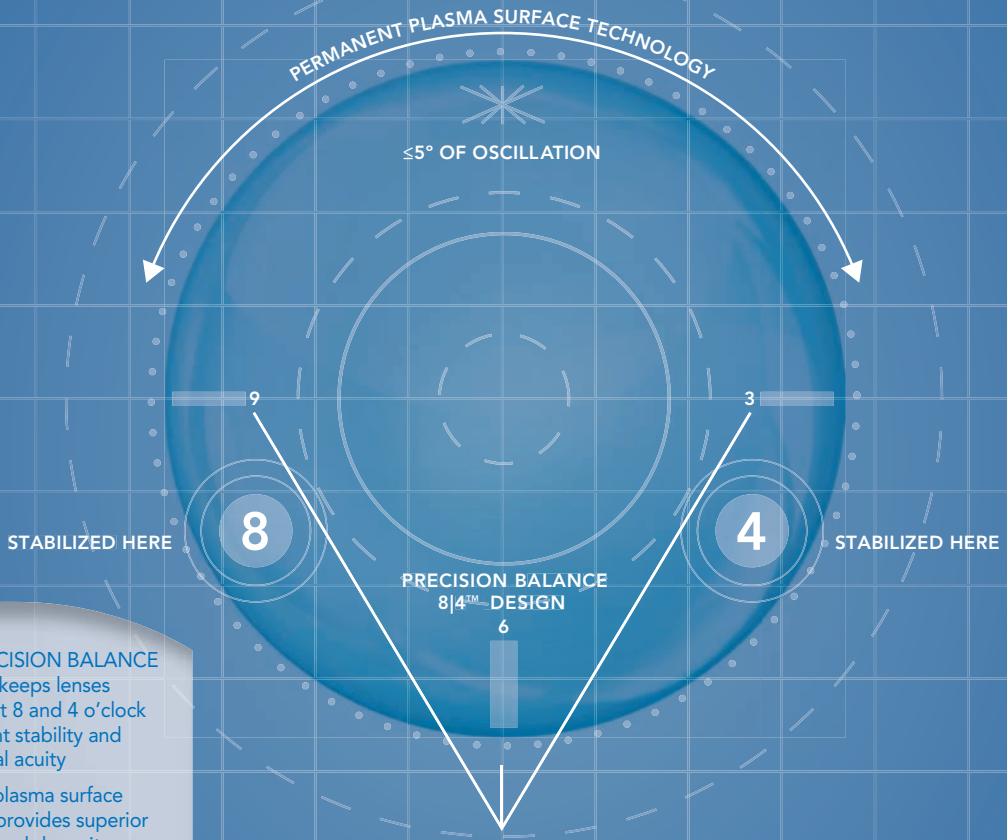
• *A New Addition to the Glaucoma Management Team—the Patient.* In the management of chronic, asymptomatic diseases such as glaucoma, long-term outcomes depend on adherence to medications and overall management. These depend partly on physician-patient communication. Presenters admitted the difficulties in achieving this because most doctors do not appreciate the patient's perspective and do not recognize real, practical problems of living with glaucomatous visual disability. To tackle this hurdle, the panel of experts provided pearls on how to connect more effectively with patients within the time and resource limits available.

The next WGC will take place June 2015 in Hong Kong.

1. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. Br J Ophthalmol. 2006;90:262-67.

STABILITY

IS THE CORE OF OUR DESIGN



- Unique PRECISION BALANCE 8|4™ Design keeps lenses positioned at 8 and 4 o'clock for consistent stability and reliable visual acuity
- Permanent plasma surface technology provides superior wettability[1] and deposit resistance[2,3]** for consistent comfort from Day 1 to Day 30[4]

AIR OPTIX® for Astigmatism

Contact Lenses

Visit **myalcon.com** to learn why AIR OPTIX® for Astigmatism contact lenses are the lenses of choice for many ECPs

Engineered for sustained performance

*Dk/t = 108 @ -3.00D, -1.25 x 180. **Compared to Biofinity^, PureVision^, ACUVUE^ OASYS^, ACUVUE^ ADVANCE^, and Avaira^ lenses. ^Trademarks are the property of their respective owners.

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

References: 1. In vitro measurement of contact angles on unworn spherical lenses; significance demonstrated at the 0.05 level; Alcon data on file, 2009. **2.** Ex vivo measurement of lipid deposits on lenses worn daily through manufacturer-recommended replacement period; AOSept Plus used for cleaning and disinfection; significance demonstrated at the 0.05 level; Alcon data on file, 2008. **3.** Nash W, Gabriel M, Mowrey-Mckee M. A comparison of various silicone hydrogel lenses; lipid and protein deposition as a result of daily wear. *Optom Vis Sci.* 2010;87:E-abstract 105110. **4.** Davis RL, Eiden SB. Evaluation of changes in comfort and vision during weeks 3 and 4 of monthly replacement silicone hydrogel contact lenses. American Academy of Optometry; 2012; E-abstract 125401.

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

Rx only

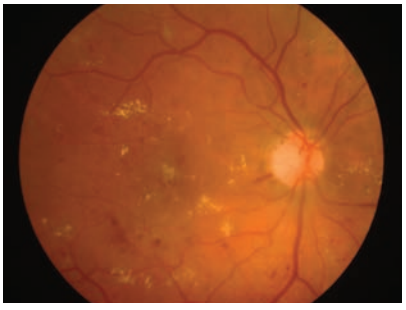
Alcon®

a Novartis company

Children with Diabetes Need Better Eye Care

Children who are at greatest risk for diabetic retinopathy are less likely to be screened.[1] Despite recommendations for yearly eye exams, only 64% of 1,112 children with type 1 diabetes were screened for retinopathy in the two years they were studied, according to an article in *Diabetes Research and Clinical Practice*.

Children who were not screened were more likely to be black or have poorer diabetes control.



Diabetic retinopathy does occur in kids.

For optometrists, "the biggest thing we can do is to continue to educate patients and parents on the importance of routine eye care, especially in higher risk populations," says Jeffry D. Gerson, OD, of WestGlen Eyecare & Omni Eye Centers of Kansas City. "We can also continue to let [diabetes care providers] know about the importance of comprehensive eye care, and that ODs can in fact deliver the care needed."

Senior author Terri Lipman, PhD, CRNP, of the University of Pennsylvania School of Nursing agrees. She believes if there were more collaborative relationships between diabetes care providers and optometrists, it would improve the chances of patients getting more frequent eye exams and better eye care.

"We want eye care to be part of health care," Dr. Lipman says. "We want families to become accustomed to yearly eye exams—similar to dental visits—so that if there are some signs of retinopathy, they are caught very early on."

This is particularly important given the findings of a separate study of retinopathy in children with diabetes, which Dr. Lipman also coauthored. That study found that nearly 14% of young people who had type 2 diabetes for about five years had signs of retinopathy.[2]

"It's helpful for ODs to see that even patients who haven't had diabetes for 20 or 30 years can still have diabetic retinopathy," Dr. Lipman says. "There was a misperception that diabetic retinopathy only occurred in adults and in those who had diabetes for many years, and this study showed that's not necessarily the case."

Of 517 children with type 2 diabetes enrolled in the study, all were overweight or obese and 71 had early signs of retinopathy.

"Results of studies like this are powerful, as 14% is not an insignificant number," Dr. Gerson says. "It is important to realize that retinopathy often tells us more than just retinal health—it may be a sign of suboptimal glucose control or other systemic diseases that are more likely with presence of retinopathy." ■

1. Dumser SM, Ratcliffe SJ, Langdon DR, et al. Racial disparities in screening for diabetic retinopathy in youth with type 1 diabetes. Diabetes Res Clin Pract. 2013 May 1;S0168-8227(13):00087-9.
2. TODAY Study Group. Retinopathy in youth with type 2 diabetes participating in the TODAY clinical trial. Diabetes Care. 2013 Jun;36(6):1772-4.

REVIEW® OF OPTOMETRY

Jobson Professional Publications Group

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

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

SALES MANAGER, NORTHEAST, OHIO
James Henne
(610) 492-1017 • jhenne@jobson.com

SALES MANAGER, SOUTHEAST, WEST
Michele Barrett
(610) 492-1014 • mbarrett@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

EDUCATION/CONFERENCE MANAGER
Meg McDonald
(610) 492-1045 • mmcdonald@jobson.com

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

SENIOR CIRCULATION MANAGER
Anthony Guadagnino
(212) 219-7870 • aguadagnino@jobson.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

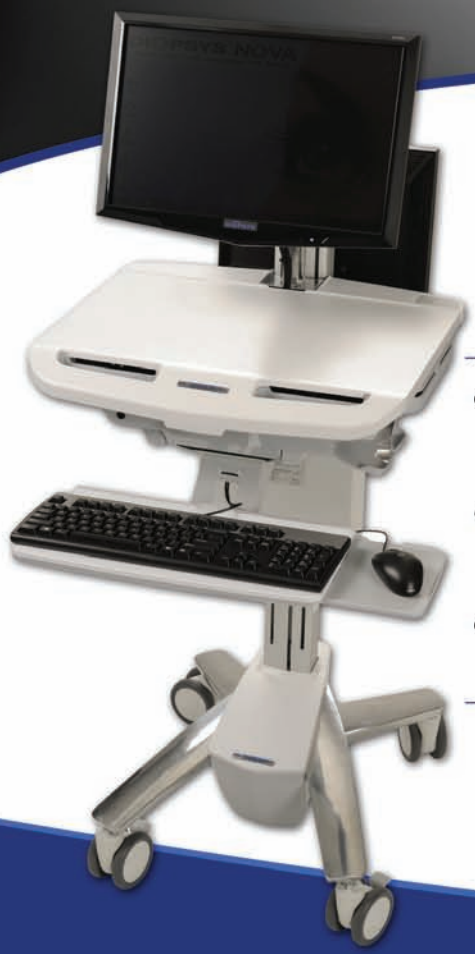
CEO, INFORMATION SERVICES GROUP
Marc Ferrara

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



The company that brought VEP into the eye care practice now leads the way to office-based pattern ERG.

- The new Diopsys® NOVA-ERG test helps doctors assess retinal function while VEP helps assess the entire visual pathway.
- Easy-to-use ERG Lid Sensors are comfortable for the patient and convenient for the doctor.
- Reimbursement for CPT Codes 95930 (VEP) & 92275 (ERG) can each exceed $100.*

To learn more, visit *www.diopsysperg.com*

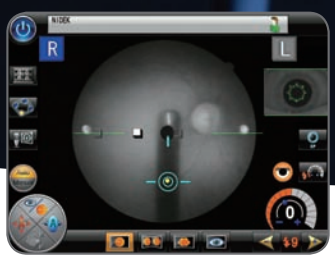
DIOPSYS® NOVA-VEP
OFFICE BASED VISUAL EVOKED POTENTIAL TESTING

*Insurance coverage may vary by contract. Please contact Diopsys at 973-244-0622 for more detail on coverage.

The Power to Simply Perform

3D AutoAlign in X-Y-Z

AutoSwitching



AutoFocus

NOW

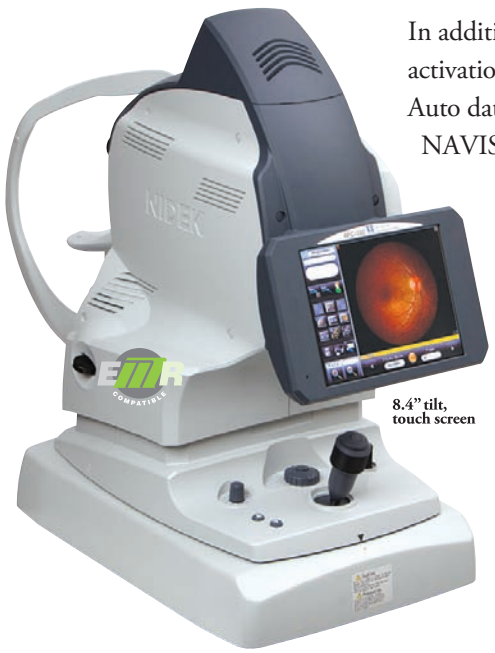
know the difference between 'auto' & 'ought-to'

Experience a fundus camera with auto 3D alignment in X-Y-Z axes, AutoSwitching, AutoFocus, AutoShot, AutoPanoramic images, and AutoStereo Pairs.

In addition, the **AFC-330** delivers Auto small pupil detection/activation of small pupil mode, Auto blink detection, Auto data transfer options, and is fully networkable with NAVIS-EX data management software.

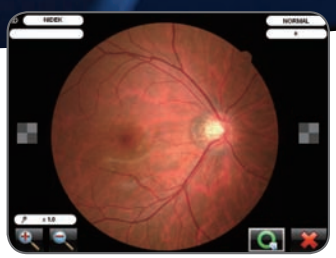
If your Retinal Camera doesn't provide these 'auto' features...it **'ought-to'**.

Arrange your free product demonstration at **www.marco.com**, and realize how simple fundus photography should be.

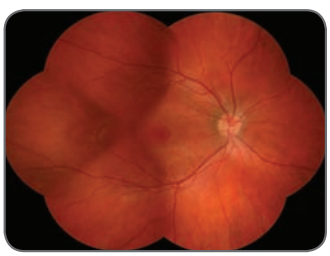


8.4" tilt, touch screen

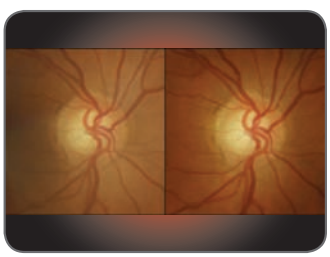
The Difference is Marco™



AutoShot



AutoPanorama (2-7)



AutoStereo Pairs

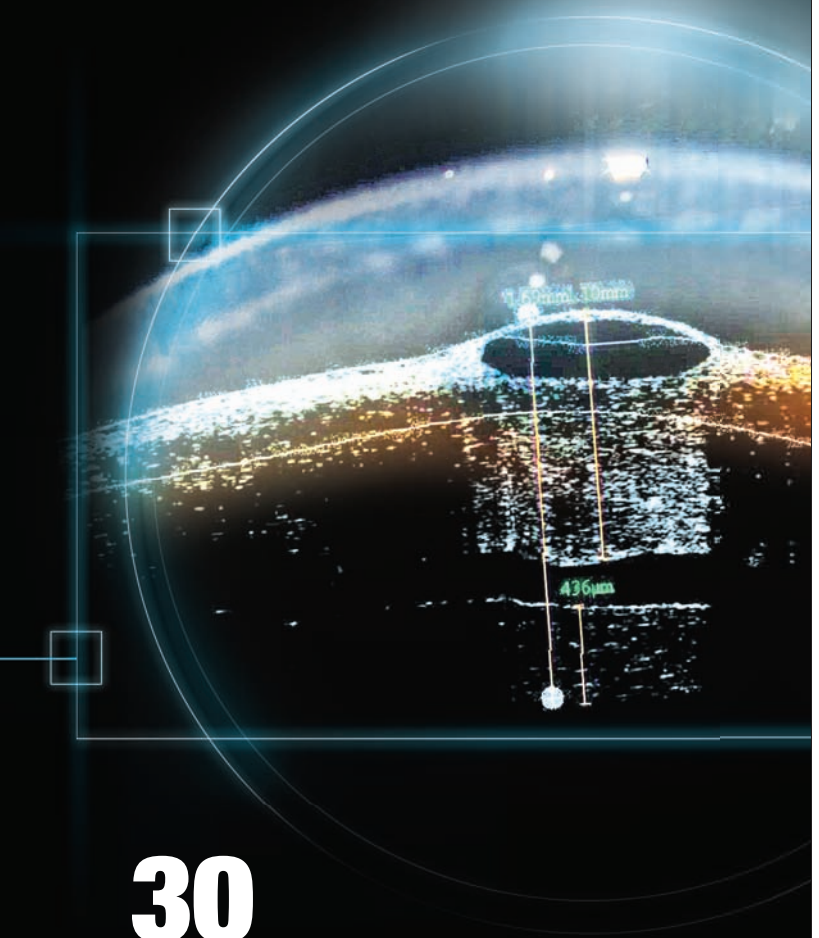
NIDEK | MARCO

Designed and Manufactured by NIDEK – Represented by MARCO

800.874.5274
www.marco.com

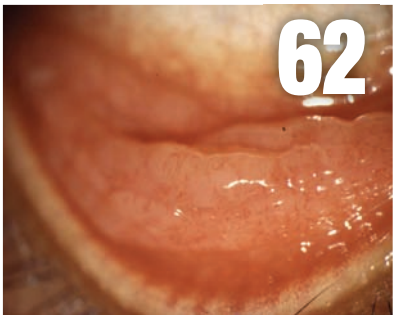
Contents

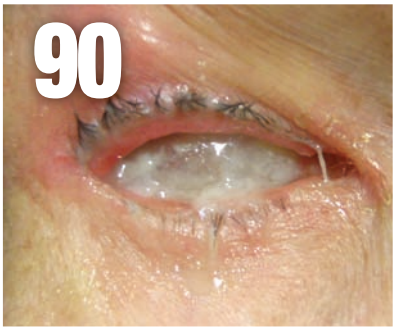
Review of Optometry August 2013



Departments

Review of Optometry August 2013





On The Web »

Check out our multimedia and continuing education @ *www.revoptom.com*

Digital Edition

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

Go to www.revoptom.com and click on the digimag link to 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

REVIEW OF OPTOMETRY

PRINTED IN U.S.A.

FOUNDING EDITOR
FREDERICK BOGER
1891-1913

EDITORIAL OFFICES
11 CAMPUS BLVD., SUITE 100
NEWTOWN SQUARE, PA 19073
EMAIL • REVIEWOFOPTOMETRY@JOBSON.COM
WEBSITE • WWW.REVOPTOM.COM

SUBSCRIPTION INQUIRIES
1-877-529-1746
CONTINUING EDUCATION INQUIRIES
1-800-825-4696

EDITOR-IN-CHIEF • JACK PERSICO
(610) 492-1006 • JPERSICO@JOBSON.COM

EXECUTIVE EDITOR • JOHN MURPHY
(610) 492-1021 • JMURPHY@JOBSON.COM

MANAGING EDITOR • MICHAEL HOSTER
(610) 492-1028 • MHOSTER@JOBSON.COM

SENIOR EDITOR/WEB EDITOR • COLLEEN MULLARKEY
(610) 492-1005 • CMULLARKEY@JOBSON.COM

DIRECTOR ART/PRODUCTION • JOE MORRIS
(610) 492-1027 • JMORRIS@JOBSON.COM

ART DIRECTOR • JARED ARAUJO
(610) 492-1032 • JARAUJO@JOBSON.COM

DIRECTOR OF CE ADMINISTRATION • REGINA COMBS
(212) 274-7160 • RCOMBS@JOBSON.COM

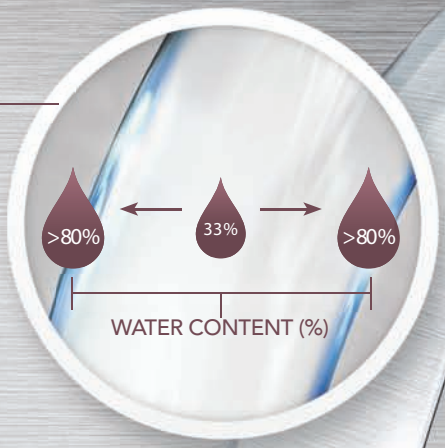
SPECIAL PROJECTS • JANE COLE
(610) 492-1043 • JCOLE@JOBSON.COM

Jobson Professional Publications Group

JOBSON MEDICAL INFORMATION LLC

jmi

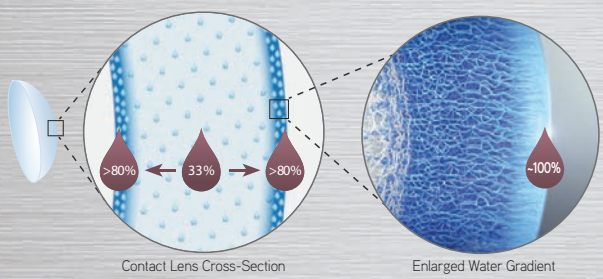
UNIQUE WATER GRADIENT



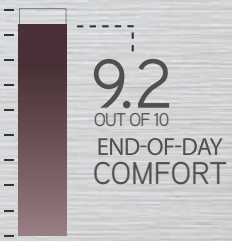
THIS IS WHY contact lenses have reached a new era in comfort.

DAILIES TOTAL1® Water Gradient Contact Lenses feature an increase from 33% to over 80% water content from core to surface[1]* for the highest oxygen transmissibility,[2] and lasting lubricity[3] for exceptional end-of-day comfort.[4]

The First and Only Water Gradient Contact Lens



Contact Lens Cross-Section | Enlarged Water Gradient



9.2
OUT OF 10
END-OF-DAY
COMFORT

UNIQUE WATER GRADIENT
Features different surface and core water contents, optimizing both surface and core properties[1]

LASTING LUBRICITY
Ultrasoft, hydrophilic surface gel approaches 100% water at the outermost surface[5] for exceptional lubricity

OUTSTANDING COMFORT
Lasting lubricity for exceptional comfort from beginning to end-of-day[4]

Let your patients experience the DAILIES TOTAL1® contact lens difference today.

PERFORMANCE DRIVEN BY SCIENCE™

*_In vitro_ measurement of unworn lenses

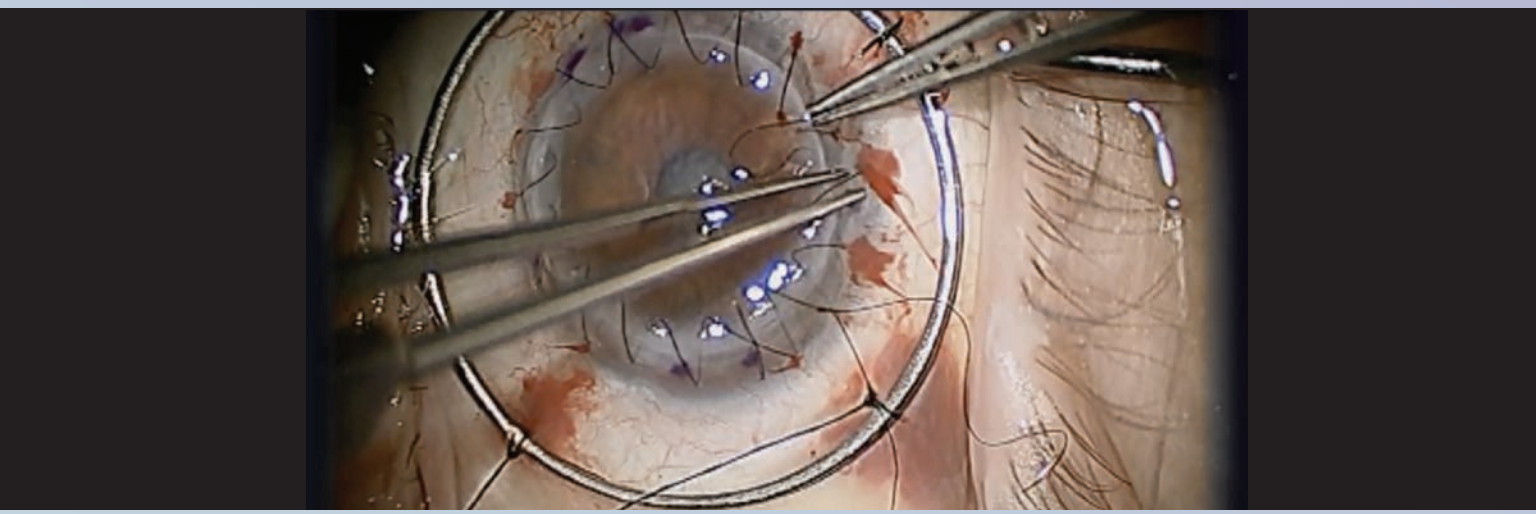
1. Thekveli S, Qiu Y, Kapoor Y, Kumi A, Liang W, Pruitt J. Structure-property relationship of delefilcon A lenses. Cont Lens Anterior Eye. 2012;35(suppl 1):e14.
2. Based on the ratio of lens oxygen transmissibilities among daily disposable contact lenses. Alcon data on file, 2010.
3. Alcon data on file, 2011.
4. In a randomized, subject-masked clinical study, n=40. Alcon data on file, 2011.
5. Angelini TE, Nixon RM, Dunn AC, et al. Viscoelasticity and mesh-size at the surface of hydrogels characterized with microrheology. ARVO 2013;E-abstract 500, B0137.

Rx only See product instructions for complete wear, care, and safety information. 6/13 DAL13097JAD-B

Alcon®
a Novartis company

Surgical Minute

By Derek N. Cunningham, OD, and Walter O. Whitley, OD, MBA



See the view through the operating microscopes of some of the best eye surgeons in the US, with expert commentary from comanaging optometrists.

Surgical Minute

PK: Right on the Button

When all else fails, penetrating keratoplasty offers a chance for better acuity.

By Derek N. Cunningham, OD, and Walter O. Whitley, OD, MBA

On The Web >> View a narrated video of penetrating keratoplasty.

Penetrating keratoplasty (PK) is a full-thickness transplant in which the damaged central cornea (7mm to 9mm) is removed and replaced with donor tissue. Compared with other types of tissue transplants, it has a long and outstanding record of success; more than 46,000 corneal transplants were performed in 2011, according to Eye Bank Association of America.

The most common indications for penetrating keratoplasty are regrafting, keratoconus, Fuchs' endothelial dystrophy, pseudophakic bullous keratopathy, perforated corneas, traumatic scars and viral keratitis.

The advantages of penetrating keratoplasty include the full removal of damaged corneal tissue, improved optical clarity, restored corneal anatomy, ease of performance compared to other corneal transplant procedures, improved cosmetic appearance and the potential for good optical results.

Some disadvantages are a higher risk of graft rejection, post-op astigmatism, suture management, intraocular complications and traumatic corneal rupture.

Variations of the procedure include deep anterior lamellar keratoplasty (DALK), Descemet's stripping endothelial keratoplasty (DSEK) and Descemet's membrane endothelial keratoplasty (DMEK). The choice of procedure (PK or one of the above variations) depends on which corneal layers have been affected.

The procedure begins with the preparation of the donor tissue. A trephine (a circular cutting device) is used to cut the donor cornea, followed by trephination of a similar sized portion (7mm to 9mm) of the patient's cornea. Once the recipient's corneal button has been removed, the anterior chamber is filled with balanced salt solution or sodium hyaluronate and the donor button is placed into position.

Four cardinal sutures of 10-0 nylon are placed at 90° intervals in the donor graft, just above Descemet's membrane. The sutures are then passed into the recipient's cornea at the same level, at approximately 1.5mm into the host tissue. Once the needle is passed though, the suture is tied and buried. After the cardinal sutures are in place, suturing can be completed with a single running suture or interrupted sutures.

Postoperatively, patients are prescribed topical antibiotics for one to two weeks as well as topical steroids, which are tapered over several months. Many times, patients are kept on low-dose topical steroids to reduce the risk of graft rejection and failure. Sutures can be removed as soon as two to three months, if needed. Or, if a patient has little astigmatism and the sutures are not causing any problems, they can be left in place for many years.

As comanaging optometrists, our main concern is the long term management and visual function. Postoperatively, corneas may take anywhere from 18 to 24 months to fully stabilize, so be sure to continuously monitor patients for adequate visual acuity and functional vision. Communicate with your corneal specialist to decide when patients are sufficiently stable for contact lenses. A specialty contact lens (GP or hybrid) may be considered as soon as three months after surgery, but may need several changes and modifications once the sutures are removed. ■

This innovative video series puts *you* in the OR.

New cases monthly!
For current and archival videos, please visit:

Download a QR scanner app. Launch app and hold your mobile device over the code to view the videos.

www.revoptom.com/multimedia

REVIEW® OF OPTOMETRY

Back to the Future

What a science fiction story written during the Eisenhower era can teach us about the perils and promise of the latest technology. **By Jack Persico, Editor-in-Chief**

I read a lot of science fiction as a kid. Not the trendy post-apocalyptic action adventures so popular in the movie theaters every summer, where good-looking antiheroes wearing expensive sunglasses save the world and restore faith in humanity. Nah, for me it was more mannered (read: dull) tales of how technology influences society and culture gradually over time, written by the likes of Isaac Asimov, Arthur Clarke and Robert Heinlein. It was for nerds, by nerds, and I ate it up like soylent green.*

I still remember an Asimov short story called "The Feeling of Power" that I read as a teenager. Written in 1958 but set in the distant future, the story is a cautionary tale about humans who have become so dependent on technology that they've lost the ability to perform simple arithmetic, letting computers handle everything instead. When a low-level engineer relearns the skill, his prowess with numbers is highly sought after by the military. Maybe the generals could use this "math stuff" to improve their weapons.

It's an irony-laden story that reminds us of the dangers of over-reliance on technology at the expense of our own brainpower.

**Are you a fan of old-school sci-fi, too? Find the reference we used in one of this month's headlines. The first reader who points it out gets a mention on Facebook. Write to jpersico@jobson.com, or post directly on our Facebook page at facebook.com/revoptom.*

Looking over the features in this technology-themed issue, that message seems more relevant than ever.

We begin with a preview of the Google Glass "augmented reality" device—how it functions and what ODs need to know when discussing it with patients—on page 24.

Our reliance on Google has only increased in the five years since a cover story in *The Atlantic* pointedly asked, "Is Google Making Us Stupid?" Guilty as charged. I use Google for answers and guidance so often that I don't even give my own memory much of a chance to stay in shape. Case in point: I've been to my mother's new house dozens of times in recent years—every trip powered by Google Maps. I'm chagrined to admit that I might not be able to make it there if I had to rely only on my wits.

So, what will life be like if Google Glass takes off and becomes ubiquitous? Ever easier access to information, ever fewer reasons to learn anything ourselves. That bothers me more than the privacy issues everyone is up in arms about over the clandestine photo-taking it enables. Luckily, the Google Glass headset looks so dorky that even a card-carrying nerd like me wouldn't wear it in its current form. Until miniaturization allows the technology to disappear into the frame, expect interest to be limited to early adopters who value gadgetry over aesthetics.

But always-connected, always-correct devices will continue to gain traction, especially in medicine.

Raiders of the Lost Arts

The anterior segment OCT technology on display in our cover story is truly astounding. But its revolutionary advances must be balanced with a keen awareness of the anatomy and pathophysiology of the ocular diseases it depicts, to allow proper perspective when acting upon the data it provides.

OCT and other advanced devices also figure prominently in our annual reader survey of new equipment purchases, found on page 30. It's great to see so many new technologies flourishing and being integrated into practice; just make sure they augment rather than supplant your clinical acumen.

Asimov's story ends with this epiphany:

"Nine times seven," thought Shuman with deep satisfaction," is sixty-three, and I don't need a computer to tell me so. The computer is in my own head." And it was amazing the feeling of power that gave him.

To safeguard that feeling in the here and now, this month we debut a new series on the 'lost arts' of optometry. The authors begin with a refresher on scleral depression; future installments will cover the fundus exam and gonioscopy. Fundamental skills like these are always worth honing, even when advanced technology abounds. Use new tech as a tool, not a crutch.

I pledge to do the same. The next time I drive to my mom's house, I'll leave the cell phone turned off and see if I can go it alone. ■

REVIEW® OF OPTOMETRY

Eyecare Resources Online

This service allows you to capture needed measures for two meaningful use objectives:

1) electronic transmission of patient prescriptions

2) distribution of patient-specific education materials

ECP Resources and ePrescribing from *Review of Optometry* and Healthcare Resources Online enable you to provide patient education, electronic prescribing and generate reports that allow you to attest for meaningful use incentives; however, determination of your bonus payments from CMS depends on other factors and qualifications specific to your practice.

For More Information, Visit Our OD E-Prescribing Resourses Website Page:

www.revoptom.com/ecp_resources_erx/

Download a QR scanner app. Launch app and hold your mobile device over the code and get ready to view our website.

This Job Will Drive Me to Drink

I live by that old saying, "Don't drink and wink." So, eyes and alcohol are not the subject of this column. Then again, since you brought it up... **By Montgomery Vickers, OD**

Some doctors serve wine in the reception area! I guess their patients must be more controlled than mine. If I served wine in the waiting room, it would be like the gladiators in the Coliseum, and I would probably be out there swinging my trident around, too. (We are a visceral bunch in West Virginia.)

In optometry school, once—and only once—I had a beer with lunch before heading back to the clinic. I was worthless the rest of the afternoon. As this was not unusual, none of my instructors noticed. But for me, I hated that sluggish, bloated feeling that comes from a single beer. That was probably the last time I ever had a single beer. Takes more than that to perk me up.

So, keep C_2H_6O as a line on the Snellen chart. Works better that way.

Hydratin' & Dilatin'

But, booze aside, drinking in the office is very important. Explaining presbyopia 12 times a day can leave one parched. The body needs water to survive and I take a sip or two of H2O between every patient. My doctor told me it might help prevent kidney stones, and it doesn't take too many kidney stones to convince even a dull boy like me that kidney stone prevention has merits.

But, my body had to adapt. In the beginning, "Which is better? Number one or number two?" quickly turned into numerous "number ones," mostly between patients and sometimes during patients. But, over time, I adapted, and the experience led to me writing my very first professional grade joke, which is copyrighted but available for purchase or rent:

"You know, my wife and I stayed at a great hotel. Just wonderful! I got up to go the bathroom in the middle of the night and, when I came out, I told my wife 'Honey, this hotel is awesome! The bathroom is amazing. I've never seen this before. It has a urinal! Looks just like a sink!'"

Cue rimshot! (Please contact my agent for details about how you can use this joke at your next office meeting or bar mitzvah.)

I try to keep two bottles of water in each room. One large one, as stated above, is for me and my kidney stones. The other, a hidden and small bottle, is for (a) the patient who will want my water as soon as he or she sees me take a hit, and (b) for the patient who gets into a coughing jag that lasts so long it cuts into my lunch hour, which is forbidden in Monty's World.

We have a little dorm room-sized fridge available for the staff. Unfortunately, they still drink all my water, so I plan to name a kidney stone after each one of them, like the weather people do with hurricanes all season.

Finally, an admission: I have one beer in the office. When my friend, Dr. Mike Burke, an expatriate West Virginian practicing in North Carolina, was sworn in as president of the North Carolina Optometric Society back in 2003, he asked me to speak at the ceremony. I told him I would do it for a beer. So, that's what he paid me and it sits in a prominent place between two boxes of frames we should have returned back in the 90s.

For the record, Mike, it was a joke. You can send me my *real* honorarium now. I'll get that beer back to you once I'm paid. ■

A Contact Lens that Works with the Tear Film

In **DAILIES® AquaComfort Plus®** contact lenses, multiple wetting technologies work in tandem to maintain tear film integrity—and all-day comfort. — **Kristopher A. May, OD, FAAO**

Research over the last decade has expanded the traditional three-layer (mucin/aqueous/lipid) model of the tear film to a more complex continuum. We now see that mucins are both bound to the epithelial glycocalyx and dissolved in the aqueous tears; that proteins, electrolytes, growth factors, and antioxidants comingle in aqueous solution; and that a thin complex of phospholipids, fatty acids, and esters prevents evaporation.[1]

When functioning properly, the tear film reduces friction during blink, protects against infection, delivers nutrients and clears wastes; and, importantly, provides a smooth refracting surface for light entering the eye. Disruption of the tear film can set the stage for the signs and symptoms of dryness to develop.[1]

Add a Contact Lens

When placed on the eye, a contact lens splits the tears into a pre-lens tear film and a post-lens tear film. Dividing the tears in this way causes the layer on top of the lens to be thinner and break up more rapidly. This loss of volume and faster breakup, which happen irrespective of lens type, is believed to be due to thinning of the lipid layer.[2]

A shortened tear film breakup time (TFBUT) can leave parts of the lens' front surface exposed to air, and these dry spots can affect lens performance. Soft contact lenses are dynamic structures: When covered by tear fluid, the hydrophilic heads of the lens polymer chains are stable at the lens surface; but when the tears break up and expose areas of the lens surface to air (which is hydrophobic), the hydrophilic moieties within the lens are driven toward the moisture within the lens bulk, leaving hydrophobic (non-wettable) areas on the lens surface.[3]

Decreased lens surface wetting leads to greater friction and greater susceptibility to protein and lipid deposition—which can contribute to discomfort for wearers.

Engineered for Tear Film Stability

DAILIES® AquaComfort Plus® contact lenses take a multi-tiered approach to wettability. First, these lenses benefit from an innovative manufacturing process called Lightstream™ Technology, which uses ultraviolet light, rather than chemical processing, to polymerize the lens material. This efficient photo-lithographic process does not require the chemical byproduct-extraction step necessary for other contact lens manufacturing processes.[4]

The material, nelfilcon A plus, contains polyvinyl alcohol (PVA), a water-soluble polymer commonly used as a wetting agent in artificial tears. Most of the PVA in DAILIES® AquaComfort Plus® contact lenses is bound to the lens matrix, but the small amount of unbound PVA present in the lenses is gradually squeezed from the lens matrix by normal blinking.[5]

The moisturizing agent polyethylene glycol, a medium-sized molecule that binds to PVA and further extends its release, is also embedded in the lens matrix. It takes 2 to 4 hours to dissipate and so helps to support a stable pre-lens tear film early in the day. Hydroxypropyl methylcellulose (HPMC), a smaller molecule added to the packaging solution of DAILIES® AquaComfort Plus® contact lenses, enhances comfort on insertion and through the initial 20 to 30 minutes of wear. This staged combination of wetting strategies results in a stable tear film—and all-day comfort for wearers.[6]

Because they do not require care solutions or complex cleaning regimens, I like to think of daily disposable lenses as having "built-in" patient compliance. Prescribing DAILIES® AquaComfort Plus® contact lenses—daily disposables with "built-in" comfort and tear film stability—helps keep my contact lens patients happy and healthy.

PROVEN PERFORMANCE, BUILT-IN

Wolffsohn and coworkers examined the clinical performance of four daily disposable lens types, all of which had some form of comfort enhancement. Lenses were worn for 8, 12, and 16 hours; and clinical measurements (taken with the lens in place) included pre-lens non-invasive TFBUT, tear prism height, bulbar hyperemia, and ocular surface temperature.[5]

For all tested lenses, the tear prism height, pre-lens non-invasive TFBUT, and ocular surface temperature decreased after longer hours of wear. However, the tear film was found to be most stable on the surface of DAILIES® AquaComfort Plus® contact lenses, whose multi-tier wettability technology outperformed its rivals.[5]

Kristopher A. May, OD, FAAO, practices at Coldwater Vision Center in Coldwater and Ashland, MS.

REFERENCES

1. Craig JP, Tomlinson A, McCann L. Tear Film. In: Dartt D, Bex P, D'Amore P, et al. *Ocular Periphery and Disorders.* 1st ed. New York: Elsevier; 2010:254-62.
2. Stapleton F, Stretton S, Papas E, et al. Silicone hydrogel contact lenses and the ocular surface. *Ocul Surf.* 2006;4(1):24-43.
3. 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.
4. Nicholson PC, Vogt J. Soft contact lens polymers: an evolution. *Biomaterials.* 2001;22:3273-83.
5. Wolffsohn JS, Hunt OA, Chowdhury A. Objective clinical performance of 'comfort-enhanced' daily disposable soft contact lenses. *Contact Lens Anterior Eye.* 2010;33:88-92.
6. Peterson RC, Wolffsohn JS, Nick J, Winterton L, et al. Clinical performance of daily disposable soft contact lenses using sustained release technology. *Contact Lens Anterior Eye.* 2006;29:127-34.

I&R: Interpretation *and* Report

The job's not finished until the paperwork is done.

By John Rumpakis, OD, MBA, Clinical Coding Editor

I've written many columns recently about the coding of diagnostic tests, with answers on:

- Whether a test is considered unilateral or bilateral. (It depends on the test.)
- Whether it can be done on the same day as any ophthalmic or E/M office visit. (Yes, it can.)
- Whether it is subject to the new Multiple Procedure Payment Reduction rule that came into place on January 1 of this year. (They all are.)

But these questions, and others, about how the test is carried out is only half of the story of diagnostic testing.

What's the other half of the story? The second essential part is the interpretation and report (I&R) that must be done to properly meet the requirements for performing a diagnostic test.

The CPT clearly defines that, "Interpretation and report by the physician is an integral part of the special ophthalmological services where indicated and that the technical procedures (which may or may not be performed personally by the physician) are often part of the service, but should not be mistaken to constitute the service itself."

What does that mean? It means that, by definition, the test is not deemed to be completed until the interpretation and report has been finished. Bear in mind that the term "interpretation *and* report" means just that. You must interpret the results of the test—*and* report on how the test affected the care plan for the patient.

Clearing Misconceptions

Before getting into the specific components of the I&R, let's talk about a couple common misperceptions surrounding it. Some lecturers have said from the podium that the I&R must be done in a "special report format" or "on a separate piece of paper."

I disagree; I have yet to find a CMS reference or any other supporting evidence for this. From my research, an I&R needs to be clearly identified within your medical record for the specific test it is associated with. That is, each test that you perform requires its own I&R—no exceptions. But, as long as the technical test findings and the I&R for that specific test are clearly associated with each other, you should be fine in an audit without the need for a special format or separate piece of paper.

Remember, each diagnostic test you order and perform must have proper medical necessity established for it in the medical record if a third-party carrier is going to pay for it. If you have a specific reason for which you believe that a test may be denied, then use an advance beneficiary notice (ABN) and the appropriate modifier accordingly.

What the I&R Includes

Here are the typical items that you should include in an I&R:

- Clinical findings, which is the pertinent data of the test results.
- Your interpretation of those findings.
- Comparative data to previous test results (if applicable).
- Clinical management, which explains how the test results will affect the management of the condition/disease going forward. Examples include:
  - — *Change/increase/stop medication*
  - — *Recommendation for surgery*
  - — *Recommendation for further diagnostic testing*
  - — *Referral to a specialist/subspecialist for additional treatment*
  - — *Returning to you for additional office visits for monitoring and/or treatment*

Simply performing the technical component of the test is not enough; nor is simply initialing the test to show that you've looked at it. When a carrier finds that an I&R hasn't been completed, then the entire test is deemed to be invalid; this means that you'll have to return the entire payment to the carrier, not just the amount for the professional component of the test.

Diagnostic testing is becoming more common in our practices. Advancements in patient care depend on our ability to properly perform diagnostic testing properly. So, fulfilling the diagnostic test requirements by appropriately completing an I&R for each test performed will not only benefit your patient, but will also reduce your risk. ■

If your practice could use financial insight, you could use U.S. Bank.

Whether you're expanding or starting your practice, U.S. Bank can help with equipment, buy-outs, refinancing or more. With the help of a trusted U.S. Bank Practice Finance Specialist, our Specialists will prescribe solutions that may help your practice.

Acquisition Financing | Practice Debt Refinancing | New Practice Start-Ups | Buy-Ins
Expansions | Relocations | Buy-Outs

Call Jeramie Eimers
Practice Finance Specialist
800-313-8820 Ext. 2

All of us serving you®

EST. 1863 | usbank®

usbank.com/practicefinance connect

Will You Be Prescribing Google Glasses?

Patients wearing this futuristic device and other "augmented reality" glasses will be showing up in your offices soon. Should you plug in to this technology?

By Kevin Wheat, OD, and Nathan Bonilla-Warford, OD, ABOC

You may have seen pictures of famous people such as actress Sarah Jessica Parker, basketball player Victor Oladipo and politician Newt Gingrich wearing Google Glasses. If you pay any attention to Silicon Valley, you've definitely seen pictures of Google co-founder Sergey Brin wearing them at meetings and blogger Robert Scoble wearing them in the shower. Optometrists are already seeing patients coming in wearing Google's new "smart glasses."

Will you be prescribing Google Glasses, or even using them in the office? And, if so, what should you do to be ready?

Photo: Trey Ratcliff, www.StuckInCustoms.com

Optometrist Danielle Pretty tests out Google Glass. She suggests the heads-up display be should used with the wearer's non-dominant eye.

Know the Types of Technology

There are three types of technology you're likely to encounter in the near future: augmented reality, smart glasses and wearable technology.

• ***Augmented reality.*** Many people are familiar with the term "virtual reality," where a computer-generated environment is created and displayed on either a screen or through a stereoscopic display. Viewers can perform actions in this simulated, artificial world. By contrast, "augmented reality" (AR) takes place in the real world with additional computer-supplied visual information superimposed. This is commonly thought of as "Terminator-style vision," a term taken from the 1984 sci-fi movie starring Arnold Schwarzenegger. The Terminator saw the real world, but with superimposed data to make him more efficient. This is reality—just "augmented."

• ***Smart glasses.*** While *The Terminator* was excellent science fiction, you may encounter people in the present day using high tech "smart glasses." Like a smartphone, smart glasses have electronic functionality that extends beyond ordinary frames and lenses. These glasses can track data, take pictures, record video, make calls and connect to the Internet. Google Glass falls into this category, although the market includes other devices as well. (*See "Other Smart Glasses," page 28.*) In fact, Google says Glass isn't AR because it's not

We have 12,000,000 reasons to believe we can fit your patients

Every patient is unique and has specific needs and we've got the lens for them. Fit ALL your patients, even your hard-to-fit patients, with CooperVision contact lenses—the broadest and most diverse family of contact lenses on the market.

CooperVision®
Live Brightly.™

meant to always be on—you turn it on when you need it, you turn it off when you don't.[1]

Only recently have smart glasses included AR functionality beyond the laboratory setting, but industry analysts project that as many as 10 million smart glasses will be sold by 2016.[2]

• ***Wearable technology.*** These kinds of wearable technologies are not new. In the early 1980s Steve Mann, PhD, started researching this field by building backpack-mounted computers with video, text, graphics and multimedia capabilities. Today, we see multiple consumer products in the form of wearable technologies, mainly wristwatches. There are also rumors that Apple, Samsung and Google are developing their own technologies to be used in wristwatch form.

Origin of Google Glass

Google has been working on Project Glass for the last two to three years. It was introduced to the public in April 2012. Glass was one of the first projects that Google[x]—Google's secretive science and technology laboratory—released to developers.

Early prototypes of Project Glass were large-framed glasses with cell phones attached to the temples with a heads-up display (HUD). Lead industrial designer, Isabelle Olsson, had the responsibility of making Project Glass fit a smaller form while remaining stylish.

What Glass Looks Like

The current Project Glass developer edition design is indeed very stylish and lightweight. There is a flexible titanium band that wraps from ear to ear with the hardware resting on the right side of the device. Glass is available in five different color options (sky, tangerine, shale, cotton and charcoal). It has the same internal specifications you'd get from an average cell phone: Bluetooth, 16GB flash storage, 1GB RAM, Wi-Fi, microphone, gyroscope and 5MP camera. The device runs on Android, Google's user-friendly mobile platform.

Photo: Google

Isabelle Olsson, Google Glass industrial designer, models an early prototype.

Glass also has some unique features, including a HUD, bone conduction speaker, infrared sensors and a large trackpad that runs along the temple. Glass weighs in at just a little over 40 grams. The battery is located behind the ear, which helps to stabilize the device and provides about 45 minutes of uninterrupted video recording time.

What Glass Can Do

The vision behind Glass is to "put you back in control of your technology" by giving you a simple, hands-free device that's on only when you need it, Google says. Glass can perform most functions that your cell phone can without the need to take your phone out of your pocket. It allows you to perform Google voice searches, turn-by-turn navigation, view web pages, view and respond to text messages and emails, and make phone calls and video conference calls. To keep distractions at a minimum, the screen is set to "off" by default and can be activated by touching the trackpad or by tilting your head up.

In the past few months, Google allowed a select few thousand early adopters—both developers and regular consumers—to test out Glass through its Google Explorer program. (*See "Through the Google Glass," page 27.*)

Glass is still a beta product and could change later this year when it is released as a consumer device. Google also says it plans on addressing the need for Glass to support prescription lenses. Because this device could be used to enhance many people's lives, Google is planning to partner with frame manufacturers to produce Glass as an attachment to prescription frames. Also, Google filed a patent last year that would use magnets to attach Glass to prescription frames. This would be convenient not only for filling the prescription but also for patients with multiple pairs of glasses.

Concerns with Glass

While Google Glass and other smart glasses are undoubtedly cool applications of technology, there are some concerns about distracted driving due to the additional visual information and limits on attention to vision. Google includes a warning about not using Glass while driving or in similar attention-demanding situations. Many people are concerned that the device will pose the same problems as texting while driving. In West Virginia, proposed legislation would ban Glass use while driving. Glass defenders point out that with the device, unlike cell-phones, you can still keep your eyes facing the road and your hands on the wheel.

More superficially, Glass has already established a reputation as being über-geeky technology. It is

frequently compared to a Segway—a good idea, but one that very few people actually use in day-to-day life. This early impression has made some industry experts predict that Glass will never really take off. To counter this, Glass is reportedly partnering with trendy, low-cost frame manufacturer Warby Parker in an effort to increase the device's fashion appeal.[3]

Your Role in Smart Glasses

Patients come to optometrists because they trust that we're knowledgeable in all areas of vision—including the growing use of AR devices and smart glasses. Even so, Google Glass probably won't cause any serious ocular problems for us to deal with—the device is not intended to be used at all times, but only sporadically so problems due to chronic use are not anticipated.[4]

Still, patients may develop some mild symptoms during adaptation to the device.[4] For instance, because the image is displayed above the horizon, patients will spend more time in upgaze, which might cause ocular fatigue. Also, patients with ocular surface disease could experience more dry eye symptoms, akin to computer vision syndrome.

The bigger concern is the splitting of visual attention. Even if the AR images are in the user's visual field, it is only possible to attend to one image at a time. While switching back and forth between the virtual image and the surroundings is easy, there may be times when the user is not paying attention. This is especially true with Glass because the image is not displayed at optical infinity and the user must accommodate to see it clearly. It is this attention-splitting concern that is responsible for the warning against wearing Glass while driving and other potentially dangerous activities. However, as AR improves, it may be possible for data to perfectly superimpose—and even interact with—the surroundings, limiting the potential attention split.

Patients interested in AR glasses would be wise to consult their optometrist, especially if they have significant visual dysfunction. Danielle Pretty, an optometrist in Wanaka, New Zealand, has a patient with Glass (a professional photographer) who has alternating strabismus and right amblyopia, meaning that the Glass image is shown to his non-dominant eye. "It would be great to be able to customize which eye views the display," she says.

There is some debate about whether patients should use the device with their dominant eye. Google employees have commented that users may feel more natural using the display with the dominant eye. Yet, some people are able to adapt to using the device comfortably in their non-dominant eye. It may simply depend on patient preference, so patients should be educated on which is their dominant eye. (If a patient is amblyopic, though, it may not be feasible to fit Glass on their amblyopic eye.)

If your patient happens to be a

Through the Google Glass

I was able to use the device for myself about a month ago. The first thing I noticed once I put on the device was how magnificent the display looked. The HUD uses a series of mirrors and prisms to project a simulated display about eight feet in front of you in the right superior temporal field of vision, with very clear and crisp text. Google claims the display is equivalent to a 25-inch high-definition screen.

In order to activate the device, you can either tilt your head or tap the trackpad on the side. Initially you will be taken to the home screen that shows the current time and the hot words "ok glass" to activate other functions.

It's fairly easy to use and understand once you've played with it for a little while. I was able to perform a couple of voice actions, including "find local optometrist." The device then showed a list of local doctors in the area through a Google search. The speech-to-text functionality works very well—the device was able to spell out words like "pterygium" and "diabetic macular edema" without any problem. I could see how useful it could be to have a device like this linked to an EHR.

How does Glass work with glasses? Most of the Glass developers that I spoke with are able to use the device as long as they view it through their distance Rx. The device also comes with a UV-protecting sunglass clip-on and a pair of clear lens clip-ons.

—Kevin Wheat, OD

This is what Google Glass looks like from the wearer's perspective. One of its functions, seen here, is a turn-by-turn navigation system.

developer or just uses the device for large amounts of time, educate them that using the device against a blank wall or screen will be more comfortable on their vision.

Smart Glasses in Your Practice

Will ODs use AR glasses routinely while examining patients?

Possibly. Glass has already been tested in exams at Michigan College of Optometry at Ferris State University. "It appears to us that Google Glass has far-reaching potential in optometry from the perspective of hands-off video and photographic documentation, ocular image and data comparisons, plus remote live interactions with our professors and instructors," says Craig Norman, director of MCO's Vision Research Institute.

Bruce Morgan, OD, director of residencies at MCO, was able to set up Glass to send live video of an exam to a nearby office. "We see this as being useful for teaching, as the student can call and ask a preceptor a question about a finding or procedure protocol … and the preceptor can respond remotely while viewing the test," he says. Also, "the device was very user friendly and allowed me to perform procedures such as biomicroscopy and binocular indirect ophthalmoscopy without being overly obtrusive to the patient or myself."

We do know that Google Glass will come in a form that uses an optical prescription, but we do not currently know what the limitations will be. It's likely that near adds will be possible, but that high powers, high prism and other more complex prescriptions will not be—similar to the optical limitations that come with rimless frames now.

It is not clear if optometrists will be able to actually sell Glass or other AR glasses in their practices. But, as smart glasses become more prevalent, high-tech optometrists will demand to offer these devices.

The Future

As more people use these glasses, it will become more commonplace to discuss them with patients. The next major step in augmented reality would be a contact lens—something that's not as impossible as you might think. Some very smart people are currently working on creating just that.

But for now, keep up with the technology and, if you are so inclined, become an AR user yourself. If you do, let us know! ■

Dr. Wheat is a graduate of Pennsylvania College of Optometry at Salus University. Dr. Bonilla-Warford is in private practice in Tampa, Fla., specializing in vision therapy and orthokeratology. He frequently lectures and writes about social media in eye care. Find ways to connect at http://about.me/NateBW.

Other Smart Glasses

While Google Glass has received the most attention, it is not the only, or even the first, smart glasses on the market. Here are four others:

• **Vuzix M100.** This is billed as the world's first enhanced hands-free smartphone display and communications system. The M100 can run applications on the Android operating system and is GPS, text, video and email friendly. It will be released to consumers this fall at an expected cost of less than $500 (www.vuzix.com).

• **Recon Jet.** A more sports-friendly pair of smart glasses comes from Recon Instruments. These use a version of Android to display sports data such as heart rate, distance travelled and weather updates. The device will also connect with popular social media networks. It is now available for pre-order for $500 at http://jet.reconinstruments.com.

• **Epson Moverio.** While not as sleek as the Vuzix or Recon Jet, the Moverio allows the wearer to project movies and YouTube clips into their visual field in a large and clear format. You can even control the video position, fast-forward and rewind. The cost for one headset is currently about $500 on Amazon (www.epson.com/cgi-bin/Store/jsp/Moverio/Home.do).

• **EyeTap.** For the do-it-yourselfer, there is EyeTap, created by MIT's Wearable Computing Project founder Steve Mann, PhD. Anyone with enough interest and technical skill can build their own smart glasses. You can find out more and purchase references and components at www.eyetap.org.

1. Google Glass FAQ. Available at: https://sites.google.com/site/glasscomms/faqs. Accessed July 10, 2013.
2. IHS news release. Spurred by Google Glass, IHS Forecasts Nearly 10 Million Smart Glasses to Ship from 2012 to 2016. April 24, 2013. Available at: http://press.ihs.com/press-release/design-supply-chain/spurred-google-glass-ihs-forecasts-nearly-10-million-smart-glasses. Accessed July 10, 2013.
3. Miller CC. Google searches for style. Feb 20, 2013. The New York Times. B1. Available at: www.nytimes.com/2013/02/21/technology/google-looks-to-make-its-computer-glasses-stylish.html. Accessed July 10, 2013.
4. Ackerman E. Could Google Glass Hurt Your Eyes? A Harvard Vision Scientist and Project Glass Advisor Responds. March 4, 2013. Forbes. Available at: www.forbes.com/sites/eliseackerman/2013/03/04/could-google-glass-hurt-your-eyes-a-harvard-vision-scientist-and-project-glass-advisor-responds. Accessed July 19, 2013.

PROFIT BY DESIGN


Visions, Woodcliff Lake, NJ


Danbury Eye Physicians & Surgeons, New Milford, CT


Ratchford Eye Center, Berlin, CT

GET STARTED

VISIT US TODAY

SPACE PLANNING
INTERIOR DESIGN
DISPLAY INNOVATION
MANUFACTURING

EYE DESIGNS®
CUSTOM INTERIORS + FURNITURE

VISIT WWW.EYEDESIGNS.COM OR CALL 800.346.8890

36th Annual Diagnostic Technology Report

New Technology: Good for Patients, Good for Business

OD practices are at a crossroads. If you spend more, will you make more—without compromising care? Many ODs are doing just that. **By John Murphy, Executive Editor**

Optometrist Alex Tan recently purchased a spectral-domain optical coherence tomographer for his practice in Oak Park, Ill., with a goal of providing better care for patients.

"Just four days after purchasing the OCT, a patient came in and I diagnosed cystoid macular edema," Dr. Tan says. "So, it impacted my practice clinically right away."

Indeed, four out of five optometrists say that "improving patient care" is their number one reason for investing in new diagnostic technology. That's a lofty goal in general, yet it hits home when it makes a big difference for a particular patient, as in Dr. Tan's experience.

New equipment affects your practice in less tangible ways, too. "Patients love new technology. Our patients tell us they feel more comfortable coming to see us because we are 'up to date,'" says Denise Glantz Arneson, OD, who points to a Marco automated refraction system and an Optos widefield imager as examples of the new technology in her office in Chippewa Falls, Wisc. In addition, she says, "we have Eyemaginations running in our office, and we use iPads for helping patients select frames. Using the latest technology is not only impressive and good for patients, it makes our job more fun, too."

Nice work if you can get it. But not every OD is having fun with new technology.

Optometrist Michael Maizel finds that replacing old equipment and buying new equipment is putting his practice at a loss.

He replaced an autorefractor/topography unit with a new one—a necessary investment, but not one that provided any new revenue. Similarly, Dr. Maizel replaced a topographer with an OCT—just at the time when the reimbursement went from $75 an eye to $43 for both eyes, which amounted to a net loss in his investment. And installing an electronic medical record (EMR) system was required, but provided no additional revenue.

"We're at a crossroads," Dr. Maizel says. "To practice good medicine, you need the technology. But the reimbursement has decreased, so the only way to make up the difference is to see more patients per hour—which was never the goal of optometry or any primary care practitioner."

Is that the new model of optometry—seeing more patients per hour just to break even? And, if so, can you provide the same quality care?

Amazingly, some ODs are making it work. And, with new technology, they're providing even better care while building their business.

For instance, Tom Carton, OD, of Lunenburg, Nova Scotia, bought a whole array of new equipment: a visual field analyzer, an aberrometer, a digital fundus camera, a scanning laser ophthalmoscope, a topographer and an automated refraction system—"all purchased to allow greater patient volume, without compromising patient care,

and to justify higher fees," Dr. Carton says. "The benefit has been surprising. A thorough exam and a caring attitude, coupled with state-of-the-art technology, has produced a word-of-mouth reputation that has generated 30% patient growth per year for the past four years and shows no signs of letting up."

To that end, here's a roundup of the most wanted instruments that ODs are buying, according to our Annual Diagnostic Technology Survey, which was based on the responses of 310 optometrists to an email questionnaire.

Digital Fundus Camera

A digital fundus camera "definitely has a 'wow' factor," says Margaret Stolarczuk, OD, of El Cerrito, Calif. Some 43% of respondents say they recently bought one or are considering buying one.

A digital fundus camera not only wows patients, it wows practitioners, too. "It improves patient care—in terms of diagnosis, documentation and patient education—and also provides increased revenue," Dr. Stolarczuk says. Plus, it also increases profits because it drives more referrals, she says.

A fundus camera—as well as a pachymeter and a perimeter—have been great for managing glaucoma and increasing profitability, says Mona Patel, OD, of Apopka, Fla. "Also, the technology has helped me move into the medical billing model much more smoothly."

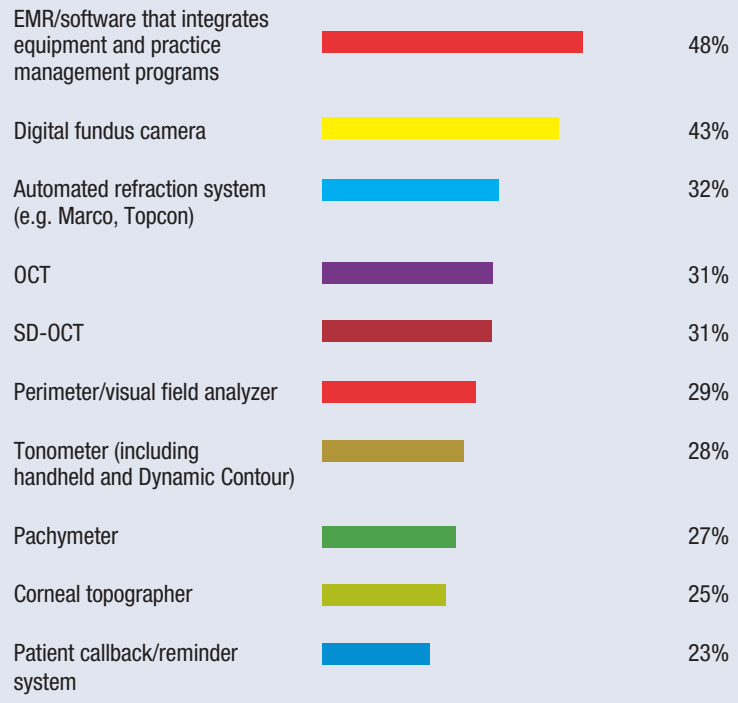
OCT

"OCT has dramatically changed my confidence in glaucoma diagnosis," says Riley Austin, OD, of Northport, Ala. "Being at a Walmart in west central Alabama, I would say I get a high percentage of the lower income population that is, unfortunately, also more at risk for glaucoma."

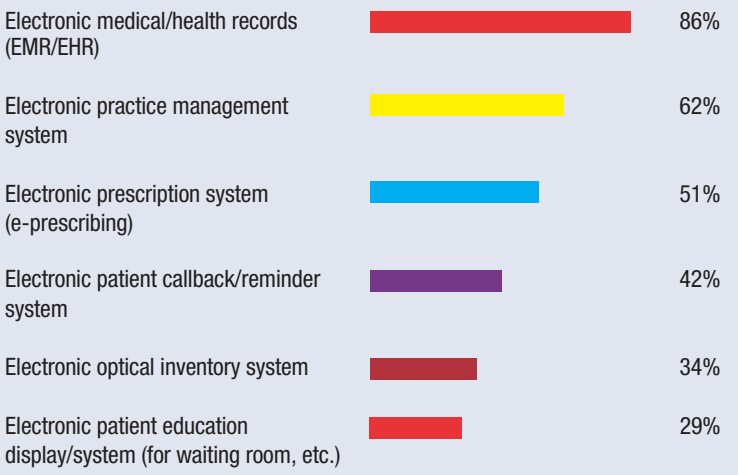
Other ODs agree. "While it is only one piece of the glaucoma puzzle, OCT certainly aids in determining when to follow and when to treat," says Robert J. Dittoe, OD, of New Lexington, Ohio.

Also, "there have been numerous instances when the OCT has revealed that the 20/20- patient has vitreomacular traction or an early

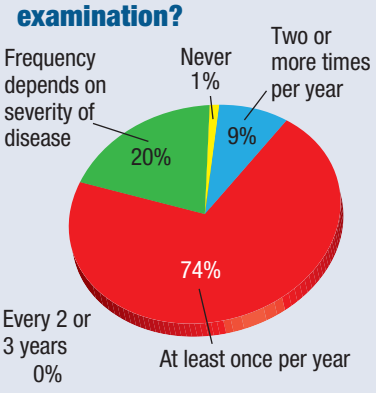
What type of new technology are you now considering purchasing (or have purchased in the past three years?)



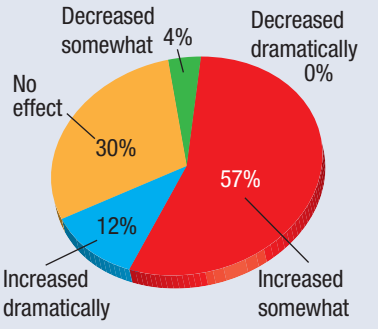
Do you currently use any of the following electronic systems?



For patients with eye diseases such as glaucoma or diabetes, how often do you perform fundus examination?



Has this new technology increased your profitability?



subretinal neovascular membrane," Dr. Dittoe says. "It gives me the ability to confidently follow or appropriately refer these patients." Because he practices in a rural setting, having that ability is an advantage. "After using OCT for a few years, I can easily say that it is an instrument I would never want to practice without."

William L. Jones, OD, of Franklin, Tenn., bought an OCT in December 2012. Ever since then, he says, he doesn't know how he practiced without it. "This versatile machine has increased my abilities to diagnose and follow ocular diseases beyond anything I have done in the past," Dr. Jones says. "If you don't have one, get one—plain and simple."

EMR

An electronic medical record system has become something of a necessary evil, thanks to the Health Information Technology for Economic and Clinical Health (HITECH) Act. The HITECH Act will essentially penalize those doctors who aren't using an EMR by 2015.

"It has reduced the number of patients I can see in a day, and I spend more time fiddling with it during non-patient care time," says Sarah Paikowsky, of Surprise, Ariz. "So I'm working more but getting reimbursed much less."

But, take heart, Dr. Paikowsky! Some optometrists have gotten over the implementation phase, and now the system is working for them—instead of the other way around.

Bruce Kiraly, OD, of Richmond, Va., says his cloud-based EMR system saves time and money by increasing efficiency between his two offices, by reducing staff time handling charts and by providing the ability to view records remotely. Also, Dr. Kiraly says, "it give patients the idea that we are progressive (we are!), and allows for a patient portal, which they love."

While improving patient care is the main reason to invest in new technology, be aware that 69% of survey respondents also increased their profitability with their most recent investment in new equipment. ■

Other 'Fun' Equipment

- **B-scan ultrasound**. "You don't need it often, but it's indispensable when you do. And, it is paying for itself," says Larry Gunnell, OD, of Wichita Falls, Texas.
- **Visual evoked potential/pattern ERG systems**. "The ability to take care of serious conditions, such as optic neuritis, papilledema, glaucoma, macular degeneration, amblyopia and pseudotumor cerebri, for our patients is dramatic," says Oliver Lou, OD, of Cedar Park, Texas. "When we pass along our findings to neurologists, neuro-ophthalmologists, ophthalmologists and other specialists that we comanage with, there is a profound impact on the care and communication for our patient."
- **Specular microscope**. "I had a plethora of non-compliant contact lens wearers who were coming in with blatant contact lens overwear and edema," says Teresa Vigario, OD, of Elizabeth, NJ. "The specular microscope has helped me diagnose and treat even the most minimal of underlying changes, and helped me to physically show patients how non-compliance is affecting their ocular anatomy. When they see the difference between a normal cornea and theirs, they change their compliance immediately. Some people need to see it to believe it."
- **Widefield scanning laser ophthalmoscope (Optos)**. "It immediately improved my ability to detect ocular and systemic pathology and at an earlier stage," says Barry Morrison, OD, of Martinsburg, WV. "It also made it easier to follow progression of disease."
- **Rebound tonometer (Icare)**. "It's a big improvement in patient comfort and accuracy," says Kevin Krajewski, OD, of Lakewood, Colo. "It took the most uncomfortable part of the exam and made it tolerable."
- **Tear film osmolarity test (TearLab)**. "We have a large elderly population and thus deal with a large amount of dry eye," says Matthew Miller, OD, of Lawrenceburg, Tenn. "We are the only office in our county that has TearLab and the patients have noticed. It's also nice that we can bill for it."

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.revoptom.com

jmi

Jobson Medical Information LLC
***Review* Professional Publications Group**

New Technology & Treatments

IN VISION CARE

West Coast

15 CE Credits
(COPE approval pending)

September 20-22, 2013 • San Diego Marriott Del Mar

COURSE TOPICS

- New Therapeutics
- Anterior & Posterior Segment New Technology
- Glaucoma
- Ocular Surface Disease
- Anterior & Posterior Segment Grand Rounds
- Contact Lenses
- Surgical Co-Management

FACULTY

- **Chair:** Paul Karpecki, OD
- **Speakers:** Mile Brujic, OD
  Blair Lonsberry, MS, OD
  Robert Prouty, OD

For more information or to register, go to
www.revoptom.com/NTW2013

or contact Lois DiDomenico at 866.658.1772
or email ReviewMeetings@Jobson.com.

jmi REVIEW® OF OPTOMETRY

cope
*Approval pending

SPONSORS

Alcon · Bruder · AMD Powered by ECR Vault · hydrogelvision CORPORATION · optovue Defining the OCT Revolution · ZEISS · ALLERGAN · DIOPSYS Advancing the Science of Vision Testing · essilor · nicox · TearLab®

SEPTEMBER 20-22, 2013

New Technology & Treatments in Vision Care *West Coast*

San Diego Marriott Del Mar

11966 El Camino Real, San Diego, CA 92130

Meeting Registration Information

Name

Practice/Affiliation

License # (License numbers are now required for HCP reporting and will only be used for this purpose.)

Mailing Address

City State Zip Code

Telephone Fax

Email

Name Badge Information (please print clearly)

My Name

My Guest

Additional Guests

Hotel Reservation Information

Discounted Room Rate: $129† per night

Call for Hotel Reservations: 800.228.9290

Discounted Room Rates Limited!
Mention "Review of Optometry" for Group Rate!

†plus tax single or double occupancy; some resort fees may apply for additional amenities.

4 WAYS TO REGISTER

online: www.revoptom.com/NTW2013

mail: *Review of Optometry* **Conferences**
11 Campus Blvd, Ste. 100
Newtown Square, PA 19073

call: 866.658.1772

fax: 610.492.1039

For more information or to register, contact Lois DiDomenico at 866.658.1772 or ReviewMeetings@Jobson.com

Payment Information

	Rate per person	No. in party		Subtotal
❑ Full Registration *Includes tuition for 15 hours of education, breakfasts, breaks and reception.*	$495 x	_____	=	$_____
❑ Friday Registration *Includes tuition for 5 hours of education, break and reception.*	$170 x	_____	=	$_____
❑ Saturday Registration *Includes tuition for 5 hours of education, breakfast and break.*	$170 x	_____	=	$_____
❑ Sunday Registration *Includes tuition for 5 hours of education, breakfast and break.*	$170 x	_____	=	$_____
		TOTAL	=	**$**_____

❑ Check enclosed (make checks payable to *Review of Optometry*) Charge my: ❑ American Express ❑ Mastercard ❑ Visa

Credit Card Number Exp. Date

Cardholder (print name)

Signature

CONFERENCE CANCELLATION POLICY

- Full refund on registration fee until August 23, 2013
- 50% refund on registration fee until September 6, 2013
- No refund past September 6, 2013

REVIEW OF OPTOMETRY

cope *Approval pending

15 CE Credits*

www.revoptom.com/NTW2013

PEER-REVIEWED RRA ARTICLE

36th Annual Diagnostic Technology Report

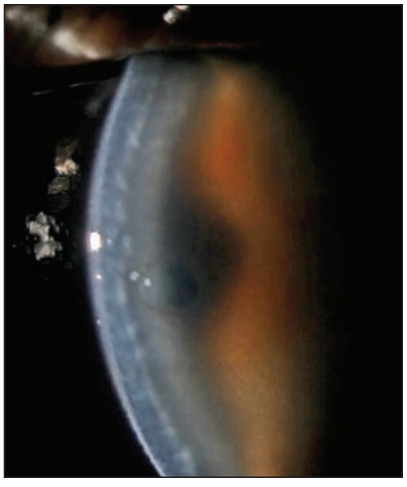
AS-OCT Aids Surgical Decision-Making

Providing a deeper look at corneal pathology, AS-OCT allows for a more realistic prognosis and better patient selection. See how it influences clinical care in four characteristic cases. **By Aaron Bronner, OD**

Few would argue that optical coherence tomography (OCT) technology has altered the landscape of eye care for monitoring and understanding ocular pathology. Time-domain OCT has been described as revolutionary, Fourier-domain OCT as evolutionary, but what about anterior-segment OCT? The often-overlooked ugly duckling of the OCT applications, AS-OCT has the potential to grow into a showstopper in optometric care.

Perhaps AS-OCT is a little less glamorous than the retinal and retinal nerve fiber layer scanning modules; it certainly is less frequently discussed. Many clinicians feel they could gather the same data with AS-OCT that they can already acquire with ultrasound biomicroscopy (UBM) or, to a lesser degree, Scheimpflug-based imaging. However, as OCT technology has evolved toward quicker, higher-sensitivity, higher-quality Fourier domain, it has achieved lateral (15µ) and axial (5µ) resolution superior to these other techniques.[1] While UBM allows for imaging through opaque media—a claim anterior-segment OCT cannot make—the OCT is simpler to use, requiring less staff training and patient preparation.

Yet, I'll be the first to admit that despite having access to AS-OCT, I'm often guilty of underusing it—and I get the sense that I'm far from the only one. In the cases that follow, we'll look at how AS-OCT can be in useful in providing better patient education, setting reasonable surgical expectations with patients, and delivering data that helps optometrists and surgeons to make more informed decisions regarding surgical eligibility and the next steps in planning. Given its clinical utility, we may soon see the use of AS-OCT growing at a more rapid pace than its popular posterior counterpart.

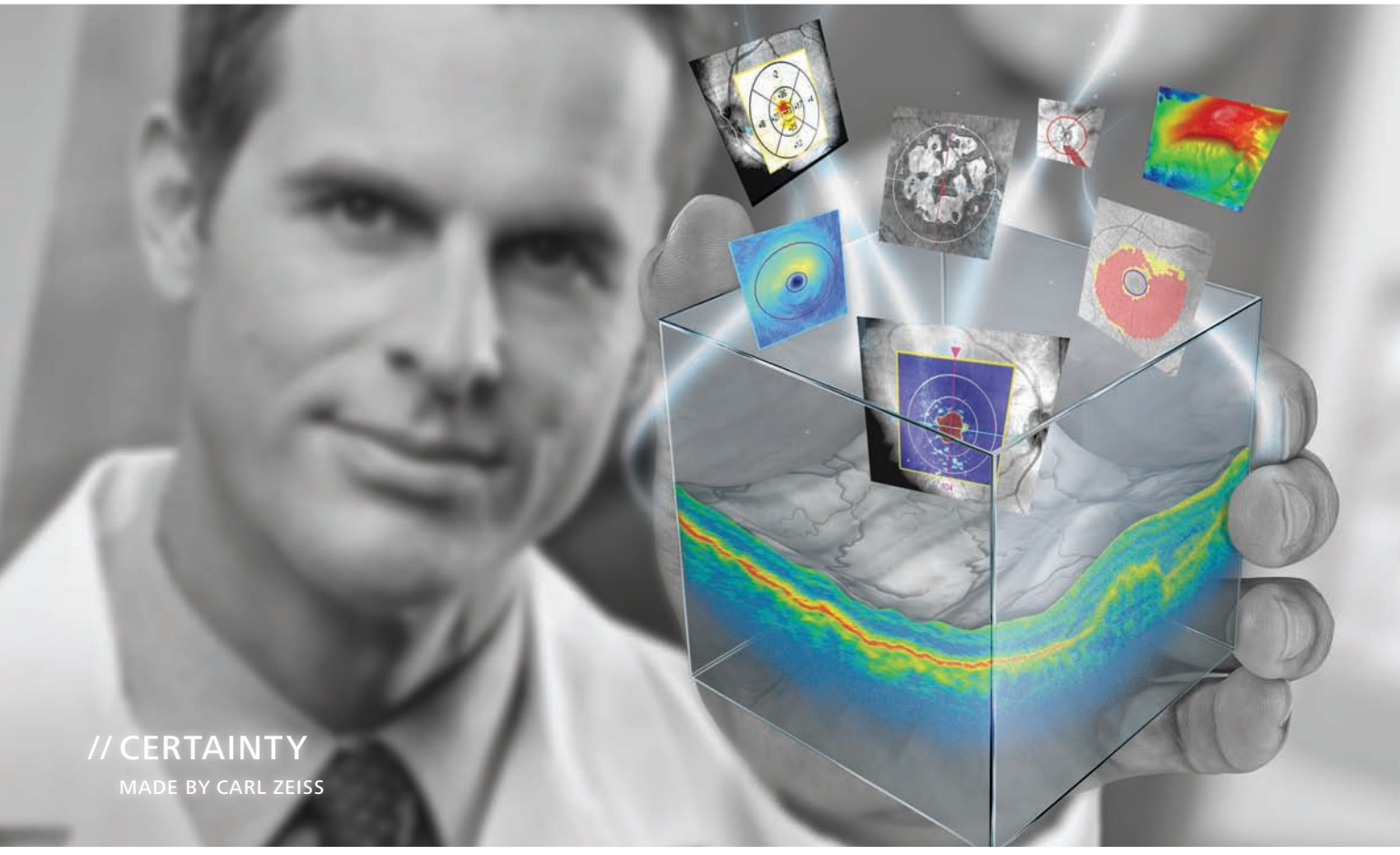


1. Note the dehiscence of the graft and substantial edema in this image, taken one week after DSAEK surgery.

Case 1: Patient Education

An 87-year-old white female presented at her one-day postoperative exam following Descemet's stripping automated endothelial keratoplasty (DSAEK). She had hand motion vision in the treated eye, the cornea had 3 to 4+ epithelial and

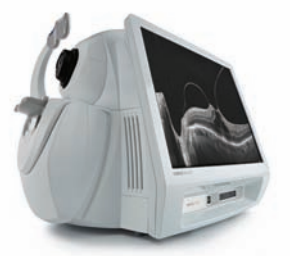
It's not what makes each member
of the CIRRUS family unique,
it's what makes them the same.



See us at
Booth #LP10064
Vision Expo West

CIRRUS SmartCube

Puts answers within reach



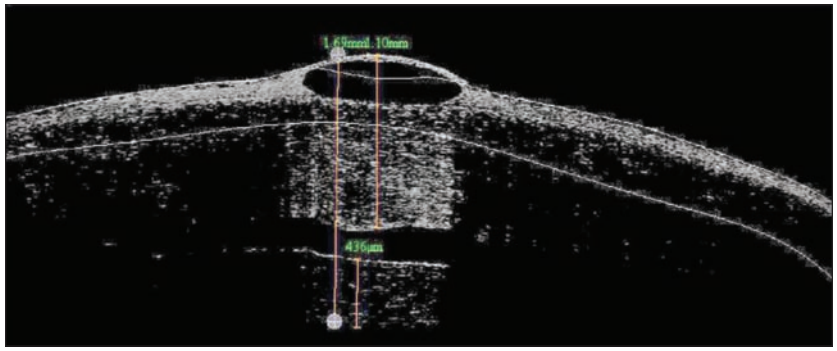
SmartCube™ is the core of the CIRRUS™ family. It helps you turn micro-structural information into new strategies in care. With extensive applications for smarter analysis and faster throughput, the power of the CIRRUS SmartCube means better decision-making is at hand.

CIRRUS. The Smart OCT.

ZEISS

We make it visible.

Carl Zeiss Meditec, Inc. 800 342 9821 www.meditec.zeiss.com/cirrus



2. Dehisced posterior graft with significant corneal edema and a central bulla.

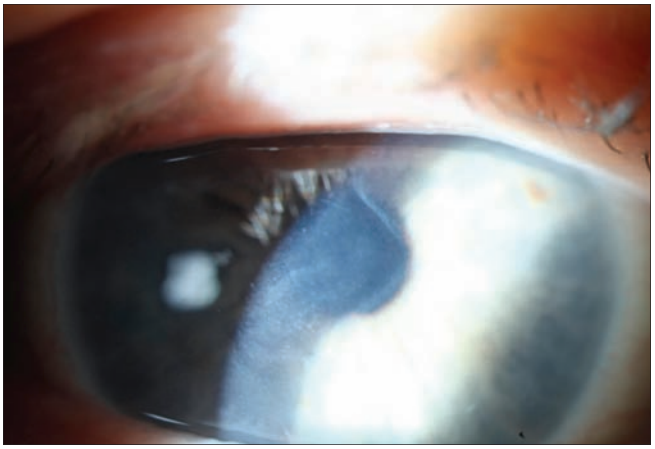
stromal edema, and the graft was very thickened but appeared to be apposed to the host stroma. A 20% air bubble remained in the superior anterior chamber.

After seeing the patient that day, the surgeon was quite convinced that, even though the positioning looked acceptable, it was unlikely the graft would clear. So he scheduled a re-graft for the following week—to be cancelled if the graft and host began to deturgesce. One week later, the patient's vision remained poor and the graft had fallen out of position centrally (*figure 1*). Edema remained and a central bulla had developed (*figure 2*). AS-OCT showed remarkably thickened donor and host tissue as well as an obvious dehiscence of the graft.

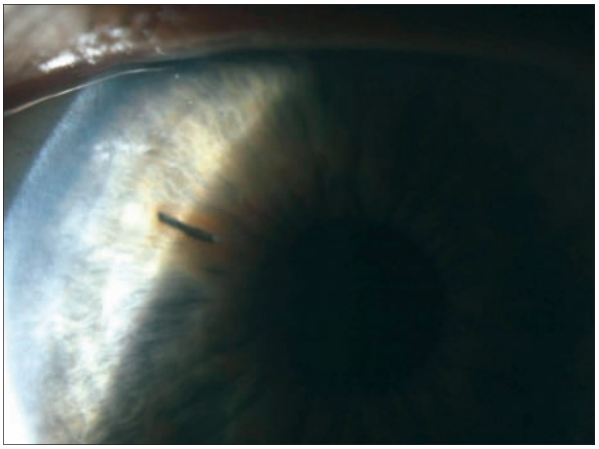
Prior to re-graft, we reviewed the AS-OCT with the patient and her family, which helped them to better understand the problem we needed to correct and reduced their level of anxiety with the surgical plan. We diagnosed the case as a failed DSAEK graft. The patient underwent re-graft as planned and did well, with acuity measuring 20/100 at one day and 20/50 at one week.

Case 2: Screening/Decision Making

A 55-year-old white female presented with a glass injury to her eye sustained in a motor vehicle accident 30 years prior. Her new primary OD had referred her to our office for an evaluation for phototherapeutic keratectomy (PTK). Over the years, she had a series of procedures to remove the embedded glass from her eye—in the



3. Diffuse, hazy anterior stromal appearance of the affected eye.



4. Iris laceration.

anterior corneal stroma primarily, though there was one area of full-thickness penetration and intraocular damage that manifested as an iris tear and localized cataract (*figures 3 and 4*). As a result, she developed an unusually diffuse reticular scar to her cornea. Since the time of her accident, the patient's vision had been relatively stable, best corrected to 20/70 levels (per her report) and her prescription was a stable +2.50-1.25x014.

Her keratometric data was only mildly irregular and a rigid gas permeable contact lens over-refraction had no impact on acuity (*figure 5*). Slit-lamp findings were unremarkable other than the previously described abnormalities.

We diagnosed the patient with anterior stromal scarring secondary to ocular trauma. Deep anterior lamellar keratoplasty (DALK) was not possible given the single area of corneal penetration, so we considered three options—PTK, penetrating keratoplasty (PK) or no treatment.

AS-OCT helped us determine the best course of action. After measuring the depths of central scarring with AS-OCT, we found the patient to be a good candidate for PTK treatment and decided to proceed with the surgery.

Standard PTK was performed with a paired anti-hyperopic treatment to reduce postoperative anisometropia. One week after surgery, the patient saw 20/30 uncorrected and noticed a substantial improvement in her vision. The scarring was essentially eliminated with the exception of the full-thickness zone, and the patient was very pleased with the outcome (*figure 6*). She returned to the care of her primary eye doctor.

Case 3: Scar Runs Deep

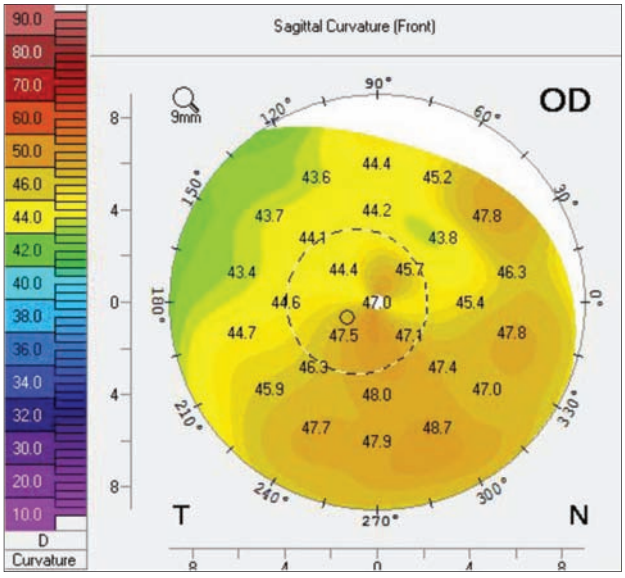
A 57-year-old white male came to our clinic about a month after sustaining a corneal injury when he was hit in the right eye by a tree branch at work, presumably while operating a piece of heavy machinery. An outside optometrist had provided good care to the patient during the acute period, and referred him to our practice for a surgical evaluation after the eye stabilized.

Best spectacle-corrected acuity was 20/50, and an over-refraction with a gas permeable lens minimally improved his vision to 20/40. Following his injury, the patient was very symptomatic of aberrations, glare and halos and had significant reported disability, paired with the right eye being his strongly dominant eye.

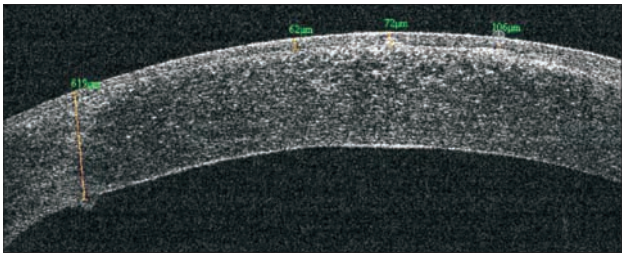
Slit-lamp examination showed a triangular central and anterior scar, with a tail trailing deeper into the cornea to its terminal point about 1.5mm from the nasal limbus where it appeared to penetrate the endothelium (*figure 7*). There were no signs of deeper disruption to the eye, and the primary optometrist had indicated that the patient never developed traumatic retinopathy. Topographic measures showed a paracentrally steep island corresponding to the primary body of the scar (*figure 8*).

AS-OCT revealed a sloped disruption to the cornea that dove from roughly 70µm in depth at the temporal edge of the scar to 243µm within the nasal margin of the visual axis. An endothelial disruption was noted on the nasal edge of the scar (*figures 9 and 10*). We diagnosed the presentation as a traumatic corneal injury with subsequent full-thickness scar.

We informed the patient that because of the depth of the scar, he was not an ideal candidate for PTK. We further explained that while PK or DALK would be curative, either would require several



5. Relatively normal keratometric topography.



6. Plane of irregularity appeared uniform and superficial—note the hyper-reflective zone in the anterior stroma and the full-thickness irregularity to the left edge of the scan.

months of follow-up and he would likely still require a contact lens for best vision. Observation seemed to be the best option, as long as the patient was improving.

As he stabilized over the next six months, he became more vocal about his desire to do something. He didn't want to go the route of transplantation, and said he would be satisfied with an improvement in his symptoms.

After significant consultation with the patient and our surgeon, we decided to attempt PTK—knowing that a large portion of the scar would remain below treatable depths, but that some of the central opacity could be removed and paired with flattening of the steep and irregular paracentral topography. The prognosis for improvement was good, but was poor for symptom resolution. The patient understood and elected to proceed with scheduling, for which we are awaiting insurance approval.

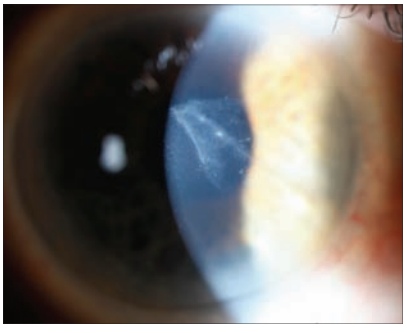
Case 4: A Steep Risk

A 61-year-old white male presented to clinic for cataract evaluation OD. He had undergone LASIK surgery on both eyes 15 years prior and had done well until the last 18 months, when he noted a significant decrease in his vision OD. He had LASIK in Alaska and his chart had been destroyed, so no preoperative data was available. He did, however, provide the history that he was significantly nearsighted and considered himself "legally blind without glasses."

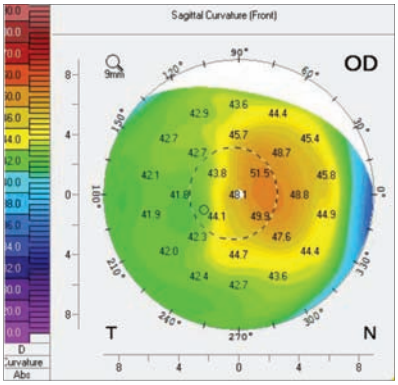
He was correctable to 20/30 and had glare-reduced acuity at 20/400. The eye had developed 2D of myopia over the last four years, according to his current primary optometrist's notes. Evaluation showed normal ocular structures with the exception of old, nearly invisible LASIK flaps OU and, in the left eye only, a mix of cortical and anterior subcaspsular changes in the lens.

We obtained variable measures of his corneal power including standard topography with Vista (Eyesys Technology), Scheimpflug-based topography with Pentacam (Oculus), automated keratometric measures with IOL Master (Carl Zeiss), and corneal power with AS-OCT using RT-Vue (Optovue). The two measures of total corneal power accounting for anterior and posterior curvatures from Pentacam and RT-Vue showed good agreement (*figure 11*). IOL Master automated keratometry and traditional topography also matched up; however, at 41.00D, these were nearly 2.00D steeper than the powers estimated by AS-OCT and Scheimpflug, which were at roughly 39.00D. Further, there was moderate irregularity in the central 3mm zone.

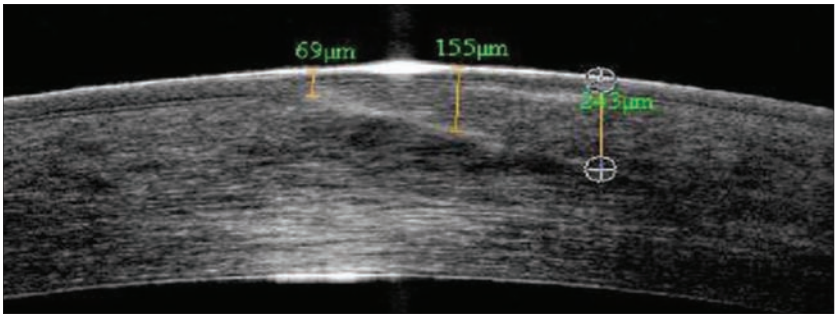
Based on the corneal irregularity and agreement between the RT-Vue and Pentacam, we decided to shift keratometric input toward the AS-OCT/Scheimpflug value. We educated the patient about the inherent difficulty in predicting his outcome, and discussed the possibility of an IOL exchange, should it be necessary. We also reviewed



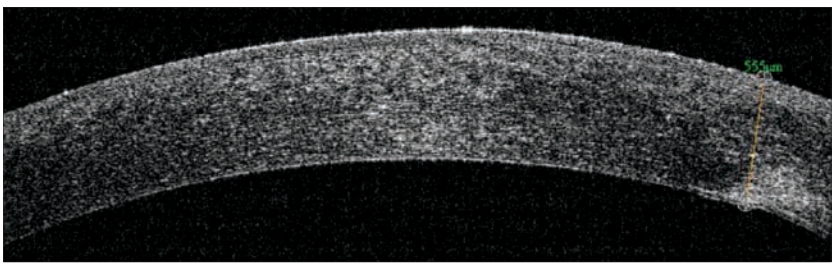
7. Slit-lamp exam showed a triangular central and anterior scar, with a tail trailing deeper into the cornea to its terminal point about 1.5mm from the nasal limbus, where it appeared to penetrate the endothelium.



8. Irregular corneal topography: paracentrally steep island corresponding to the primary body of the scar.



9. AS-OCT image of the grade of the penetrating tunnel.



10. AS-OCT showing a penetrating scar of the endothelium.

the normal risks of cataract surgery, and the patient elected to proceed as scheduled.

At his one-day postoperative exam, his uncorrected vision was 20/20 and he was very pleased with his results. We sent the patient back to his primary OD for care. In this case, AS-OCT provided us with a level of specificity and accuracy that ensured the best outcome. If standard keratometric results had been used, he would have ended up approximately 1.50D hyperopic.

Discussion

In the surgical management of corneal pathology, the primary question that needs to be answered in many cases is: Is there a less invasive option than PK for this patient?

The historic limitations of PK are well known—including lifetime risk of rejection, glaucoma, infection, high dependence on gas permeable contact lenses—and highlighted by the lifetime follow-up care needed to ensure both refractive function and viability of the graft.

While DALK presents an option with reduced lifetime rejection and endothelial failure issues, it still requires a significant time investment for visual rehabilitation and a high reliance on gas permeable contact lenses for best vision.

PTK, however, eliminates both the need for long-term refractive rehabilitation and the lifetime effects of simply having a graft placed on the eye. However, while the acceptable depth of treatment with PTK is deeper than what is achievable with surface treatments like superficial keratectomy, it remains limited, with "acceptable" varying based on the study, but ranging from 20% to 50%.[2,3] Therefore, determining the depth of corneal pathology accurately with anterior-segment OCT allows for a more realistic prognosis and better patient selection.

Moving from PTK to transplantation, there can occasionally be clinical difficulty in determining whether a patient's pathology affects the posterior stroma alone or if the endothelium has also been compromised. In cases of corneal trauma, where only the posterior stroma has been compromised, DALK would be the procedure of choice for surgeons who have added this difficult technique to their repertoire.

However, the most frequently encountered intraoperative complication of DALK is perforation of the endothelium—a complication that may require transition to a full PK and is more likely in the case of endothelial involvement.[4] In cases where there is question of endothelial compromise, an AS-OCT can help to clearly define whether the patient would fare better with DALK vs. PK—or at the very least, give the surgeon a reasonable idea that the case will be more or less likely to require transition to PK mid-surgery.

A rapidly developing area of interest in surgical eye care is refining techniques to more accurately predict corneal power after refractive surgery prior to cataract surgery. It's widely known that prior refractive surgery disrupts the accuracy of measures of true corneal power, a metric required for appropriate IOL calculations.

This disruption is at least

partially based on the fact that corneal power calculations use a thin-lens model of the cornea, despite its having distinct anterior and posterior curvatures.[5]

To account for this problem, and allow only anterior curvatures to be gathered, formulas for calculation have relied on a known "normal" ratio of anterior to posterior corneal curvature to give an overall corneal power. Refractive surgery disrupts this ratio by changing anterior curvature without having a significant effect on posterior curvature—a trend that is becoming more common with the continued increase in refractive treatment.

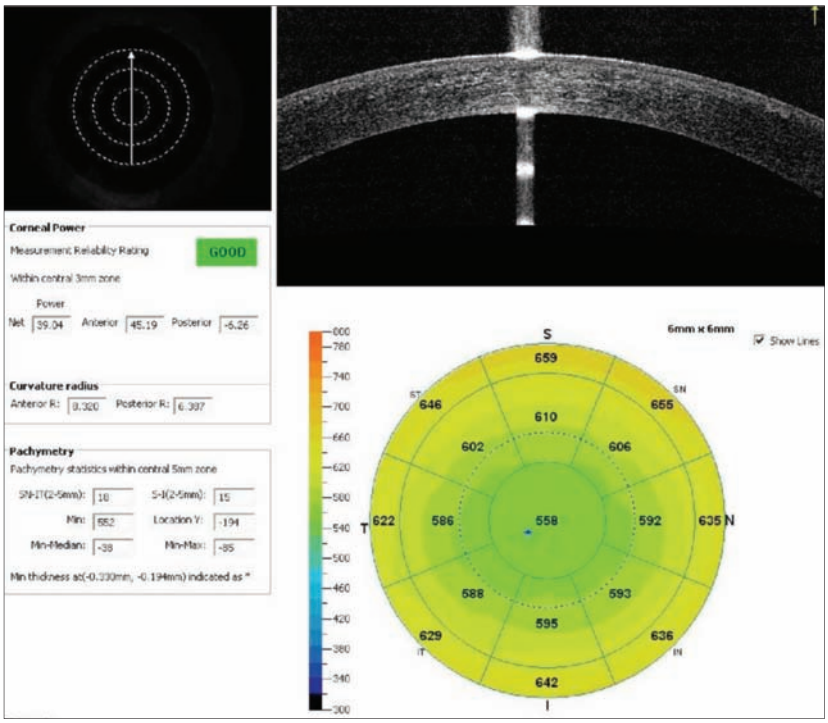
Therefore, it could be expected that devices that allow capture of both anterior and posterior corneal curvatures may perform superiorly in lens calculations for patients with previous refractive surgery. AS-OCT has this ability, and the device is widely available in many surgery centers.

Bear in mind that the results described in Case 4 are not universal, and I have had experiences of the traditional keratometric data performing as well as, or better than, AS-OCT for post-refractive surgery patients. Ability to plug in the data readily seems to vary from case to case. These results are not developed to be inserted into standard IOL power calculation formula, like the Holladay 2, Hoffer-Q and SRK/T formulas, and so applying it in this manner is an off-label use of both the formula and the data. However, having the data to compare directly against more standard keratometric measures for agreement can give the clinician an idea of the validity and accuracy of the traditional measurement.

Also, the ability of this device to estimate corneal power—perhaps more accurately than traditional measures—creates an intriguing inroad for developing more accurate lens calculation formula. As more post-refractive patients begin making their way into our cataract clinics along with their high refractive expectations, AS-OCT's ability to measure corneal power may prove to be as valuable and just as widely used as the posterior segment module.

While AS-OCT and retinal OCT share much of the same technology, clinicians must remember they are essentially different devices with distinct applications. Whereas use of retinal OCT is typically for diagnosis and monitoring response to treatment, AS-OCT is generally less useful in diagnosis of pathology but better suited for treatment decision-making. However, AS-OCT does provide valuable objective information that aids in the development of an effective treatment paradigm for anterior segment disease—and like the retinal OCT, gives a clear, easily readable image for improved interpretation and patient education. ■

Dr. Bronner is a staff optometrist at the Pacific Cataract and Laser Institute in Kennewick, Wash. He has no financial interest in any of the products mentioned.



11. Various measures of this patient's corneal power included standard topography, Scheimpflug-based topography, automated keratometry and corneal power with anterior-segment OCT.

1. Ventura BV, Moraes HV Jr, Kara-Junior N, Santhiago MR. Role of optical coherence tomography on corneal surface laser ablation. J Ophthalmol. 2012;2012:676740. Epub 2012 Sep 5.
2. Rashad MA. Pentacam-based phototherapeutic keratectomy outcome in superficial corneal opacities. Clin Ophthalmol. 2012;6:885-94. Epub 2012 Jun 14.
3. Faktorovich EG, Badawi DY, Maloney RK, Arivasu RG. Growth factor expression in corneal wound healing after excimer laser keratectomy. Cornea. 1999 Sep;18(5):580-8.
4. Reinhart WJ, Musch DC, Jacobs DS, et al. Deep anterior lamellar keratoplasty as an alternative to penetrating keratoplasty, a report by the American Academy of Ophthalmology. Ophthalmology. 2011 Jan;118(1):209-18.
5. Holladay JT, Hill WE, Steinmueller A. Corneal power measurements using scheimpflug imaging in eyes with prior corneal refractive surgery. J Refract Surg. 2009 Oct;25(10):862-8.

2CE Credits
cope
*Cope Approval Pending

Save the Date

JOIN THE ANTERIOR SEGMENT SECTION OF THE AMERICAN ACADEMY OF OPTOMETRY FOR A CE DINNER IN SEATTLE

Thursday, October 24

MANAGEMENT OF COMPLEX ANTERIOR SEGMENT CONDITIONS

FACULTY

Moderator: David Kading, OD, FAAO

Derek Cunningham, OD, FAAO

Larry Henry, OD, FAAO

Tracy Schwartz, OD, FAAO

Space Limited! Please Arrive Early for Your CE Dinner Seat

LOCATION

Sheraton Seattle
1400 Sixth Avenue
Seattle, WA 98101

TIME

7:00pm - 7:15pm	Registration
7:15pm - 9:00pm	**Dinner** and **CE Seminar**
9:00pm	Meet and Greet the Anterior Segment Section of the American Academy of Optometry

CE TOPICS

- Introduction / Role of Inflammation and Infection in Complex Disorders
- Pharmaceutical and Ocular Surface Treatments for the Anterior Segment
- Advanced Optometric Lasers and Surgical Procedures
- The Surgical Minute: Peri-operative Care for Anterior Segment Surgery

Jointly sponsored by

REVIEW OF OPTOMETRY

AMERICAN ACADEMY of OPTOMETRY

Supported by an educational grant from

BAUSCH + LOMB

You must be registered for Academy 2013 Seattle to attend this CE Program.
To register for the AAO visit www.aaopt.org

PEER • REVIEWED • RRA • ARTICLE

The Lost Arts of Optometry, Part One

A Refresher on Scleral Depression

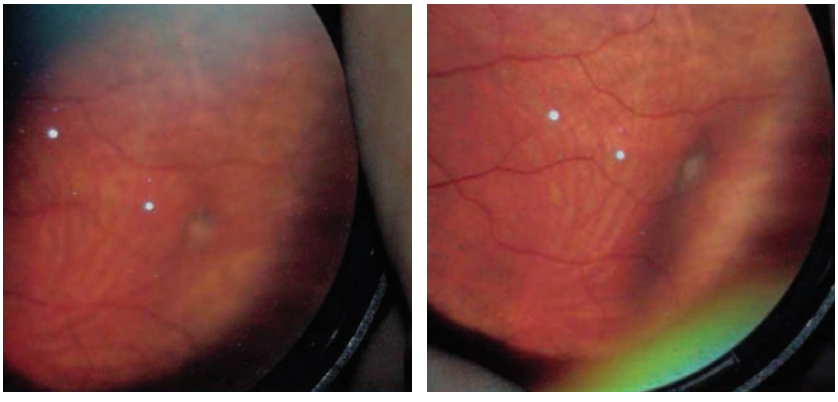
When was the last time you performed scleral depression? Do you even remember how to do it? Relax—we'll jog your memory.

By Amy Dinardo, OD, MBA, and Philip Walling, OD

Like many skills in life, the key to mastering the art of optometry consists of the three Ps: Practice, Practice and more Practice. The formula for success is straightforward: The more you use your talents, the easier they are to maintain.

Unfortunately, some optometrists never have the opportunity to practice specialized clinical skills, such as scleral depression, on a regular basis. On the other hand, you may use different clinical skills several times a day—automatically applying them without reflection upon the fundamentals and tricks of the trade that make the technique more effective.

In this first article of this three-part series, "The Lost Arts of Optometry," we review the clinical value and proper execution of scleral depression.



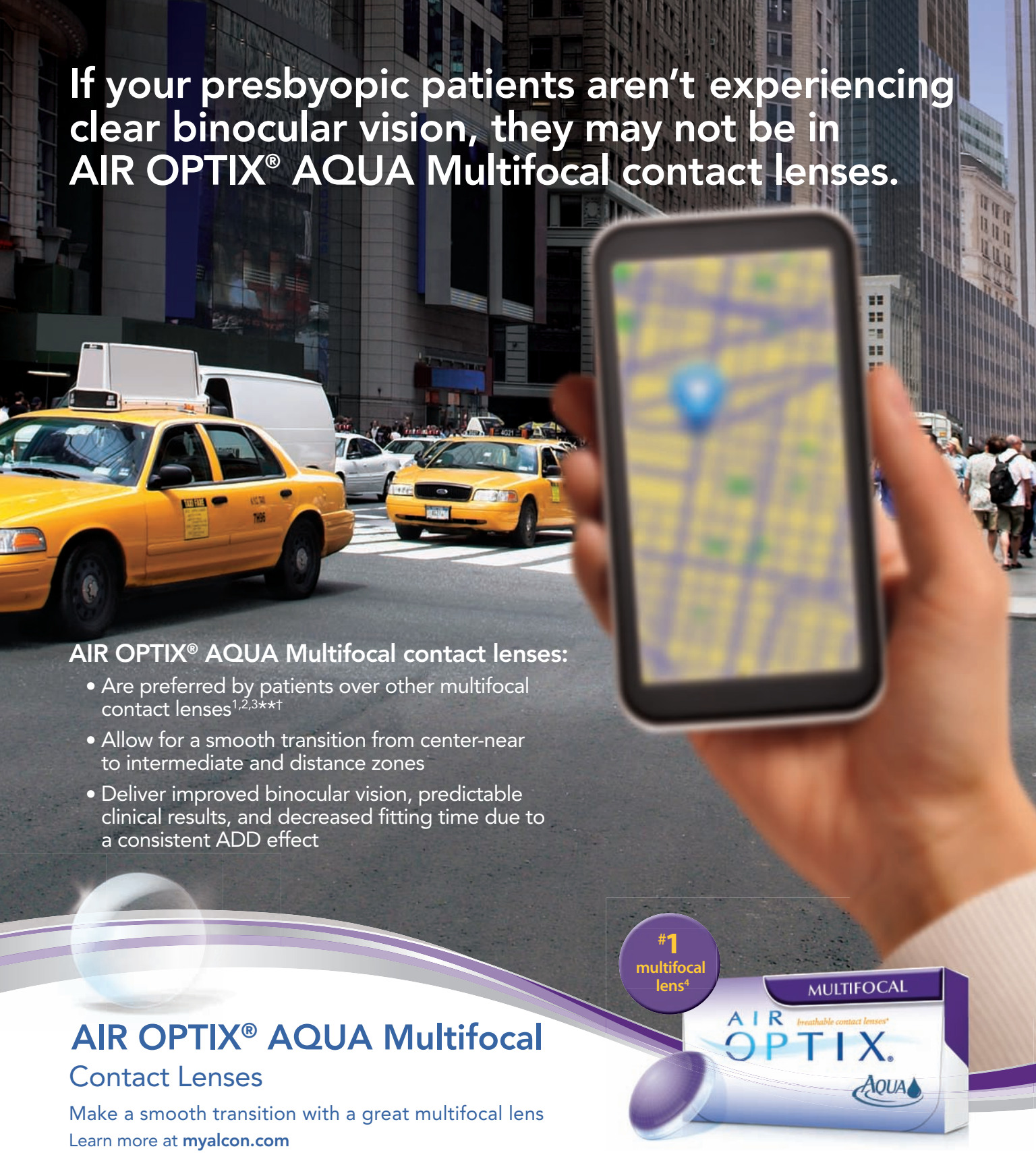
1. This patient presented with a retinal traction tuft (left). Note the enhanced detail upon application of scleral depression (right).

The Purpose of Scleral Depression

Did you know that, even with maximum pupillary dilation, you might be overlooking a critical portion of your patient's peripheral fundus in areas near the pars plana and ora serrata? In fact, the patient's iris, crystalline lens and/or ocular globe frequently obscure this section of the retina. In conjunction with binocular indirect ophthalmoscopy (BIO), scleral depression is an excellent (but often neglected) method for seeing a detailed view of the peripheral fundus.

By inserting the tip of the scleral depressor between the globe and the orbit, the space occupied by the probe displaces the retina inward and creates an elevation. This technique enhances the contrast between a retinal lesion and the surrounding retinal tissue. In doing so, scleral depression helps you locate and diagnose lesions

If your presbyopic patients aren't experiencing clear binocular vision, they may not be in AIR OPTIX® AQUA Multifocal contact lenses.



AIR OPTIX® AQUA Multifocal contact lenses:

- Are preferred by patients over other multifocal contact lenses[1,2,3]**†
- Allow for a smooth transition from center-near to intermediate and distance zones
- Deliver improved binocular vision, predictable clinical results, and decreased fitting time due to a consistent ADD effect

#1 multifocal lens[4]

AIR OPTIX® AQUA Multifocal

Contact Lenses

Make a smooth transition with a great multifocal lens

Learn more at **myalcon.com**

*Dk/t = 138 @ -3.00D. **Among those with a preference. †As compared to PureVision^ Multi-Focal and ACUVUE^ OASYS^ for PRESBYOPIA contact lenses. ^Trademarks are the property of their respective owners.

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

References: 1. In a randomized, subject-masked clinical study at 20 sites with 252 patients; significance demonstrated at the 0.05 level; Alcon data on file, 2009. **2.** Rappon J. Center-near multifocal innovation: optical and material enhancements lead to more satisfied presbyopic patients. *Optom Vis Sci.* 2009;86:E-abstract 095557. **3.** In a randomized, subject-masked clinical trial at 6 sites with 47 patients; significance demonstrated at the 0.05 level; Alcon data on file, 2008. **4.** Based on a third-party industry report, 12 months ending October 2012; Alcon data on file.

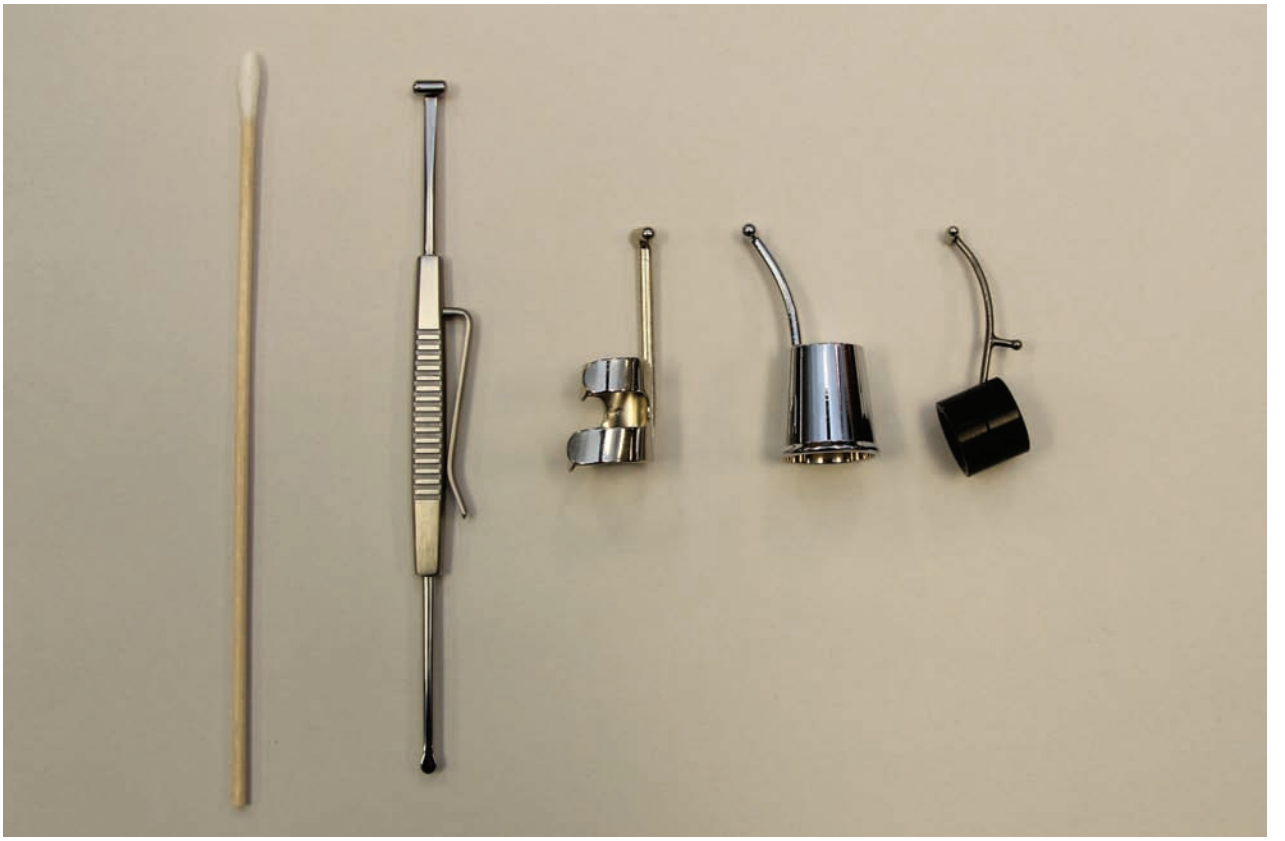
See product instructions for complete wear, care and safety information.

Alcon®

a Novartis company

Rx only

Scleral Depression



2, 3. Various types of scleral depressors, including a cotton-tip applicator, flat double-ended and multiple thimble designs (top). The Josephberg-Besser scleral depressor (Stephens Instruments) is a modified thimble design that features a curved blade (left).

that may otherwise go undetected. This process also can be used to examine retinal lesions that are not well defined, such as suspected retinal holes, tears or vitreoretinal adhesions (*figure 1*).

Scleral depression is particularly useful in assessing patients who present with complaints of flashes and floaters. For example, it is an effective way to rule out peripheral breaks as an underlying cause of the symptoms. Scleral depression is also helpful when examining patients who are at risk for peripheral retinal anomalies, such as high myopes or those with a history of blunt trauma. Keep in mind that a healthy retina does not have round-, linear-, arc- or geometrically-shaped lesions located in the periphery. So, these lesions always require a closer look with scleral depression.

While scleral depression is useful in many instances, it is contraindicated under certain circumstances. Examples include patients with an open globe injury, hyphema, a scleral buckle and/or a filtering bleb, as well as those who recently underwent ocular surgery. Remember that scleral depression temporarily increases intraocular pressure, so be especially cautious in ocular hypertensives.

Tools of the Trade

There are three primary designs of scleral depressors: thimble, flat double-ended and cotton-tip appli-

cator (*figure 2*). Your choice of instrument mainly depends upon personal preference. Some practitioners are partial to the thimble depressor because it allows more freedom to manipulate the lids, while others prefer the convenience of a cotton-tip applicator. (Despite their ease of use, cotton-tip applicators generally are more difficult to move across the lids and are less effective at posterior depression.)

Recently patented, the Josephberg-Besser scleral depressor (Stephens Instruments) uses a wider, more ergonomically curved blade, which is reportedly more comfortable for both the examiner and patient (*figure 3*).[1]

How to Perform the Technique

Scleral depression is a relatively straightforward procedure that requires a lot of dexterity and a high level of competency with the binocular indirect ophthalmoscope (*see "BIO: A Companion to Scleral Depression," page 48*). In order to achieve successful scleral depression, your view and the BIO's oculars must both be aligned with the quadrant being viewed and the patient's direction of gaze (*figure 4*). When perfect alignment with the viewing axis is achieved, a red reflex appears in the patient's pupil through the BIO's oculars without the condensing lens in place.

To that end, patient positioning is essential to the technique. Some practitioners choose to perform BIO and scleral depression with the patient upright. Others place the patient in a supine position with the chair reclined (*figure 5*). Regardless of position, you must be able to approach the patient on a tangential plane to the pupil.

Prior to initiating scleral depression, the patient should be fully dilated. Use both 1% tropicamide and 2.5% phenylephrine. Instill a drop of 0.5% proparacaine prior to the procedure to increase comfort and reduce the patient's need to blink.

Start by identifying an area of peripheral retina to be examined. Ask the patient to look in the opposite direction, then apply the scleral depressor to the lid at a location about 5mm to 8mm behind the limbus. Ask the patient to slowly change fixation and look in the direction of the area to be examined. As he or she shifts fixation, the scleral depressor should follow along the eye perpendicularly, gently pulling the lid with it. Next, apply gentle pressure tangentially. Watch the red pupillary reflex, and look for it to darken slightly or appear as a shadow; this signifies that scleral depression is now in the proper location (*figures 6 and 7*). Then, simply move the condensing lens into place to acquire a view.

To get a more three-dimensional view of an anomaly, move the depressor both horizontally and vertically over the lid under the area of interest, enabling a cross-sectional view of the lesion. The 3D view permits better visualization of retinal breaks or subretinal fluid.

Because of lid configuration, performing scleral depression at 3 and 9 o'clock is always a challenge. Instead of applying pressure directly to the globe itself, maneuver the depressor to slide the lid over this area.

It's challenging to achieve a good view of areas in the retinal periphery located closest to the ora serrata. To do so, try physically moving up and down or side-to-side while maintaining a good, crisp view of the fundus. Remember that the more extreme the patient's position of gaze, the more

4, 5. During scleral depression, there should be perfect alignment between you, the BIO lens and the retinal quadrant being viewed (top). Also, you may choose to examine the patient upright, or in a supine position (right).

BIO: A Companion to Scleral Depression

Along with scleral depression, binocular indirect ophthalmoscopy remains a critical skill for detecting the many subtleties that exist in the peripheral retina. BIO facilitates detection of small retinal excavations and elevations, while also permitting an exceptional stereoscopic view of the posterior pole, equator and periphery. Additionally, the BIO technique is not limited by the patient's refractive error, and you can visualize the posterior pole through even moderately opaque media (i.e., cataract).

When performing BIO, the light intensity should be sufficiently bright to visualize small retinal details and color differences. If you have trouble acquiring a view because of the patient's light sensitivity, try to examine the posterior pole first with a lower intensity. This usually desensitizes the patient so that the peripheral examination is not as obtrusive.

Binocular indirect ophthalmoscopes are now available with a small-pupil feature that can help visualization in patients who do not fully dilate. If you don't have a model with this feature, you can hold your condensing lens out farther than normal and spread the oculars far apart. This simulates the compensating prism of the small pupil models and may provide a better view.

Examine the retina in a systematic fashion to improve efficiency, provide a context in which the exam findings can be recalled and recorded, and reduce the likelihood that you'll overlook portions of the fundus. Don't forget about the equatorial region. It is often missed when looking for peripheral retinal detachment or serous maculopathy. Also, use the red-free filter to your advantage—it aids in examining retinal vasculature, hemorrhages and the nerve fiber layer by providing a greater level of contrast.

Recent advances in BIO lenses have produced a wide variety of available options (*see "Grading Common BIO Condensing Lenses," below*). Several lenses now provide a much more efficient and detailed examination of the retina, macula and/or optic nerve. The type of condensing lens you choose for each patient scenario is important. Often, we use just a few of our favorite lenses; however, we need to know the advantages and disadvantages of each condensing lens to fully exploit their capabilities in each scenario.

The 20D BIO lens is a good "workhorse" selection because it offers an ideal combination of magnification and field of view. It is a relatively low-powered lens that can be used to perform almost any fundus examination.

Higher magnification lenses, such as the 15D, are effective for evaluating the posterior pole. They provide a clear, stereoscopic view of the macula, optic nerve and nerve fiber layer. These lenses might be useful when examining patients who cannot be positioned at a slit lamp. But one disadvantage of a very high magnification BIO lens is its fairly lengthy working distance. Long fingers and steady hands also are necessary to use these lenses properly.

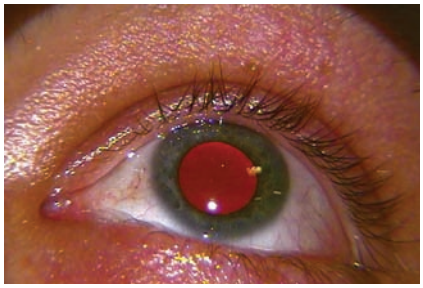
Medium magnification lenses, such as the 28D, are good for patients with small pupils or a constricted, opaque capsulorhexis. They provide a larger field of view at the expense of magnification. So, keep in mind that detail may be compromised when using such a BIO lens.

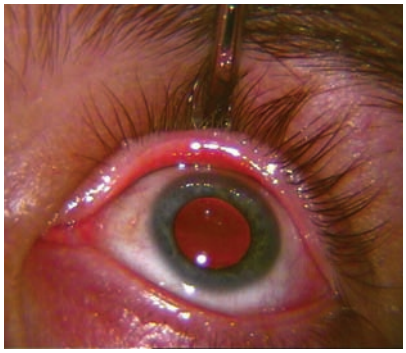
Medium to low magnification lenses are helpful when performing pediatric examinations or screening institutionalized patients (that is, whenever a quick, wide view of the retina is required). Practitioners can view a large retinal segment at one time to rule out any obvious disease.

Most condensing lenses are available with a yellow filter to block short-wavelength light. This can increase patient comfort while performing the examination. However, note that subtle color differences in the retina may not be as obvious when using such a lens. For many practitioners, it is a matter of personal preference.

Grading Common BIO Condensing Lenses

Lens	Posterior Pole	Equator	Periphery
High Magnification			
15D	Excellent	Good	Poor
20D	Good	Excellent	Excellent
Medium Magnification			
28D or 30D	Good, but reduced image size	Good, but reduced image size	Good, but reduced image size
Low Magnification			
40D	Poor	Good for screening	Good for screening





6, 7. Red reflex without (top) and with depression (right). Upon proper application of the scleral depressor on the eyelid and appropriate positioning, you'll achieve a darker reflex.

peripheral areas you will be able to identify. If the patient does not move his or her eyes as much, areas closer to equator will be in view.

When you approach the far periphery, the fundus view will seem to "blink" in and out within your condensing lens. This means you've reached the viewing limit of the BIO. You will then have to use the blink in order to peer into the far periphery and search for any anomaly.

Note that if the depressor is pushed perpendicular to the eye or is pressing on a muscle insertion, the patient will feel uncomfortable. Little pressure is required during this procedure. If the patient shows signs of pain or discomfort, you are likely depressing too hard.

Even though you may not perform scleral depression on every patient, it's wise to practice and hone this skill for use when necessary. Be sure to apply the tips and tricks highlighted above to ensure that this technique does not become a "lost art" for you.

Look for part two of this series, "Put the 'Fun' Back Into the Fundus Examination," in next month's issue. ■

Dr. Dinardo is an assistant professor at the Michigan College of Optometry in Big Rapids. Dr. Walling is a professor and chief of the Medical and Surgical Service at MCO's University Eye Center.

1. Josephberg RG, Besser E. A New Scleral Depressor. Retina Today. 2012 May/June; 8(4):79.

CHRISTOPHER STANSBURY, OD

From Monovision to Multifocals

Convert your presbyopic patients to a more modern modality.

The presbyopic patient population is growing rapidly in the United States, which should mean an influx of patients age 40 years and older looking for presbyopic contact lens correction. However, a recent study shows that of the approximately 69.5 million corrected presbyopes in the United States under the age of 60 years, 96% use spectacle correction and 11% use contact lens correction.[1]

Of the lens wearers in this study, 3.5% use monovision and 2.2% wear bifocals or multifocals.[1] So, even with the advent of modern multifocal lenses, many practitioners still use monovision for their presbyopic patients. It's one way to get presbyopes to read without using reading glasses, but is it the best way?

Monovision: Tried and True

Monovision may seem like a quick and easy option, but consider its disadvantages: loss of depth perception and intermediate vision, as well as poor night vision, which can place patients in unsafe situations. Moreover, some older presbyopes who require greater add powers reach a point where this type of correction is no longer effective.

Existing monovision patients are great candidates for multifocal refits. All you need to do is educate them about the new technology and adaptation period so they know what to expect.

The Latest and Greatest

Due to the clear, binocular vision it provides, the **AIR OPTIX® AQUA Multifocal contact lens with Precision Profile Design** can help convert presbyopic patients. The aspheric front surface **provides optimized image quality**. The aspheric back surface ensures an **optimum fit and excellent centration**, while the lens's center-near design works synergistically with the eye's natural binocular function.

> "The AIR OPTIX® AQUA Multifocal contact lens with Precision Profile Design can help convert presbyopic patients."

AIR OPTIX® AQUA Multifocal contact lenses also feature an **adaptive minus power profile**, which allows for a smooth progression of power gradients from near to intermediate to distance. And, its **permanent plasma surface treatment resists deposits and maintains wettability and all-day comfort**.

Embrace Modern Technology

I have had great success with AIR OPTIX® AQUA Multifocal contact lenses because they are easy to fit, which equates to less chair time and fewer return visits. It also means happy patients—who serve as a great source of referrals!

Following the steps in the AIR OPTIX® AQUA Multifocal contact lens Fitting Guidelines shaved time off of our fits, and I encourage you to follow them when performing your next ten AIR OPTIX® AQUA Multifocal contact lens fits. It will make you a more confident multifocal fitter and fitting this lens in general will demonstrate to patients that you keep up with current technology.

Reference: 1. US Census, Vision Correction Option: Alcon OMNIBUS study of 1000 patients, 2012.

Dr. Stansbury is a partner at West Virginia Eye Consultants, where he specializes in ocular surface disease and complicated contact lens fits. He serves as a paid consultant to Alcon.

Up To 15
CE Credits
(COPE approval pending)

2014 NEW TECHNOLOGIES AND TREATMENTS IN VISION CARE

...*REVIEW* MEETINGS OF CLINICAL EXCELLENCE

SAVE THESE DATES:

ARUBA	**January 16-19**
SAN DIEGO, CA	**May 2-4**
ORLANDO, FL	**June 19-22**
TYSONS CORNER, VA (Washington DC area)	**September 12-14**

REVIEW® OF OPTOMETRY

cope®
*Approval pending

2 CE Credits
(COPE approval pending)

PEER • REVIEWED • PRA • ARTICLE

In the Event of an Emergency

Patients with ocular emergencies may present at any time. Are you adequately prepared? Here's what to know and what to do. **By William B. Potter, OD**

Some of the greatest rewards in optometric practice come from providing proper and compassionate emergency care. While a few practitioners may regard the emergent visit as a nuisance or disruption, you must remember that timely care in the patient's hour of need likely will endear him or her to your practice for life.

In such instances, offering symptomatic relief and a path to recovery not only yields tremendous professional satisfaction, but also helps integrate your services into the comprehensive medical management of the patient.

This article addresses key diagnostic and treatment strategies for a host of common ocular emergencies, including acute angle closure, giant cell arteritis, orbital cellulitis, orbital fracture, true microbial keratitis and retinal detachment. While these conditions will not be reviewed comprehensively, we'll specifically focus on the most effective strategies to help restore the patient's vision and quality of life.

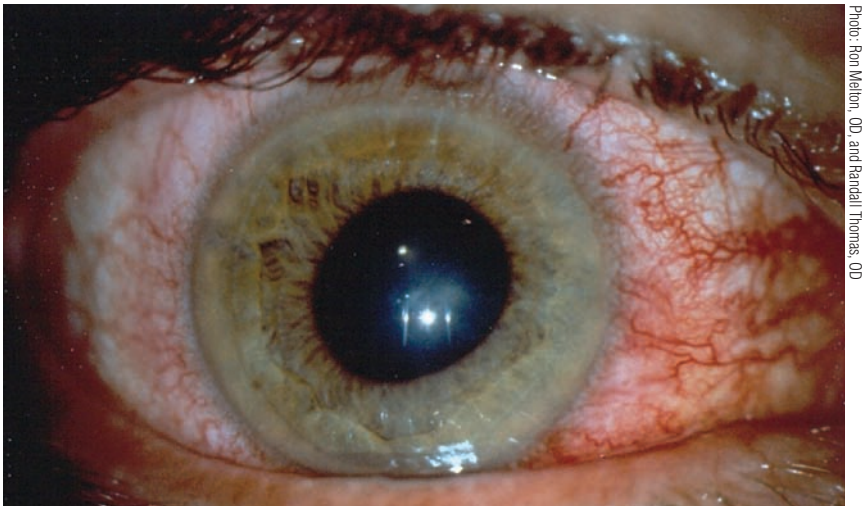


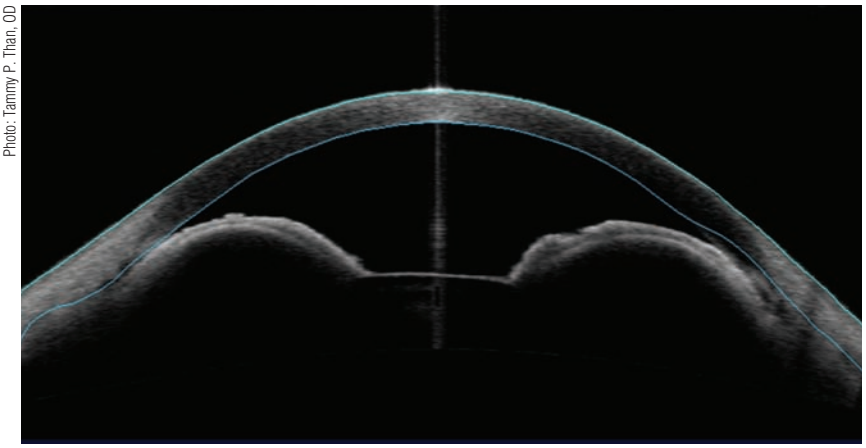
Photo: Ron Melton, OD, and Randall Thomas, OD

This patient presented with acute angle closure. What steps should you take?

Release Date: August 2013
Expiration Date: August 1, 2016
Goal Statement: This article addresses key diagnostic and treatment strategies for several ocular emergencies, including acute angle closure, giant cell arteritis, orbital cellulitis, orbital fracture, microbial keratitis and retinal detachment. While these conditions will not be reviewed comprehensively, we will specifically focus on the most effective strategies to help restore the patient's vision and quality of life.

Faculty/Editorial Board: William B. Potter, 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. Potter is a consultant to Alcon and serves on its speakers' bureau.

Photo: Tammy P. Than, OD



Acute angle closure, as seen on Visante OCT (Carl Zeiss Meditec). Does this individual require referral for laser peripheral iridotomy?

Acute Angle Closure

• ***What to know.*** Two key considerations will help you remain adequately prepared for a presentation of acute angle closure. First, your office should be equipped with a specialized kit that holds unopened and unexpired topical meds—including a beta blocker, an alpha agonist, a carbonic anhydrase inhibitor, prednisolone and pilocarpine.

In addition, your kit should include oral Diamox (acetazolamide, Duramed Pharmaceuticals) and isosorbide.[1] Isosorbide is a hyperosmotic agent that recently has become less popular in our practice due to frequent complications, including nausea and vomiting. Aside from obvious discomfort, vomiting also will limit the metabolic uptake of other oral medications.

The second consideration in preparation for acute angle closure could be termed "local knowledge." The quintessential therapy for narrow angles and/or angle closure is laser peripheral iridotomy (LPI).[2] So, it is critical to be aware of local ophthalmologists who are able to consult, treat and perform the procedure in a timely fashion. Additionally, does the ophthalmologist have ready access to the argon laser for iridotomy, and is he or she willing to see these patients on an after-hours basis?

No matter the case—it is essential to establish a professional relationship with the surgeon, where mutual trust and support are understood. Obtaining the "on call" schedule from the local hospital also would be helpful.

• ***What to do.*** Immediately upon diagnosis, administer drops of pressure-lowering agents initially, as well as 500mg Diamox PO. (Avoid Diamox if the patient has kidney disease.) Once intraocular pressure has decreased below 40mm Hg, dose the patient with pilocarpine. If the pressure remains above 40mm Hg for 30 minutes, re-administer the initial beta-blocker and alpha-agonist drops.[3]

An interesting update on acute angle closure involves those patients who have already undergone LPI for narrow angles. We recently fielded a case of acute angle closure in a patient who presented for a routine exam with small, very peripheral iridotomies. Despite the presence of a patent surgical opening, the iris muscle apparently folded into the angle as the patient dilated, rendering the iridotomy ineffective. So, you must remain on guard for angle closure and be prepared to treat—even if the individual previously underwent LPI.

Giant Cell Arteritis

• ***What to know.*** Seniors who present with profound, unilateral vision loss are a challenge to the optometric practice. First, obtain a careful history and systemic workup to rule out a condition that would require referral to the emergency department prior to ophthalmic examination. Common emergent signs include sudden-onset stroke symptoms, such as hemiparesis, mental confusion and garbled speech.

When considering a diagnosis of giant cell arteritis (GCA), the patient's history may provide several clues. Typically, he or she may report pain upon chewing (jaw claudication), fever, malaise and scalp tenderness or even necrosis. Further, GCA patients often are constitutionally ill due to an underlying systemic inflammatory disorder such as polymyalgia rheumatica.[4] Common ocular manifestations of GCA include profound visual loss due vascular inflammation and occlusion, and diplopia secondary to cranial nerve ischemia.[5]

Ischemic optic neuropathy (ION) is the end result of this inflammation in the temporal artery. Remember that approximately 10% of ION cases are arteritic, with the remaining 90% being non-arteritic due to embolism or inhibited vascular regulation.[6] It is extremely important to rule out arteritic causes of GCA in patients age 70 and older because the individual's health and vision in the fellow eye are at tremendous risk.

• ***What to do.*** Giant cell arteritis is classically diagnosed by eryth-

rocyte sedimentation rate (ESR) and temporal artery biopsy. In 1997, Sohan Singh Heyreh, MD, proposed that jaw claudication was highly suggestive of GCA.[7] He also suggested that ESR can be used in conjunction with C-reactive protein to determine an individual's risk for GCA. Specifically, an ESR >47mm/hour and a C-reactive protein >2.45mg/dl is 97% specific for giant cell arteritis.[7] These two tests should be ordered on a "stat" basis if GCA is suspected. As with almost any laboratory test, a patient can exhibit a normal result yet still manifest the disease.

It is important to note that, in the past, cases of GCA with vision loss have yielded several malpractice suits.[8] Thus, to insulate yourself from a potential lawsuit, you must take several essential steps without hesitation. Following a complete history and examination, notify the patient's internist or emergency room physician immediately. Ensure that the aforementioned laboratory testing is performed as soon as possible, so you can obtain and evaluate the results promptly. (Results should be available on the day of the test, but be sure to contact the laboratory if there is any delay.)

Additionally, make certain that the receiving physician has an acute understanding of the inherent diagnostic concerns associated with GCA, as well as an awareness of the appropriate treatment protocol (e.g., 250mg to 1,000mg IV methylprednisone for three days, oral steroids as needed and a provision for temporal artery biopsy).[9] Remember, the biopsy is indicated for any affected patient—irrespective of whether ESR is elevated.[5]

After hospital treatment, schedule the patient for a follow-up visit immediately after discharge. At follow-up, confirm that proper protocol was followed (otherwise, you expose yourself to a potential medicolegal complication).[6] Also, verify that the patient is receiving long-term follow-up care for the underlying systemic disease that triggered the GCA.

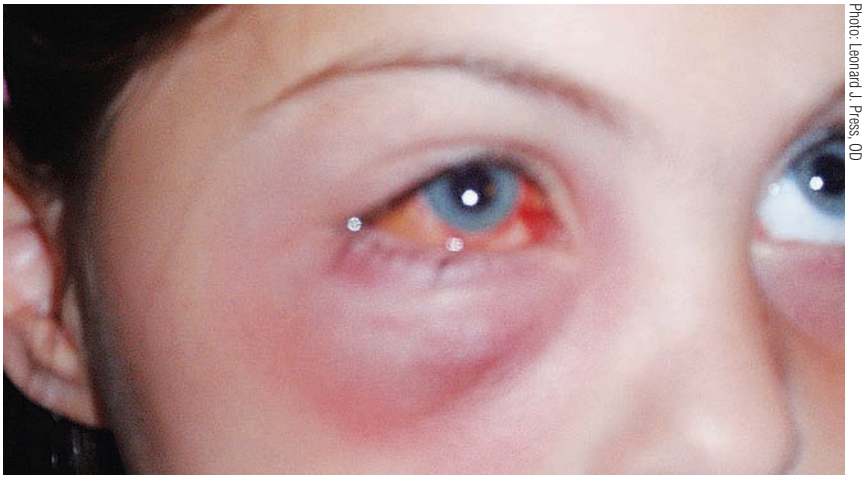


Photo: Leonard J. Press, OD

Periorbital cellulitis in a young girl, presumably caused by *Streptococcus* exposure.

Orbital Cellulitis

• ***What to know.*** The presentation of a patient with swollen lids and conjunctiva seems fairly common. However, any case of orbital cellulitis has obvious distinguishing features from the outset. Patients often are febrile and constitutionally ill, and may manifest a "head tilt" if proptosis and impaired extraocular muscle function are involved. Worse yet, there is risk of orbital compartment syndrome—where consequent swelling and pressure damages the optic nerve and other orbital contents.

Before the introduction of its vaccine in 1985, bacterial infection via *Haemophilus influenzae* was the most common cause of orbital cellulitis.[10] Today, however, most cases are attributed to *Staphylococcus aureus*, *Streptococcus pneumoniae* and beta-hemolytic streptococci.[10]

Systemic dissemination of the infectious agent is also a great risk because the brain's cavernous sinus is in close proximity to the orbit.[11] While a specific causative history may be lacking, trauma, bite marks, and sinus or periodontal infection may be concurrent.[12]

• ***What to do.*** Suspected orbital cellulitis can be considered a true emergency. Early identification of signs and symptoms is crucial to prevent permanent blindness or even death. Consultation with infectious disease and ophthalmic specialists is indicated.

Hospital admission is inevitable in any confirmed case of orbital cellulitis, because IV antibiotics frequently are indicated. Direct any patients who manifest orbital cellulitis symptoms to the emergency department, and call the hospital staff to advise of the situation. Be sure that the accepting hospital is willing and able to handle such cases, especially if it involves a pediatric patient. In most instances, the attending physician in the emergency room will be able to redirect the patient if there is a more appropriate local facility.

Avoid use of topical or oral antibiotic therapy because these agents don't have a sufficiently robust concentration to eradicate the infection. Further, the logistics of

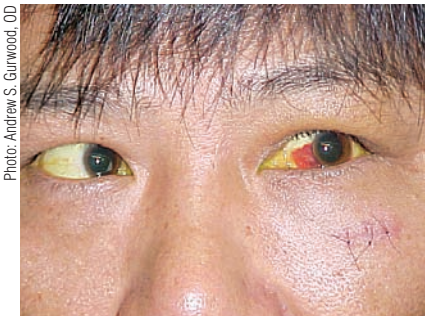


Photo: Andrew S. Gurwood, OD

This man experienced extraocular muscle entrapment secondary to an isolated orbital blowout fracture after being punched in the face.

attaining a prescription will simply delay appropriate care.

It is important to differentiate orbital cellulitis from the lesser emergency of preseptal cellulitis. Swollen lids are associated with both disease states, so it can be difficult to distinguish the two conditions at first blush. However, preseptal cellulitis does not cause proptosis or extraocular muscle restriction.[12] Also, preseptal cellulitis generally can be treated with topical and oral antibiotics.

Orbital Fracture

• ***What to know.*** While a blow to the orbit often will lead the patient directly to the emergency room, ophthalmic follow-up and management is crucial. The integrity of the globe, orbital bones and extraocular muscle function require professional evaluation. It is important to document the exact circumstances of the injury in order to apply proper diagnostic and therapeutic measures.

Blunt force trauma is frequently accompanied by legal issues—with considerations of assault, accident and work-related injury. All eye care professionals should be familiar with state-level or local statutes on reporting child abuse, as many municipalities have stringent requirements. Time, place, persons involved and intensity of force should be charted in as much detail as possible.

• ***What to do.*** As with other emergent conditions, determine whether the orbital trauma patient is stable enough to receive ophthalmic examination. Disorientation could indicate intracranial injury, which requires immediate referral to the emergency department. Also look for a depressed pulse rate or other vasovagal signs that would indicate orbital compartment syndrome.

Complete examination of the trauma patient entails a systematic consideration of all ocular structures. Significant "negatives" should be part of the charting process because trauma can trigger late complications (e.g., hyphema). Visual acuity testing, with pinhole if needed, is mandatory. Record extraocular muscle testing, and note "no diplopia or restriction" if appropriate.

Maddox Rod testing is most helpful in determining deviations that involve an entrapped extraocular muscle. "No proptosis or enophthalmos" indicates consideration of the globe's position within the orbit. Be certain to note your method of evaluation—either via palpation or the more precise Hertel exophthalmometry. "No hyphema" and "no iris tear" as well as "no cataract" and "no retinal holes, tears or detachments" signify an assessment of internal trauma. Finally, a dilated fundus examination is critical.

Imaging of the orbital trauma patient can play a critical role in the patient's care. Judging the degree of trauma, as well as consideration of the positive findings outlined above, leads to a radiologic study of the orbits. CT scan typically is the initial approach of choice, as it is readily available, cost effective and highly capable of viewing the orbit's bony structures.[13] Our approach is to report the nature of the trauma and request that the radiologist rule out orbital fracture by CT scan. Contrast dye is not usually indicated, as the risks can outweigh the benefits.[14] This deci-

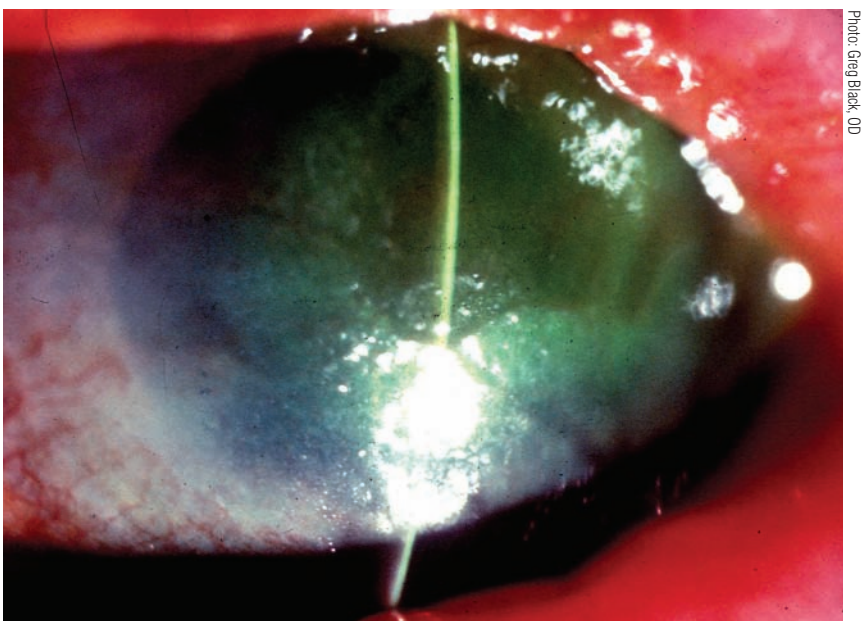


Photo: Greg Black, OD

***Pseudomonas aeruginosa*, a gram-negative bacterium, is responsible for a large proportion of microbial keratitis cases in contact lens wearers.**

sion, as well as consideration of specific test features, is left to the radiologist's discretion.

Simple X-ray tomograms are inadequate, which should be made clear to the receiving physician. Recently, for example, we saw a case of orbital fracture in which the X-ray was "normal," while the CT scan revealed a non-displaced but significant orbital fracture that required surgery.

A common question regarding post-orbital trauma care involves the use of prophylactic oral antibiotics. The theory behind this approach is rational (e.g., limit infection when the contents of the orbit and sinus are in contact secondary to a fracture). However, research does not support broad application of this treatment modality.[15] Further, the potential for antibiotic side effects can overwhelm any perceived benefit.

Published studies in this area involve small numbers of patients, so statistical validity is an issue. For example, one study indicated that antibiotic use should be reserved for cases involving contaminated wounds and leaking cerebrospinal fluid, or if the individual is on oral steroids.[15] Our approach is to prescribe oral antibiotics if the fracture is suspected and the patient is readily able to swallow oral medication. A course of 500mg cephalexin TID to QID is well tolerated, and is a good choice due to its gram-positive activity. Remember that there is some cross-sensitivity with penicillin, so do not prescribe cephalexin if the patient reports a drug allergy.

While orbital fracture does not require immediate repair, the optometrist evaluating acute orbital trauma should be mindful of a few situations that require immediate referral to an orbital surgeon. An unresolving oculocardiac reflex from edematous and hemorrhagic pressure on the globe requires prompt surgical attention. Similarly, a "white-eyed blowout," with interrupted circulation to the orbit, can precipitate ischemia of the orbital contents. Finally, an obvious, severe enophthalmos should be referred for more immediate surgical care.[16]

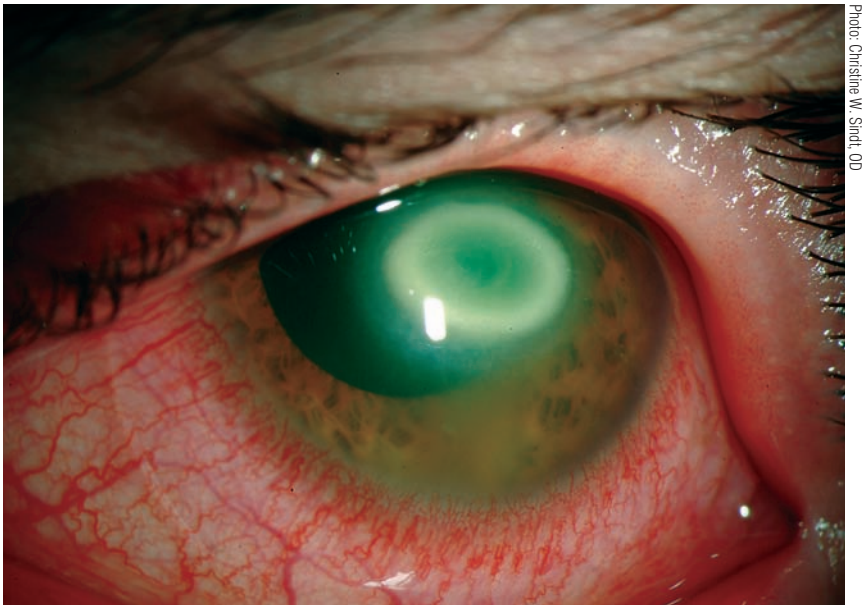


Photo: Christine W. Sindt, OD

Microbial keratitis caused by the *Acanthamoeba* species is relatively rare, but it often causes severe pain and a characteristic late-stage ring infiltrate, as seen here.

Microbial Keratitis

• ***What to know.*** Microbial keratitis (MK) is a mutual nightmare for every patient and eye care practitioner, and usually causes significant pain and lid edema. The condition represents a true emergency, as delayed intervention or inappropriate prescribing can result in poor visual outcomes. Some basic approaches at the primary care level can help improve the patient's well-being as well as help you avoid medicolegal issues.

• ***What to do.*** In MK, culturing a suspicious lesion is a fundamental aspect of appropriate care. Any suspicious lesion that presents with a centralized location, is >2mm in diameter and/or exhibits significant stromal depth should be cultured. The same is true of lesions that have resisted treatment or those documented in institutionalized patients.[17] The best practice includes streaking infectious material onto agar plates, including blood, chocolate and Sabouraud. Also, swab conjunctival fornices to thioglycolate broth.[18] Due to the short shelf life of the agars, be sure to prearrange a source of these plates—whether it be from a local medical laboratory or hospital.

Because a significant percentage of contact lens-related ulcers involve *Pseudomonas*, it is important to cover this pathogen even before culture results are attained. Establish a current source of fortified antibiotics, even if referral is contemplated. Topical ciprofloxacin is a strong choice for hourly dosing, combined with tobramycin. We have often ordered fortified tobramycin prior to culture results, due to its broad-spectrum activity. Remember that fortified vancomycin should be reserved for

gram-positive infections due to its narrow spectrum.

A word about referrals: As primary care optometrists, we often rely on corneal specialists for help with MK cases. This is appropriate if specialty care is accessible in a timely fashion. Invariably, however, our most serious cases occur when specialty resources are not readily available.

It is far better to be prepared to begin the microbial study via culturing than to initiate empirical treatment while awaiting specialty care. If you opt for referral and the corneal specialist is immediately available to culture and treat, do not start antibiotic therapy until culturing is completed because it will influence the results.

Retinal Detachment

• ***What to know.*** Retinal detachments yield a wide spectrum of visual symptoms. The location and severity of the detachment determine visual loss, and the patient history provides clues as to chronicity and etiology. Spontaneous detachments and trauma comprise the majority of cases, but diabetic retinopathy, inflammatory diseases and post-cataract patients all should receive consideration.

• ***What to do.*** The primary care optometrist should have detailed knowledge of retinal specialists in the area—even to the extent of maintaining a current on-call schedule for reference in an emergency. This prompts the question: Exactly how "emergent" is the detachment? Before answering, we have a few additional concerns to address.

Because retinal surgery is a significant intervention that may require heavy anesthesia, patients likely have to refrain from consuming any foods or liquids other than water for several hours prior to surgery. Also, there may be extensive preparation of an operating room staff and instrument tray, depending on the nature of the surgeon's facility. These two issues alone make it challenging to "rush a patient into surgery" for a retinal detachment.

Additionally, the genuine urgency of retinal surgery may be based upon whether the macula is "on" or "off" following detachment. One study indicated that fovea-off detachments had better visual prognosis if surgery was performed within one to three days vs. four to six days.[19] In other words, there usually is adequate preparation time for non-emergent intervention as long as surgery still is performed within a few days following injury.

If, however, the macula remains on—especially in the context of a superior detachment—true emergent intervention may be visually beneficial. In this instance, instruct the patient to take nothing by mouth and engage in bed rest with his or her head elevated. Then, be sure to consult with your preferred retina specialist as soon as possible.

All things considered, there may be very little rationality in summoning the retinal specialist immediately on an off-hours basis. Trust the retinal specialist's system for handling detachment patients, based on the description of clinical findings.

So, what's the take-home message? In any instance of ocular emergency, you should have a clear, predetermined plan of action. Also, a calm demeanor in the face of emergency is critical because the patient feels worse and loses confidence if the doctor appears anxious.

Knowledge of local professionals who can help—including emergency, internal medicine, neurology, radiology and infectious disease specialists—is very important. Finally, appropriate follow-up care, including phone calls, will enhance the quality of patient care. ■

Photo: Mark T. Dunbar, OD

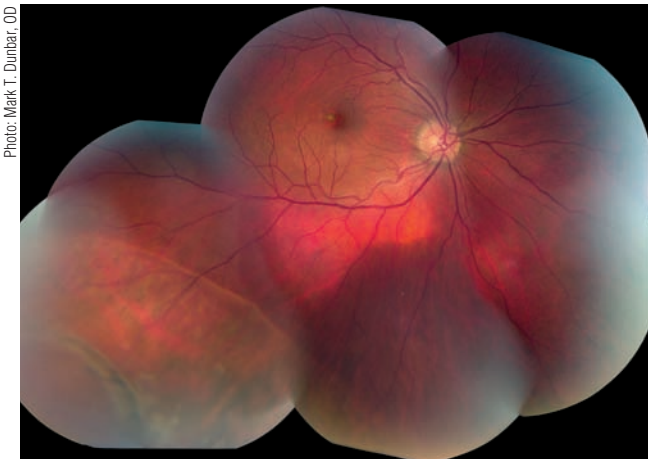
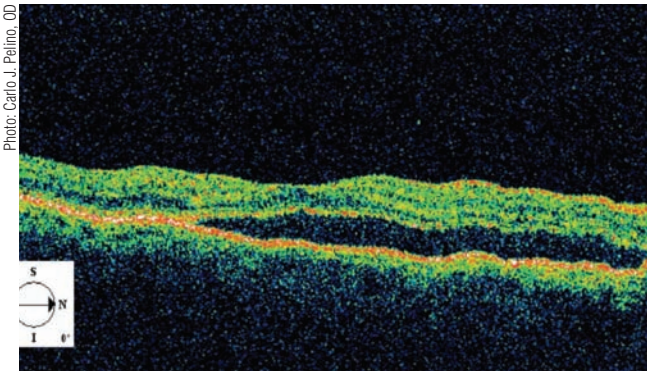


Photo: Carlo J. Pelino, OD



Retinal detachments, as seen in these two patients, aren't usually true emergency presentations. That said, the less time that passes between injury and repair, the better the patient's chances for a favorable visual outcome.

The OD in the ED, and How to Obtain Hospital Privileges

By Thomas A. Wilson, OD, FCOVD

In addition to identifying emergent ocular issues in the exam chair, some optometrists help to triage eye emergencies and provide eye care in the hospital. Generally, optometrists who obtain hospital privileges work in one of two areas.

• ***Emergency medicine.*** In this model, the optometrist should be viewed as the primary eye care physician, and thus be willing and able to treat and diagnose any ocular problem that may present in the emergency department. The OD makes the determination as to whether the patient's condition requires a subspecialist and helps to orchestrate that care. Generally speaking, it's more common to see optometrists in this role in rural settings as opposed to metropolitan areas. However, with the number of ophthalmology residencies staying flat and the population continuing to grow, we could see more ODs in the ED as optometry continues to expand its scope of practice.

• ***Vision rehabilitation.*** Inpatients on the rehabilitation floor often require medical intervention secondary to myriad ocular and systemic disorders. These patients frequently benefit from visual rehabilitation and, in this role, the optometrist is viewed as the subspecialist. We work with multiple rehabilitation specialists to communicate the patient's eye care needs and help to devise a vision rehabilitation plan. In addition, we can assess general vision, correct refractive error, manage infections and identify potentially vision-threatening conditions in these patients.

The Path to Privileges

In either case, the hospital system has established a specific path to become an on-staff optometrist or consultant. Usually, the hospital's chief medical officer (CMO) and board of directors make the appointments, and typically "cold calling" the CMO is not the way to go. If you put in the nesccessary legwork ahead of time, the process is much easier to navigate.

• First, gain the respect of the attending physicians and their staff by building relationships with them—talk with them, provide mutual referrals and offer your expertise to help with community outreach and patient education. Physicians outside of the ophthalmology realm may be unaware of what a valuable resource the optometrist can be. Educate them.

• After you have established a relationship with some physicians in the hospital, you can inform them of your interest in becoming more involved as a staff member or consultant. In some cases, it may be appropriate to ask the physician to talk with the CMO on your behalf.

• If they establish the need for your expertise on staff, the CMO will then present the idea to the hospital's executive director, and the board and you will be asked to fill out an application packet to obtain hospital privileges. This can be a sticking point, as many hospitals require some form of specialization that separates you from the "crowd." While board certification, fellowships or residency training are not always required, they can be very helpful in making the case for why the hospital needs your expertise. In addition, the hospital usually will require references from ophthalmologists on the hospital staff.

• If your packet is approved, you will be asked to produce medical malpractice documents, CPR training, TB tests and EHR training, and a complete background investigation will be conducted. You will be required to join an on-call team, even in a rehabilitation setting, and provide a pager or cell phone number where you can be reached.

After your appointment has been made, you will join one of the most exciting, dynamic and fulfilling modes of optometric practice. You will most likely be classified as an allied member or a consultant, which often means billing for services is your responsibility. During the delineation phase of your privileges, you should be clear that you want to practice under the full scope of your license, and you will be able to write orders.

Dr. Wilson runs a private practice in Colorado Springs and is on staff at Penrose Hospital and Memorial Hospital, both in Colorado Springs. He is immediate past president of the Colorado Optometric Association.

Dr. Potter is chief of optometry and contact lens services at Millennium Eye Care, in Freehold, NJ.

1. Jackson J, Carr LW, Fisch BM, et al. American Optometric Association. Optometric Clinical Practice Guidelines. Care of the Patient with Primary Angle Closure Glaucoma. Available at: www.aoa.org/documents/optometrists/CPG-5.pdf. Accessed July 15, 2013.
2. Robin AL, Pollack IP. Argon laser peripheral iridotomies in the treatment of primary angle closure glaucoma. Long-term follow-up. Arch Ophthalmol. 1982 Jun;100(6):919-23.
3. Sowka JW, Gurwood AS, Kabat AG. Handbook of Ocular Disease Management, 12th ed. Rev Optom. 2010 Apr;147(4):33a.
4. Calvo-Romero JM. Giant cell arteritis. Postgrad Med J. 2003 Sep;79(935):511-5.
5. Sowka JW, Gurwood AS, Kabat AG. Handbook of Ocular Disease Management, 2nd ed. Rev Optom. 1998 Mar;135(3):59a.
6. Morse PH. Emergencies. In: Risk Prevention in Ophthalmology. Kraushar M (ed.) New York: Springer; 2008:154-5.
7. Hayreh SS, Podhajsky PA, Raman R, Zimmerman B. Giant cell arteritis: validity and reliability of various diagnostic criteria. Am J Ophthalmol. 1997 Mar;123(3):285-96.
8. Meyer S. Case Studies: Failure to Diagnose Giant Cell Arteritis. Ophthalmic Mutual Insurance Company. Available at: www.omic.com/failure-to-diagnose-giant-cell-arteritis-2/. Accessed July 24, 2013.
9. Seetharaman M. Giant Cell Arteritis. Medscape Reference: Drugs, Diseases and Procedures. Available at: http://emedicine.medscape.com/article/332483-overview. Accessed July 15, 2013.
10. Mathias MT, Horsley MB, Mawn LA, et al. Atypical presentations of orbital cellulitis caused by methicillin-resistant Staphylococcus aureus. Ophthalmology. 2012 Jun;119(6):1238-43.
11. Harrington JN. Orbital Cellulitis. Medscape Reference: Drugs, Diseases and Procedures. Available at: http://emedicine.medscape.com/article/1217858-overview. Accessed July 15, 2013.
12. Sowka JW, Gurwood AS, Kabat AG. Handbook of Ocular Disease Management, 15th ed. Rev Optom. 2013 Jun;150(6):14a.
13. Pascotto A. Imaging in Orbital Fractures. Medscape Reference: Drugs, Diseases and Procedures. Available at: http://emedicine.medscape.com/article/383739-overview. Accessed July 15, 2013.
14. Massoud TF, Cross JJ. The orbit. In: Adam A, Dixon A (eds.). Grainger and Allison's Diagnostic Radiology. 5th ed. Philadelphia: Elsevier; 2008:61.
15. Newlands C, Baggs PR, Kendrick R. Orbital trauma. Antibiotic prophylaxis needs to be given only in certain circumstances. BMJ. 1999 Aug 21;319(7208):516-7.
16. Burnstine MA. Clinical recommendations for repair of isolated orbital floor fractures: an evidence-based analysis. Ophthalmology. 2002 Jul;109(7):1207-10.
17. Bowling E, Sonsino J, Shovlin JP, Sindt CW. The Corneal Atlas. Rev Optom. 2013 Jan;150(1):4.
18. Murillo-Lopez FH. Bacterial Keratitis Workup. Medscape Reference: Drugs, Diseases and Procedures. Available at: http://emedicine.medscape.com/article/1194028-workup. Accessed July 24, 2013.
19. Williamson TH, Shunmugam M, Rodrigues I, et al. Characteristics of rhegmatogenous retinal detachment and their relationship to visual outcome. Eye (Lond). 2013 Jun 21.

OSC QUIZ

You can obtain transcript-quality continuing education credit through the Optometric Study Center. Complete the test form *(page 61)*, 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.revoptom.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. The optometric practice benefits from delivery of timely emergency care by:
a. Providing professional satisfaction via relieving patient suffering.
b. Bonding the grateful patient to your practice.
c. Integrating your services into the comprehensive medical management of the patient.
d. All of the above.

2. What is the most common and best-tolerated oral medication for acute angle closure?
a. Diamox (acetazolamide, Duramed Pharmaceuticals).
b. Lovaza (omega-3-acid ethyl esters, GlaxoSmithKline).
c. Isosorbide.
d. None of the above.

3. What is the most likely cause of angle closure in patients who previously have undergone laser peripheral iridotomy?
a. Pupillary block.
b. Blockage of smaller peripheral treatment areas.
c. Steroid response.
d. Hyphema.

4. Which underling inflammatory disorder commonly is associated with giant cell arteritis (GCA)?
a. Polymyalgia rheumatica.
b. Rheumatoid arthritis.
c. Lupus erythematosus.
d. Multiple sclerosis.

5. Approximately what percentage of ischemic optic neuropathy cases are arteritic in nature?
a. 5%.
b. 10%.
c. 85%.
d. 90%.

6. Which clinical finding typically is NOT present in patients suspected of GCA?
a. Scalp tenderness.
b. Fever.
c. Decreased erythrocyte sedimentation rate (ESR).
d. Jaw claudication.

7. What key laboratory tests should you order for a patient suspected of GCA?
a. ESR and C-reactive protein.
b. Fasting blood sugar and HbA1C.
c. Anti-nuclear antibody and rheumatoid factor.
d. Complete blood count with differential.

8. What is the appropriate management protocol for a confirmed case of GCA?
a. IV methylprednisone.
b. Oral steroids.
c. Temporal artery biopsy.
d. All of the above.

9. Which bacterium is NOT currently regarded as a common cause of orbital cellulitis?
a. *Staphylococcus aureus*.
b. Group B beta-hemolytic *Streptococcus*.
c. *Haemophilus influenzae*.
d. *Streptococcus pneumoniae*.

10. What is the recommended treatment option for the majority of orbital cellulitis cases?
a. Topical antibiotics.
b. Topical corticosteroids.
c. Oral antibiotics.
d. IV antibiotics.

11. In cases of orbital facture, Maddox Rod testing helps:
a. Rule out the presence of iris tear.
b. Determine the extent of extraocular muscle involvement.
c. Evaluate the severity of hyphema.
d. All of the above.

12. A diagnostic evaluation of potential orbital fracture in a patient who experienced blunt trauma should NOT include:
a. X-ray.
b. CT scan.
c. Extraocular muscle function.
d. Hertel exophthalmometry.

13. How should oral antibiotics be used in suspected cases of orbital fracture?
a. Always use oral antibiotics in potential orbital fracture.
b. There are instances where oral antibiotics are appropriate, but broad application is not recommended.
c. Never use oral antibiotics in potential orbital fracture.
d. Only use oral antibiotics if there is no evidence of leaking cerebrospinal fluid.

14. What is NOT a typical sign or symptom of true microbial keratitis (MK)?
a. Pain.
b. Lid edema.
c. Lesion larger than 2mm.
d. Jaw-wink reflex.

15. At a minimum, proper culturing technique for MK includes:
a. Plating to blood agar.
b. Plating to chocolate agar.
c. Plating to Saboraud's agar.
d. All of the above.

16. Although many organisms can cause MK, which bacterium is responsible for a significant percentage of contact lens-related ulcers?
a. *Serratia*.
b. *Staphylococcus*.
c. *Pseudomonas*.
d. *Treponema*.

17. In MK suspects, which topical antibiotic is a good choice prior to receiving culture results?
a. Erythromycin.
b. Vancomycin.
c. Tobramycin.
d. Azithromycin.

18. What is the most effective treatment regimen for a severe, yet unconfirmed, case of MK?
a. Azithromycin and trimethoprim.

OSC QUIZ

b. Ciprofloxacin and tobramycin.
c. Bacitracin and vancomycin.
d. Combination tobramycin/dexamethasone.

19. What is the most common underlying cause of retinal detachment?
a. Inflammatory disease.
b. Diabetes.
c. Cataract surgery.
d. Trauma.

20. Which statement regarding a fovea-off retinal detachment is true?
a. It is critical to summon the retinal specialist and insist on immediate surgery.
b. Patients who undergo surgery within one to three days often experience the best visual results.
c. Patients who undergo surgery within one to six days often experience the best visual results.
d. Surgical intervention rarely requires heavy anesthesia.

Important Notice: Processing Answer Sheets and CE Certificates

Review of Optometry is strengthening our commitment to the environment and "going green."

Effective September 2012, we will send the results of any CE post-course test that is manually submitted (via mail or fax) to the email address provided on your answer sheet.

If you do not provide an email address OR if you prefer to receive a hard copy of your certificate of completion via mail, you will be charged a $2.50 processing fee per certificate (via credit card or check payable to Jobson Medical Information LLC).

We cannot process your post-course test if neither an email address nor $2.50 processing fee is provided. Any answer sheet will automatically be returned to you.

We appreciate your support of this new process. Please contact us via email at cecustomerservice @jobson.com with any questions. Thank you!

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

Examination Answer Sheet

Valid for credit through August 1, 2016

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.

In the Event of an Emergency

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.

You must choose and complete one of the following three identifier types:

① SS # ___ - ___ - ____

Last 4 digits of your SS # and date of birth

② ____ - ____

State Code and License #: (Example: NY12345678)

③ _____

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 109300

RO-OSC-0813

Better Ask, or They Won't Tell

This patient's follicular conjunctivitis could be caused by anything—but it's probably due to chlamydia. You won't know unless you ask. **Edited by Paul C. Ajamian, OD**

Q A 30-year-old white female came in with follicular conjunctivitis that won't respond to topical treatment. I'm thinking it could be chlamydia—but how can I be sure?

A "First, rule out other causes of chronic conjunctivitis," says Tammy Than, OD, associate professor at University of Alabama at Birmingham School of Optometry. "For instance, *molluscum contagiosum* also causes follicular conjunctivitis. So, look carefully for hidden lesions between the eyelashes."

If none are present, you're probably right to be suspicious of chlamydial conjunctivitis. Indeed, chlamydia is the most frequently reported sexually transmitted bacterial infection in the United States, and the most common cause of chronic follicular conjunctivitis.[1] But if it's not in your differential, you'll never diagnose it.

Most frequent in young, sexually active adults, chlamydial (adult inclusion) conjunctivitis can be transmitted sexually or by hand-to-eye contact, Dr. Than says. It generally presents as a chronic, unilateral red eye with large follicles in the inferior conjunctival fornix. An enlarged preauricular lymph node is also common. A case history, with direct and open questioning about past sexually transmitted diseases (STDs), is probably the most important component of the exam. You must ask your patient about possible STDs, because she will not volunteer the information.

Definitive diagnosis requires a lab test. This includes Giemsa staining, cell culture, serum immunoglobulin G (IgG) titers to *Chlamydia* species, enzyme-linked immunosorbent assay and polymerase chain reaction (PCR).

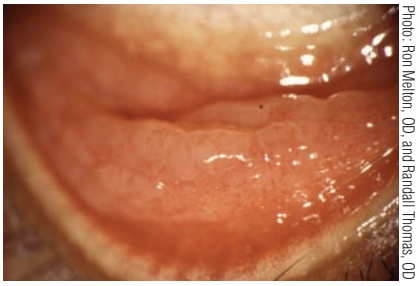


Photo: Ron Melton, OD, and Randall Thomas, OD

Follicular conjunctivitis due to chlamydia.

"Select a test with high specificity and sensitivity," Dr. Than says. "The Charles T. Campbell Ophthalmic Microbiology Lab at the Eye and Ear Institute in Pittsburgh recommends Giemsa stain or PCR tests for chlamydia." (For further information and collection instructions, see the lab's site at http://eyemicrobiology.upmc.com/chlamydia.htm.)

Treatment is straightforward and simple.

"Due to the chronic nature of chlamydial conjunctivitis, many patients present with a history of using several different topical antibiotics without resolution of the condition," Dr. Than says. "So, suspected or confirmed chlamydia cases require systemic treatment."

The treatment of choice is a single, 1g dose of azithromycin. Other therapies, which each require a minimum of seven days of treatment, include tetracycline 500mg four times a day, doxycycline 100mg twice a day, or erythromycin 500mg four times a day. Avoid tetracyclines in children and in women who are pregnant or breastfeeding.

Note that Vigamox and Moxeza (moxifloxacin 0.5%, Alcon) are both indicated for conjunctivitis caused by *Chlamydia trachomatis*. Erythromycin ointment is another topical therapy. But because chlamydia is a systemic disease, systemic treatment is usually preferred.

Patients should return for monitoring in two to three weeks.

"Because chlamydia often occurs concomitantly with other sexually-transmitted diseases, the patient also needs to be referred to a medical specialist," Dr. Than says.

Often, patients have no genitourinary symptoms. Therefore, chlamydia is likely significantly underreported. For the same reason, it can lead to devastating long-term consequences, such as pelvic inflammatory disease (PID) and infertility.

Furthermore, all sex partners from the past two months need to be informed, seen by a health care provider and treated, according to the Centers for Disease Control and Prevention. Simultaneous treatment of current partner(s) needs to occur to prevent re-infection.

Lastly, you must report all cases of chlamydia and gonorrhea to your state health department. ■

1. Rubenstein JB, Virasch V. Conjunctivitis: Infectious and Noninfectious. In: Yanoff M, Duker JS, eds. Ophthalmology. 3rd ed. St. Louis: Mosby Elsevier; 2008: 231.

Hungry for success?

At Jobson, we have more effective ways for you to reach the optical market than anyone. So our approach to serving clients is unique. First, we develop a thorough understanding of your specific goals. This understanding, plus our extensive offering of products and services, enables us to then suggest solutions that will help achieve those goals. This often includes innovative ideas and premium positions. For advertising information contact Michele Barrett (610-492-1014, mbarrett@jobson.com) or Jim Henne (610-492-1017, jhenne@jobson.com). Let us satisfy your hunger for success.

REVIEW® OF OPTOMETRY | Review of Cornea & Contact Lenses | REVIEW® OF OPTOMETRY www.revoptom.com | REVIEW® of Ophthalmology www.revophth.com

Jobson Optical Group

The vision to help you succeed

Did You Miss a Spot?

A conjunctival lesion can be tough to classify, but studying its appearance and charting its location can help you make a diagnosis. **Edited by Joseph P. Shovlin, OD**

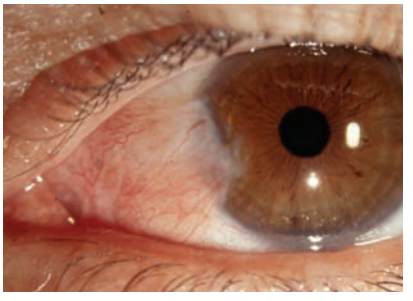
Q I have a contact lens patient who has a corneal/conjunctival lesion that is quite raised and has a white appearance. How can I differentiate between pterygia, vascularized limbal keratitis (VLK) and conjunctival intraepithelial neoplasia (CIN)?

A "The big issue is the nature of the lesion," says J. James Thimons, OD, center director for Ophthalmic Consultants of Connecticut. "All three of these are best differentiated by the anatomy of the appearance and the location." Let's take a look at some of the defining features of each.

• ***Pterygia.*** Of the three conditions, this is by far the most common. "I tell my patients that a pterygium is effectively a callus on the eye, secondary to chronic exposure to sun, dust or wind," Dr. Thimons says. It is almost always bilateral and not gelatinous. The vascular bed runs parallel with the wedge of the lesion, apexes toward the cornea, and weaves itself into the corneal epithelium and Bowman's membrane.

In the case of a medium to large pterygium, you should perform topography to rule out induced distortion, according to Henry D. Perry, MD, a founding partner of Ophthalmic Consultants of Long Island. Histopathology shows a thickened epithelium, amorphous eosinophilic staining, hyalinized material and numerous vessels identified in the substansia propia. Stromal fibrocyte proliferation can also be seen. "Several papers have reported as many as 10% of pterygia having foci of CIN—interestingly, none of these 10% were clinically recognized preoperatively," Dr. Perry says. "Therefore, clinical photos are helpful, and performing a conjunctival scraping with a Kimura spatula and putting the material on a glass slide may be diagnostic." Put the slide in a Coplin jar with methanol and send to a cytologist for evaluation.

Photo: J. James Thimons, OD



Pterygium, such as the one seen in this photo, is a common diagnosis.

• ***VLK.*** This condition is usually associated with hard contact lens wear and in patients with dryness or desiccation of the cornea secondary to lens fit dynamics. "It's basically like a scab on the cornea—it's thought to be a hyperplastic response of the cornea to try to heal itself," Dr. Thimons says. It's typically located between the limbus and the edge of the lens where it rides into the temporal cornea.

Usually smaller in size than a CIN, VLK does not have a whitish or gelatinous appearance. "This is clearly a corneal lesion with some limbal involvement," Dr. Thimons says.

• ***CIN.*** Less common than pterygia or VLK, CIN tends to be more gelatinous with a bumpy texture and some gray-white pigment in the body of the lesion. "Any white lesion on the conjunctiva that looks suspicious for a neoplasm should be at least evaluated by serial photography and perhaps conjunctival scrapings," Dr. Perry says. "Pinguecula that become elevated and/or develop a whitish, foamy appearance may actually represent CIN. Pterygia may also degenerate into CIN."

Whereas most pterygia are nasal, CINs are typically temporal but can occur superiorly. Usually unilateral, CIN crops up more often in men, elderly patients and those with a history of chronic sun exposure or tobacco use. "Quite frankly, a CIN looks bad because it usually is," Dr. Thimons says. "It's one of those lesions that lives up to its reputation. Clinicians become concerned by the atypical aspect of the presentation and, as a result, either monitor regularly in the early phase or refer for biopsy and treatment if changes occur."

"I would be uncomfortable with just a visual diagnosis; you would definitely want to biopsy," he says. CIN is a pre-malignancy and can certainly progress to squamous cell CA when it breaks through the conjunctival basement membrane. If a CIN continues to grow, it can cause significant tissue damage and can invade adjacent structures, such as the sclera, lids and orbit. CIN can be aggressive, but very rarely metastasizes when it progressses to squamous cell CA. ■

Invest In Your Practice And Get A Guaranteed Positive Return.

Lombart's CS-4 Package Offers Quality, Style & Value.

Ask about optional Slit Lamp & Chart Projector configurations.

$13,595

Or lease for $269/mo. for 60 months *

Package includes:

- The Lombart CS-4 Chair & Stand
- Topcon VT-10 Refractor
- Topcon SL-2G Slit Lamp
- Reichert LongLife Chart Projector with mount, slide & screen
- Upgrade to the Lombart CVSi21 for only $2000 more or to the CVS-PC for only $1500 more — Additional upgrades & configurations available.

(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 | 800-446-8092
www.lombartinstrument.com

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

***Lease rate subject to credit approval, 1st payment is paid for by leasing company at signing with 59 remaining rental payments of $269 and a $1.00 purchase option. Taxes, freight and installation additional. Hand Instruments optional. Quantities limited. Subject to change without notice.**

If IOP is Up, Take Another Look

This patient's IOP is slowly on the rise, despite topical medication. How can we look closer to find out what's going on? **By James L. Fanelli, OD**

In 2008, a 64-year-old white male glaucoma patient was referred to me from a colleague in Connecticut. This doctor had treated the patient for several years and sent him to me for further care because the patient was relocating to my area.

At that time, he was on Travatan (travoprost, Alcon) HS OU for about three years. His other medications included only aspirin (81mg daily as prophylaxis for cardiovascular disease) and generic vitamins.

He reported no family history of glaucoma, and said he'd been diagnosed with glaucoma based on elevated intraocular pressure and "some damage" to his right eye.

Diagnostic Data

At this initial visit, his best-corrected visual acuity was 20/20 OU through mild hyperopic astigmatic and presbyopic correction. Pupils were equal, round and reactive to light and accommodation with no afferent defect. Intraocular pressure measured 14mm Hg OD and 16mm Hg OS at 10:35 am. His angles appeared to be grade 3 open OU by Van Herick estimation. His anterior segments were unremarkable and his crystalline lenses were clear.

Upon dilation, his macular examination was unremarkable, as was his vascular and peripheral retinal examination OU. Stereoscopic evaluation of his discs showed estimated cup-to-disc ratios of 0.50 x 0.60 OD and 0.40 x 0.40 OS. The right optic nerve did not respect the ISNT rule, with a somewhat thinned neuroretinal rim inferotemporally. The neuroretinal rim of the left eye appeared relatively robust. Central corneal thickness measured 532µm OD and 549µm OS.

Prior to the patient's arrival at my office, the previous provider sent a summary of his clinical care, which included the rationale for initiating therapy: increased IOP and optic nerve asymmetry. Prior to treatment, his IOP averaged 24mm Hg OD and 21mm Hg OS. After treatment, his IOP averaged in the mid-teens OU.

Following his initial visit with me, I saw the patient on a regular basis over the next few years. During this period, his IOP remained in the mid-teens in both eyes. Gonioscopy showed grade 3 open angles OU with mild trabecular pigmentation and no angle abnormalities in either eye. Heidelberg Retina Tomograph-3 (HRT-3, Heidelberg Engineering) imaging of the optic nerves correlated well with my clinical observations of his optic nerve and neuroretinal rim appearances OU. Sequential HRT-3 Topographical Change Analysis (TCA) showed stable neuroretinal rims. Threshold standard automated perimetry demonstrated no discernable field defects OD or OS over several years, though scattered areas of depression were occasionally noted in the superior arcuate area of the right eye.

In late 2010 though, his IOP in both eyes began to creep upward, more in the right than in the left. IOP in the right eye increased to 20mm Hg on average over four visits, while IOP in the left increased to an average of 17mm Hg during the same time. Given this modest but demonstrable IOP increase, I added Azopt (brinzolamide, Alcon) BID to the right eye only.

Subsequently, IOP in the right eye decreased to 18mmHg, with lower fluctuations in IOP ranges and with no structural or functional changes observed in the right eye's visual fields or optic nerve characteristics. All indices in the left eye remained stable.

But recently, over the past four visits, the patient has had another increase in IOP in both eyes. When seen most recently in mid-July, his IOP was 21mm Hg OD and 19mm Hg OS. While the right eye had sustained more damage initially, both optic nerves still showed no progressive structural damage, nor were they exhibiting any significant functional damage.

Evaluation and Management

Because there are no demonstrable structural or functional changes at this time, I'm going to continue to monitor the patient without alteration of his therapeutic regimen.

Discussion

When managing a glaucoma patient over a prolonged period, any of the three primary indices of stability—IOP, visual fields and optic nerve structure—might begin

to change. In this patient's case, it's his slowly rising IOP in his right eye. This crossroads is commonly encountered in managing glaucoma patients: What should you do when you're beginning to lose control of the disease, and when do you make that change in therapy?

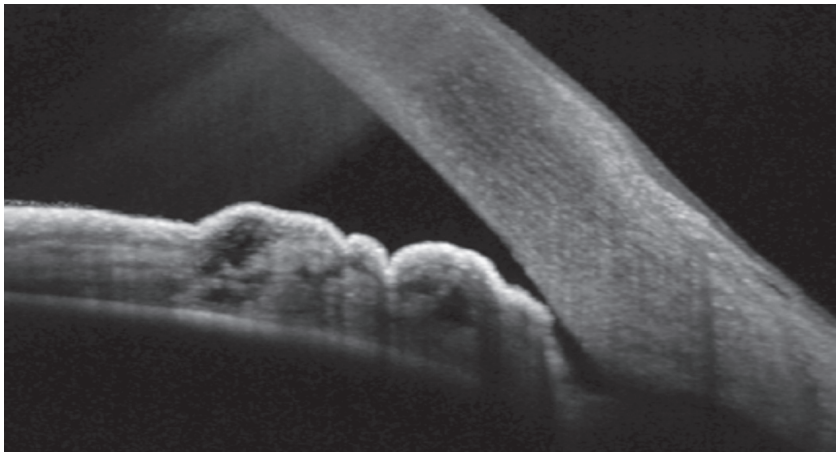
In this case, let's think about why his IOP is becoming seemingly less controllable and gradually increasing with time. In the simplest scenario, IOP increases either because of increased outflow obstruction or because of reduced efficacy of the anti-glaucoma medications—or perhaps both mechanisms at the same time. (Regarding the reduced efficacy of current medical therapy, consider that either the medications themselves are losing their effectiveness or perhaps the glaucoma is simply becoming more recalcitrant to therapy.)

In either case, once you're certain that there has been repeatable, demonstrable change, a modification of therapy is warranted. And that may include the addition of more medications, a substitution of medications, or progression to laser or other surgical intervention. Which option you choose to regain control of the IOP will vary on a case-by-case basis.

In this patient's case, medical management of his current glaucoma state must be considered along with periodic examination of another very important aspect of IOP control: outflow mechanisms. To do so, we need to take into account another diagnostic method of glaucoma management: serial gonioscopy.

A New Angle on Gonio

Gonioscopy gives us a great view of the outflow structures, but it can be a difficult procedure to perform in some patients (though with practice, the technique does become easier).



Anterior segment OCT image of the temporal angle of the left eye. Note the anterior placement of the iris adjacent to the trabecular meshwork, which was not apparent with gonioscopy. Could this be causing the patient's recent rise in IOP?

In addition to the problem of actually performing the procedure, the other limitation with gonioscopy is the seemingly low yield of practical information it provides, especially in patients with open angles. But gonioscopy does indeed give us valuable information about the outflow structures (even on patients with open angles): the amount of trabecular pigmentation, the presence of iris processes or peripheral anterior synechiae, and the contour of the iris plane as it relates to the angle (bowed, flat, plateau).

That said, I performed gonioscopy on this patient at least yearly since I assumed his care, but I was not able to ascertain any significant demonstrable change in his gonioscopic appearance over time. Part of the difficulty in appreciating subtle changes in the angle over time lies in the fact that we do not take serial gonioscopic photographs—in fact, I know of only a few clinicians who take such photos for documentation purposes.

However, OCT imaging of the anterior segment may give us the ability to do just this: monitor subtle gonioscopic changes over time. With the advent of anterior segment OCT imaging systems, examination of the anterior chamber angle has become somewhat easier to perform than doing gonioscopy, and the detail obtained with such imaging systems is often greater.

To that end, once I realized that this patient's IOP was slowly increasing despite medical therapy, I recently performed OCT of his angles. His anterior segment OCT images were interesting because, while they showed open angles, a good portion of his posterior trabecular meshwork in each eye was partially covered temporally by a roll of iris tissue—something that I could not appreciate gonioscopically.

Could this iris tissue be contributing to his gradual increase in IOP by impeding his trabecular outflow? It very well might.

Does this information factor into what steps I'll take next if I decide to modify his therapy? It most certainly will. ■


ACADEMY 2013
Seattle
Soar to the Peak of Exceptional Knowledge with the Academy!
Cutting edge education, top-notch speakers, intriguing papers and posters, and exciting social events— all in the exhilarating city of Seattle! Join the Academy in 2013 for another year of unsurpassed education. See you there!
Academy 2013 Seattle
October 23-26, 2013
Washington State Convention Center
Register today! Early bird registration ends August 20, 2013
For more information, visit www.aaopt.org

One Tough Find

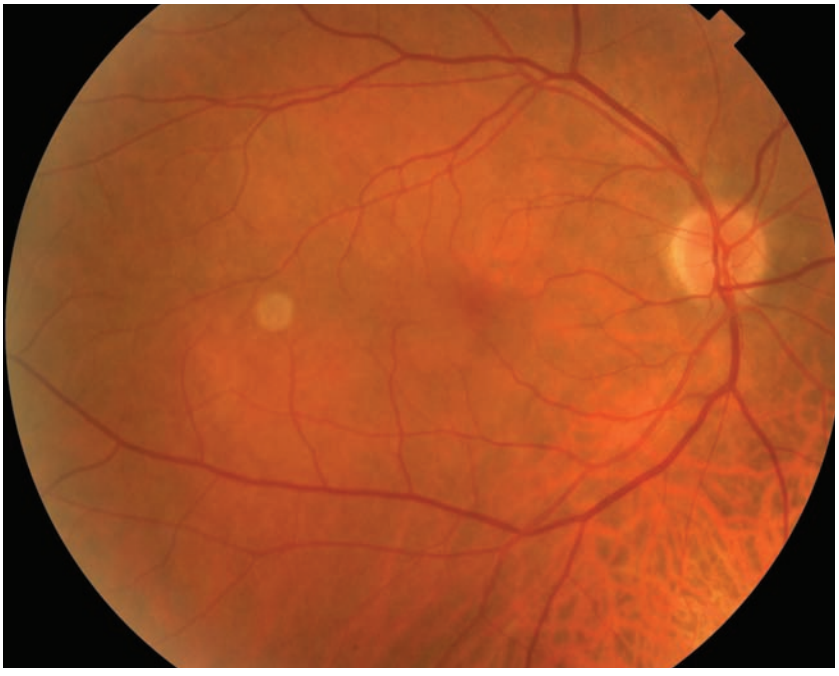
This patient exhibited a retinal presentation so subtle that we almost missed it entirely. Do *you* see it? **By Mark T. Dunbar, OD**

A 68-year-old Hispanic male presented for an annual eye exam. He reported occasional ocular itching, but otherwise was not experiencing any problems. His medical history was significant for hypertension, which he claimed was medically controlled.

On examination, his best-corrected visual acuity was 20/20 OU. Confrontation visual fields were full to careful finger counting OU. His pupils were equally round and reactive, with no evidence of afferent defect. Extraocular motility testing was normal. The anterior segment examination of both eyes was unremarkable. Intraocular pressure measured 15mm Hg OU.

Dilated fundus exam revealed a clear vitreous OU. Both optic nerves appeared healthy, with small cups and good rim coloration and perfusion. The fundus evaluation of the left eye appeared normal, with an unremarkable peripheral retina.

The right macula was normal with a good foveal light reflex; however, we noted a subtle elevation located inferotemporal to the macula along the arcade (*figure 1*). In the same location, the retina exhibited a reddish hue over an area that measured approximately 2DD. We ordered a spectral-domain optical coherence tomography (SD-OCT) scan (*figure 2*) and an ultrasound (*figure 3*) of the right eye.



1. Fundus photograph of the right eye shows an imperceptible change in the retina along the inferotemporal arcade. (Note: The round, white lesion is an artifact.)

Take the Retina Quiz

1. The lesion primarily involves which retinal layer?
   a. Sensory retina.
   b. Bruch's membrane.
   c. Retinal pigment epithelium (RPE).
   d. Choroid.

2. What is unique about the information provided by the SD-OCT scan?
   a. The presence of choroidal fluid.
   b. An extremely deep view into the choroid.
   c. Significant retinal elevation.
   d. Nothing.

3. What is the extent of the lesion's reflectivity?
   a. Too small to determine.
   b. Low internal reflectivity.
   c. Medium internal reflectivity.
   d. High internal reflectivity.

4. What is the correct diagnosis?
   a. Amelanotic nevus.
   b. Choroidal melanoma.
   c. Metastatic lesion.
   d. Choroidal hemangioma.

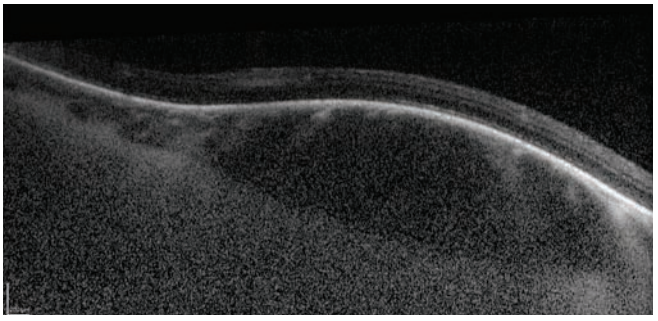
5. How should this patient be managed?
   a. Observation.
   b. Intravitreal anti-VEGF injection.
   c. Plaque radiotherapy.
   d. Photodynamic therapy (PDT).

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™



2. The SD-OCT scan of the lesion located in our patient's right eye. What is unique about this image?

For answers, turn to page 90.

Discussion

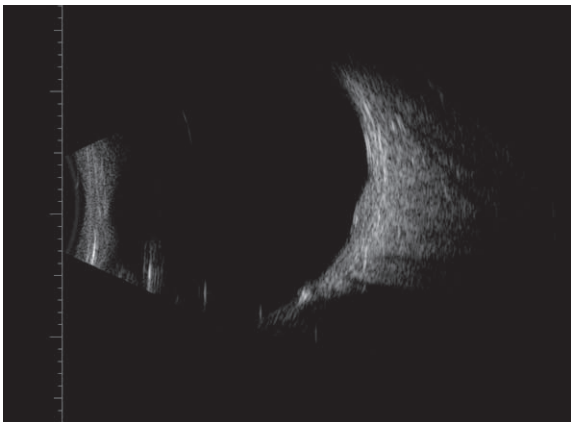
On clinical examination of the right posterior pole, we detected a subtle reddish hue located inferotemporal to the macula along the inferior arcade. This really was noticeable only when looking at the area with indirect illumination. In other words, with the light source directed off to the lesion's side, the affected retina and choroid exhibited a reddish glow.

We determined that this difference in coloration required closer inspection. Upon further evaluation, we detected an extremely subtle elevation of the retina and RPE. It was so subtle that we even questioned the accuracy of our observation. Fortunately, ancillary testing supported our clinical impression. Our primary suspicion was that this defect represented a small choroidal hemangioma.

An "enhanced depth" SD-OCT scan (which images deeper into the choroid) showed an obvious lesion pushing upward on the RPE. The consequent elevation was depicted on the scan as an optically empty space located below the RPE. In comparison to the lesion's clinical appearance, its size and extent were exaggerated on SD-OCT. The scan also revealed no evidence of retinal or subretinal fluid.

Standardized ultrasound is perhaps the most useful diagnostic test for evaluating such a presentation. Unfortunately, our patient's lesion was too small to identify its reflectivity on the A-scan.

However, the B-scan nicely complemented the SD-OCT findings—clearly revealing a dome-shaped lesion that measured slightly less than 1mm thick. Even though the A-scan did not provide definitive confirmation of what the lesion represented, we remained fairly certain that our patient exhibited a small choroidal hemangioma.



3. The B-scan component of our patient's ultrasound. What do you notice?

A choroidal hemangioma is a benign, vascular tumor of the choroid that is composed predominately of large, dilated, thin-walled vessels with minimal stroma. These tumors blend almost imperceptibly with the surrounding choroidal tissue. Usually, they are round or oval, and appear slightly elevated with a subtle, orange-red coloration.[1] They often have indistinct borders, and are more apparent upon binocular indirect ophthalmoscopy. Choroidal hemangiomas typically are located in the posterior pole, within the paramacular area. Some, however, may be found adjacent to the optic nerve or on the nasal side of the disc.

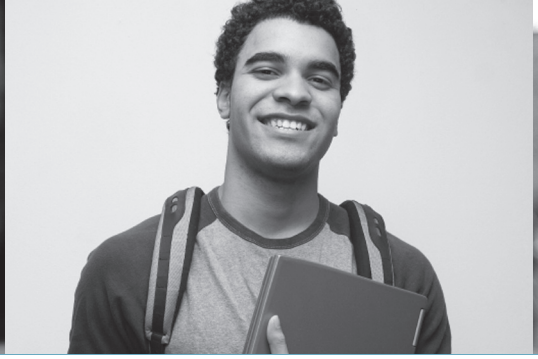
Most patients are asymptomatic and, as a result, the lesion may be discovered as an incidental finding. Interestingly, our patient had been seen several times over the last 10 years for annual eye examinations; however, we never noted this presentation. This likely was due to the extremely subtle elevation and the lack of associated symptoms.

These tumors generally do not grow much in adulthood. Some minor enlargement may occur later in life, but this is thought to result from varicosity and congestion of the large vascular channels.

Symptoms can develop if the lesion is located directly under the macula, or if the individual develops a neurosensory detachment involving the macula. If this occurs, photocoagulation is the traditional intervention of choice. Additionally, good success has been attained with newer, less invasive treatments, such as PDT and intravitreal anti-VEGF therapy. Nevertheless, most patients do not require treatment.

We explained the findings to our patient and asked him to return in four to six months to ensure that the lesion had not progressed. ■

1. Agarwal A. Neoplastic Diseases of the Choroid. In: Gass' Atlas of Macular Diseases, 5th ed. Philadelphia: Elsevier Saunders; 2012:1206-53.

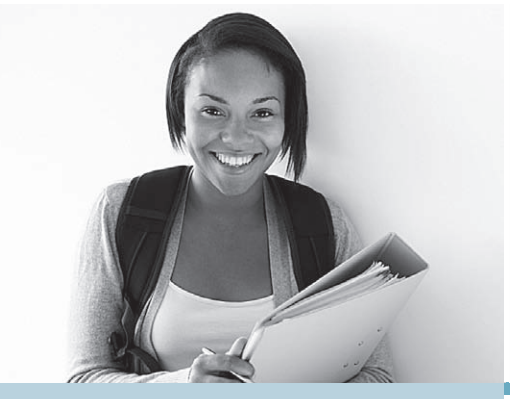




The Rick Bay Foundation

for Excellence in Eyecare Education

www.rickbayfoundation.org

Support the Education of Future Healthcare & Eyecare Professionals



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.

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.

Interested in being a partner with us?

Visit www.rickbayfoundation.org

THE RICK BAY FOUNDATION
for Excellence in Eyecare Education

Simbrinza's Ready for Action

Here, we review the efficacy and safety of this newly approved, fixed-combination glaucoma agent. **By Joseph W. Sowka, OD, and Alan G. Kabat, OD**

A 61-year-old male presented for a glaucoma consultation at the request of his local optometrist. The man had primary open-angle glaucoma for many years, and the resultant damage was more advanced in his right eye than his left eye. While his visual acuity measured 20/20 in each eye, his right visual field was damaged extensively (10° central field).

His untreated intraocular pressure (IOP) was 28mm Hg OD and 26mm Hg OS. It was believed that his target IOP should be less than 18mm Hg OU. Previously, he had achieved this target successfully with a prostaglandin analog (PGA); however, during the course of his care, he developed anterior uveitis twice in his right eye. The uveitis was successfully treated each time, but there was concern that the use of a PGA may have contributed to the associated inflammation. The patient's referring optometrist decided that PGAs should be avoided entirely due to his history of recurrent uveitis, and wanted an opinion regarding the next course of therapy.

When faced with a glaucoma patient who cannot use a PGA, we have to consider alternate therapies that offer a similar ability to reduce IOP. Glaucoma monotherapy often does not equate to the IOP reduction demonstrated by PGAs. Therefore, combination medications typically are the best option for such patients.

Until now, however, all available combination medications in the US have employed a beta blocker as one of their components—making these agents unsuitable for some patients. But, the recent FDA approval of Simbrinza (brinzolamide 1.0% and brimonidine 0.2%, Alcon) fundamentally changes the game.

A Word on Combination Glaucoma Meds

Fixed-combination medications that lower IOP often are used to treat glaucoma and ocular hypertension because they offer several potential advantages over the combined use of separate medications. These include: enhanced convenience, improved adherence, reduced exposure to preservatives and potential cost savings. Additionally, fixed combination agents reduce IOP more effectively than their component medications when used separately as monotherapy.[1]

Even with the advent of PGAs, many patients need two or more medications to achieve the desired therapeutic effect. In the Ocular Hypertension Treatment Study, nearly 40% of patients required two or more medications to achieve a target pressure reduction of 20% over five years.[2] As more patients require multiple medications, the use of combination medications has become more commonplace.

Simbrinza

Simbrinza received FDA approval in April 2013. It is a topical ophthalmic suspension that combines a carbonic anhydrase inhibitor (brinzolamide 1%) with an alpha-2 adrenergic agonist (brimonidine 0.2%). It is approved and marketed for the reduction of IOP in patients with open-angle glaucoma and ocular hypertension. As a suspension, patients must shake the bottle prior to its use to ensure proper mixing. The recommended dosing is three times per day, and the bottle size is 8ml to accommodate. Also, Simbrinza is unique in that it is the only fixed-combination glaucoma agent currently available in the US that does not feature a beta blocker.

Because Simbrinza combines two agents, it is important to be aware of potential complications and adverse reactions associated with the use of its components. Brimonidine has been noted to induce a small decrease in blood pressure after dosing. Thus, Simbrinza should be used with caution in patients who have severe cardiovascular disease.

FOR THE HEALTH OF YOUR PATIENTS.
FOR THE HEALTH OF YOUR PRACTICE.

MACULAR DEGENERATION AND NUTRITIONAL SUPPLEMENTS (15 HOURS)

SPECIAL NUTRITION PROGRAM (9 HOURS)

GLAUCOMA (21 HOURS)

NEW GOVERNMENT REGULATIONS & HEALTHCARE UPDATES (9 HOURS)

GUIDED PRACTICE MODULES (6 HOURS)

VISIONOMICS® AND BUSINESS SOLUTIONS (74 HOURS)

OPTICAL BOOT CAMPS (19 HOURS)

PATIENT WELLNESS (12 HOURS)

AND SO MUCH MORE — 350 HOURS OF CONTINUING EDUCATION FOR EVERY ROLE AND EXPERIENCE LEVEL!

FEATURED SPEAKERS:

MARK DUNBAR, OD
Michigan College of Optometry at Ferris State University

STEVEN FERRUCCI
Chief of Optometry at the Sepulveda VA, and Professor, Southern California College of Optometry

DIANA SHECHTMAN, OD
OD, Nova Southeastern University College of Optometry

ARE YOU PRACTICING FULL SCOPE OPTOMETRY?
Expand your knowledge base to practice to the maximum extent your license allows. Focus on three core competencies – disease diagnosis, treatment and management.

THE ONLY EYECARE CONFERENCE TO FOCUS ON BUSINESS SOLUTIONS.
Keep up with relevant practice management trends to ensure your business is utilizing best practices in: processes, technology, efficiency, management tactics, marketing, patient service and staffing.

AN AFFORDABLE SOURCE FOR STAFF TRAINING.
Boot camps and flexible package pricing jumpstart competency and add value. Reduce the learning curve by immersing new staff, and cross-train experienced staff to increase efficiency and customer service.

SHARE YOUR EXPERIENCE!
Refer an optometrist or optician who has never been to International Vision Expo and you will each receive a $100 gift. For reward options and Referral Program eligibility, visit www.visionexpowest.com/referral.

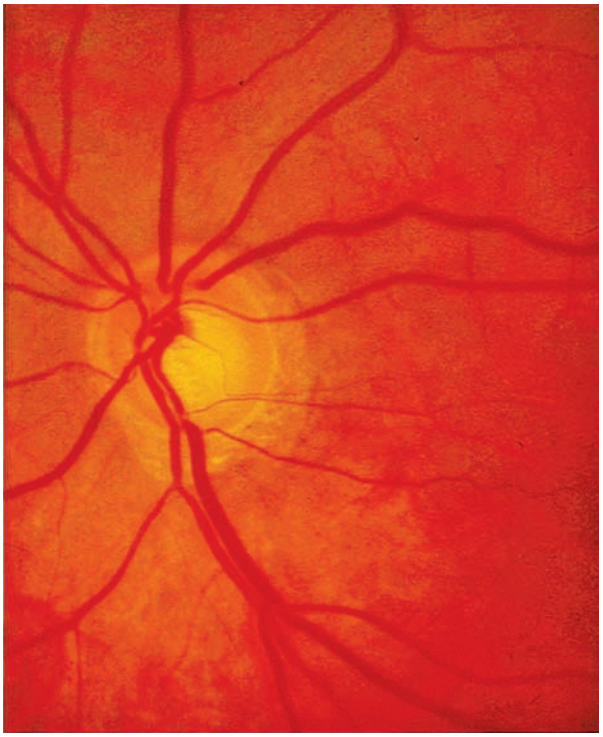
THE COMPLETE
EYECARE
EVENT

25 YEARS
INTERNATIONAL VISION EXPO & CONFERENCE
LAS VEGAS

EXPAND YOUR FIELD OF VISION

EDUCATION: OCTOBER 2–5, 2013
EXHIBITION: OCTOBER 3–5, 2013
Las Vegas, NV | Sands Expo & Convention Center
www.visionexpowest.com/OD

Also, because brinzolamide is a carbonic anhydrase inhibitor, you must exercise discretion in patients who have sulfonamide hypersensitivity. Finally, there is a possibility of inducing corneal edema in patients with low endothelial cell counts (although this complication is not likely to occur in patients with normal corneas).[3]



Patients with primary open-angle glaucoma who have failed prostaglandin therapy may benefit from Simbrinza use.

Efficacy

In two identical clinical studies, researchers determined that Simbrinza yielded a substantial reduction in IOP.[4,5] Both studies enrolled more than 650 patients with open-angle glaucoma or ocular hypertension. After eligibility determination, patients underwent a washout of their existing therapies and were randomized to receive TID dosing of brinzolamide 1.0%, brimonidine 0.2% or Simbrinza. The primary goal was to determine the IOP lowering effect the medications at all study points over a three-month duration. It is important to note that the patient treatment groups were stratified to create a nearly identical untreated baseline IOP, so that no group was favored over another.

The results of both clinical studies indicated that Simbrinza had a greater IOP lowering effect than either of its two components dosed separately. Simbrinza reduced mean IOP by 1.0mm Hg to 3.2mm Hg more than brinzolamide 1.0% and 1.7mm Hg to 2.8mm Hg more than brimonidine 0.2%. In terms of a reduction from baseline, Simbrinza lowered mean IOP between 5.4mm Hg and 8.8mm Hg (21% to 35% respectively).[4,5]

Safety

In clinical trials, Simbrinza exhibited comparable side effects to those already known to be associated with the use of either brinzolamide 1.0% or brimonidine 0.2%—including blurred vision, hyperemia, dry eye, mild ocular irritation and dry mouth.[3-5] The incidence rates of these effects were low and very similar to what has been seen in patients who separately use Simbrinza's component medications. Also, when evaluating its cardiovascular safety profile, researchers noted that there was a very small decrease in resting pulse rate and a clinically insignificant decrease in mean systolic and diastolic blood pressure—again, very similar to what has been seen in those using brimonidine 0.2%.[3-5]

Simbrinza's Role in Glaucoma Therapy

Simbrinza has been approved as an initial, first-line therapy. This is very important for patients who cannot use a PGA. Not only can Simbrinza be used as first-line therapy, but also it can serve as a complete replacement for patients who failed PGA use. While studies of adjunctive use have not yet been published, it can be speculated that Simbrinza also would be effective and beneficial when added to a PGA regimen.

We educated our patient and his optometrist about the newly approved combination therapy, and all agreed that Simbrinza would be the most appropriate therapeutic option. The patient used the medication on a trial basis and tolerated it well, with no adverse effects. Subsequently, his IOP dropped to 16mm Hg OD and 17mm Hg OS—an excellent therapeutic outcome. ■

Drs. Sowka and Kabat are consultants for Alcon, but have no direct financial interest in any products mentioned.

1. Higginbotham EJ. Considerations in glaucoma therapy: fixed combinations versus their component medications. Clin Ophthalmol. 2010 Feb 2;4:1-9.
2. Kass MA, Heurer DK, Higginbotham EJ, et al. The Ocular Hypertension Treatment Study. A randomized trial determines that topical ocular hypotensive medication delays or prevents the onset of primary open angle glaucoma. Arch Ophthalmol. 2002 Jun;120(6):701-13.
3. Simbrinza package insert. Alcon Laboratories. Fort Worth, Texas.
4. Nguyen QH, McMenemy MG, Realini T, et al. Phase 3 randomized 3-month trial with an ongoing 3-month safety extension of fixed-combination brinzolamide 1%/brimonidine 0.2%. J Ocul Pharmacol Ther. 2013 Apr;29(3):290-7.
5. Katz G, Dubiner H, Samples J, et al. Three-month randomized trial of fixed-combination brinzolamide, 1%, and brimonidine, 0.2%. JAMA Ophthalmol. 2013 Jun 1;131(6):724-30.

FES: A Diagnostic Challenge

Patients who present with floppy eyelid syndrome are frequently misdiagnosed. Here's why. **By Paul M. Karpecki, OD, and Diana L. Shechtman, OD**

Floppy eyelid syndrome (FES) is a relatively rare condition that often masquerades as dry eye disease. Patients may exhibit clinical signs of chronic superficial punctate keratopathy (SPK) and meibomian gland dysfunction (MGD), as well as more acute symptoms of ocular dryness and grittiness.

In this month's column, we'll examine the most effective diagnostic and management strategies for FES and its associated ophthalmic complications.

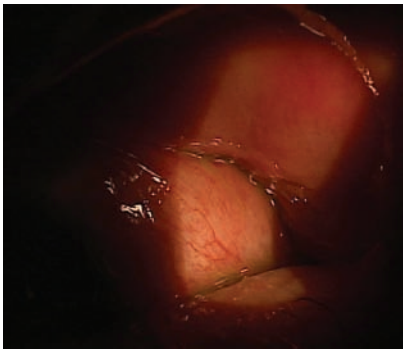
Findings

The lack of tight eyelid closure in patients with FES yields chronic corneal and conjunctival inflammation. This persistent irritation often leads to edema, chemosis, staining and occasional epithelial abrasions.[1]

Everting the upper eyelids frequently reveals an extremely elastic eyelid, and patients may even complain of spontaneous lid eversion. The upper eyelid also may reveal the presence of papillae secondary to chronic trauma.[2]

Many patients with FES may have a genetic or developmental problem that reduces the inherent structural rigidity of collagen or elastin tissues.[3,4]

Multiple studies have indicated that patients with obstructive sleep apnea (OSA) experience a partial collapse of the pharynx when breathing in while sleeping, resulting in loud snoring and gasping for air. Some authors have theorized that, like the upper tarsal plate, the pharynx may lack the necessary structural integrity for proper function.[5,6]



This FES patient exhibited an everted lid.

Other researchers suggest that a high percentage of matrix metalloproteinase enzymes located on the ocular surface and eyelids may, in fact, damage the elastic fibers present in the eyelid.[7]

Further, patients with FES are more likely to develop keratoconus secondary to a potential structural integrity defect or repetitive nocturnal eye rubbing.[8]

Diagnosis

FES is frequently under-diagnosed or misdiagnosed by eye care providers because patients often present with concurrent SPK and advanced MGD. So, you must carefully evaluate the individual for more unique signs and symptoms of FES to help confirm the diagnosis.

For example, be sure to look for a stringy mucous discharge or evidence of severe ocular itch. FES patients also may report a history of corneal abrasions in the complete absence of traumatic insult. Additionally, because of the strong association between FES and OSA, remember to ask the patient about symptoms of fatigue, headache, and sleeping or breathing problems.[8,9]

Management

Treating the symptoms associated with FES may work for mild cases but, as the condition advances, eyelid-tightening surgery typically is required. Initial treatments for the ocular surface inflammation and SPK may include ample lubrication with artificial tears.

For more severe presentations, topical difluprednate 0.5% BID and loteprednol 0.5% QID could be used to control the initial inflammation. Be sure, however, to taper the loteprednol to BID in specific cases that require long-term treatment.

If a corneal abrasion is present, you must treat it with ample lubrication and topical antibiotics before initiating anti-inflammatory therapy. In some instances, the patient may require a bandage lens or overnight patching to help heal the abrasion.

Patients with corneal abrasions also may benefit from the use of bland ointments at night. Additionally, antibiotic ointments (i.e., erythromycin) or corticosteroid ointments (i.e., loteprednol) may encourage rapid healing in highly inflamed cases that exhibit significant papillae.

In severe or non-responsive cases of FES, eyelid tightening surgery often is the only effective treatment option.[10] Following the procedure, you must maintain the best possible ocular surface conditions via artificial tears, punctal plugs and therapeutics for chronic SPK.

Finally, don't forget to manage the associated systemic disease components, including sleep apnea. Refer patients with OSA to a sleep specialist or pulmonologist.[11] Interestingly, OSA management actually may actually help reverse or eliminate the signs and symptoms of FES.[12]

It is also important to be aware of serious ocular findings that are more common in patients with both FES and OSA, including glaucoma and non-arteritic anterior ischemic optic neuropathy.[13]

FES is a rare condition—and typically, it is these less common conditions that are often overlooked or misdiagnosed. Because the symptoms of FES are similar to those associated with ocular surface disease, it makes the diagnosis significantly more difficult to confirm. But, with cautious observation and a thorough differential, you can help identify and manage FES patients early in the disease process and minimize their discomfort. ■

1. Moscato EE, Jian-Amadi A. Floppy eyelid syndrome. Compr Ophthalmol Update. 2007 Mar-Apr;8(2):59-65.
2. Kestelyn P. A rare case of chronic papillary conjunctivitis diagnosed after several years of evolution. Clinical and pathological findings. Bull Soc Belge Ophtalmol. 1993;248:61-6.
3. Karger RA, White WA, Park WC, et al. Prevalence of floppy eyelid syndrome in obstructive sleep apnea-hypopnea syndrome. Ophthalmology. 2006;113(9):1669-74.
4. Lee WJ, Kim JC, Shyn KH. Clinical evaluation of corneal diseases associated with floppy eyelid syndrome. Korean J Ophthalmol. 1996 Dec;10(2):116-21.
5. Netland PA, Sugrue SP, Albert DM, et al. Histopathologic features of the floppy eyelid syndrome. Involvement of tarsal elastin. Ophthalmology. 1994 Oct;10(1)1:174-81.
6. Ezra DG, Beaconsfield M, Collin R. Floppy eyelid syndrome: stretching the limits. Surv Ophthalmol. 2010;55(1):35-46.
7. Schlötzer-Schrehardt U, Stojkovic M, Hofmann-Rummelt C, et al. The pathogenesis of floppy eyelid syndrome: involvement of matrix metalloproteinases in elastic fiber degradation. Ophthalmology. 2005 Apr;112(4):694-704.
8. Ezra DG. The associations of floppy eyelid syndrome: a case control study Ophthalmology. 2010 Apr;117(4):831-8.
9. Waller EA, Bendel RE Kaplan J. Sleep disorders and the eye. Mayo Clin Proc. 2008 Nov;83(11):1251-61.
10. Ezra DG, Beaconsfield M, Sira M et al. Long-term outcomes of surgical approaches to the treatment of floppy eyelid syndrome. Ophthalmology. 2010 Apr;117(4):839-46.
11. Leibovitch I, Selva D. Floppy eyelid syndrome: clinical features and the association with obstructive sleep apnea. Sleep Med. 2006 Mar;7(2):117-22.
12. McNab AA. Reversal of floppy eyelid syndrome with treatment of obstructive sleep apnoea. Clin Experiment Ophthalmol. 2000;28(2):125-6.
13. Abdal H, Pizzimenti JJ, Purvis CC. The eye in sleep apnea syndrome. Sleep Med. 2006 Mar;7(2):107-15.

Product **Review**

Dry Eye

Rhein EyeSolutions

A new line of products and services from Rhein EyeSolutions aims to help patients understand dry eye, encourage visits to an eye doctor and to soothe irritated eyes and eyelids in mild to moderate cases. Available chiefly through eye care practitioners, the line is configured into three categories:

• The ***Inspect*** category consists of an iPhone app and 10x-magnification mirror to help individuals inspect the anatomical features of their eyes and eyelids alongside depictions characteristic of dry eye.

• The ***Help*** products allow patients to regain ocular comfort, to clean the lids and ocular adnexa, and to warm and massage the eyelids.

Items include a warming mask, warming lid massager and lavender towelette lid wipes.

• ***Sustain*** focuses on food and nutrition. The Vision Bar Omega-3 1000 contains 1,000mg of triglyceride derived from omega-3 and organic ingredients identified as potentially beneficial in certain types of dry eye. The Vision Gels Omega-3 1000 nutritional supplement also seeks to sustain eye comfort through dietary augmentation.

The book *Eye Foods: A Food Plan for Healthy Eyes* explains the relationship between nutrition and eye health, and offers dietary advice and recipes.

Rhein EyeSolutions is a new division of Rhein Medical, maker of handheld surgical instruments for ophthalmologists. Visit www.RheinEyeSolutions.com.

Nutraceuticals

Retaine Supplements for Dry Eye Relief

New Retaine OM3 and Retaine Flax dietary supplements from Ocusoft contain a blend of omega-3 and omega-6 essential fatty acids specially formulated to support ocular health in patients with dry eye. Retaine OM3 contains 800mg EPA and 400mg DHA per serving, while Retaine Flax contains flax seed oil—making it ideal for patients who cannot tolerate fish oil-based supplements.

Both supplements are packaged in blister cards to improve compliance and reduce the potential for missed doses. Retaine OM3 is to be taken twice daily and each package contains 60 softgel capsules, whereas Retaine Flax contains 120 softgel capsules and is to be taken four times daily (or as directed by an eye care professional).

Practitioners dispensing from their office can obtain introductory discount pricing on these products; however, patients may also order online directly at www.ocusoft.com/retaine.

Visit www.ocusoft.com.

Lens Autofluorescence Detection

ClearPath DS-120

Freedom Meditech presents the ClearPath DS-120 Lens Fluorescence Biomicroscope, an FDA-approved device that measures autofluorescence by scanning the crystalline lens of the eye with a blue light. A significant number of independent peer-reviewed studies have suggested that elevated lens autofluorescence may be an early indicator of the presence of diabetes.

The noninvasive ClearPath scan is pain free, takes just six seconds and does not require

blood draw or pupil dilation. It produces a quantitative result that is immediately available to the optometrist and patient, and can be electronically transmitted to a patient or referral health care provider, the company says.

The device has a small footprint, sits on a tabletop and employs an easy-to-use touch screen display that can be wirelessly linked to a practitioner's electronic medical records system.

Visit www.freedom-meditech.com.

Ultrasound Biomicroscopy

Compact Touch UBM

With the new Compact Touch Ultrasound Biomicroscopy (UBM) system, physicians can diagnose and obtain measurements of the anterior segment.

This portable diagnostic ultrasound system from Quantel Medical has a number of clinical applications, including artifact-free measurement of the anterior chamber angle in glaucoma, plateau iris, differentiation of tumors and cysts and lens/IOL anatomy.

The platform's high-quality, 50MHz linear scanning technology can visualize structures behind the iris and pigmented tissues, helping the clinician to determine not only the severity of the conditions, but also the underlying cause, the company says.

The Compact Touch UBM was designed for use with the Clearscan sterile probe cover, which simplifies the UBM exam for both the doctor and patient.

Visit www.quantel-medical.com. ■

Meetings + Conferences

August 2013

■ **22-25.** *106th SCOPA Annual Meeting.* Myrtle Beach Marriott Resort & Spa at Grand Dunnes, Myrtle Beach, SC. Hosted by: South Carolina Optometric Physicians Association. CE hours: 21. Visit http://southcarolina.aoa.org.

■ **23-25.** *UAB Continuing Education & Alumni Weekend.* Volker Hall, UAB Campus. Hosted by: UAB School of Optometry, Birmingham, Ala. CE Hours: 18. Contact Candie Bratton at (205) 934-5701 or uabsoce@uab.edu. Visit www.uab.edu/optometry.

■ **24.** *San Antonio Ophthalmic Symposium.* Westin Riverwalk Hotel, San Antonio, Texas. Hosted by: *Review of Optometry*. Contact Lois DiDomenico at ReviewMeetings@Jobson.com or (866) 658-1772. Visit www.revophth.com/saos2013.

September 2013

■ **6-8.** *FCO Annual Educational Conference.* Holiday Inn Resort, Pensacola Beach, Fla. Hosted by: Fellowship of Christian Optometrists. Contact Mike Goen at foreknown@aol.com or (850) 530-9626. Visit www.fcoint.org/services/annualConference.html.

■ **8-9.** *Northeast Optometric Congress.* Westford Regency Inn and Conference Center, Westford, Mass. Email Kathleen Prucnal, OD, at drkaprucnal@msn.com or visit www.oepf.org.

■ **13-15.** *Vermont Optometric Association Annual Meeting.* Hilton Hotel and Conference Center, Burlington, Vt. Hosted by: Vermont Optometric Association. Contact David J. DiMarco, OD, at djd@nveyecare.net or (802) 524-9561.

■ **19-21.** *Envision Conference.* Hyatt Regency Minneapolis, Minneapolis, Minn. Email info@envisionconference.org or call (316) 440-1530. Visit www.envisionconference.org.

■ **19-22.** *GWCO Congress 2013: Focused on the Future.* Oregon Convention Center, Portland. Hosted by: Great Western Council of Optometry. Featured speaker: Jim Trunick, OD. Contact Wayne Oman, deputy director, at gwco@gwco.org or (503) 654-1062. Visit www.gwco.org.

■ **20-22.** *New Technology & Treatments West Coast 2013.* Marriott Del Mar, San Diego. Hosted by: *Review of Optometry*. Contact Lois DiDomenico at ReviewMeetings@Jobson.com or (866) 658-1772. Visit www.revoptom.com/conferences.

■ **20-22.** *44th Annual Colorado Vision Training Conference.* YMCA of the Rockies, Estes Park, Colo. Contact Jamie Anderson, OD, FCOVD, (303) 325-2019 or jamie@highlinevisioncenter.com. Visit www.visioncare.org.

■ **21-22.** *Fall Conference 2013.* Steele Auditorium, NSU Campus, Orlando, Fla. Hosted by: Nova Southeastern University College of Optometry. Program Director: Joseph Sowka, OD. Contact Vanessa McDonald at oceaa@nova.edu. Visit http://optometry.nova.edu/ce.

■ **21-22.** *4th Annual Everything Retina Symposium.* Westin Riverwalk Hotel, San Antonio, Texas. Hosted by: University of Houston College of Optometry. CE hours: 16. Call (713) 743-1900 or visit http://ce.opt.uh.edu/live-events/ers2013.

■ **22.** *CE Forum XVII.* The Hotel Hershey, Hershey, Pa. Hosted by: Central Pennsylvania Optometric Society. CE hours: 6. Email Mary Good, OD, at cposrsvp@gmail.com.

■ **29.** *Glaucoma CE Lecture Seminar.* Western University College of Optometry, Pomona, Calif. CE hours: 8. For more info, email ceoptometry@westernu.edu or call (909) 706-3493. Visit www.westernu.edu/optometry-continuing-education.

October 2013

■ **2.** *6th Annual Prevent Blindness America Swing Fore Sight Golf Tournament.* Bali Hai Golf Club in Las Vegas. Contact Danielle Disch at ddisch@preventblindness.org or (312) 363-6022. Visit preventblindness.org/swingforesight.

■ **2-5.** *International Vision Expo & Conference West 2013.* Sands Expo & Convention Center, Las Vegas. Call (800) 811-7151 or visit www.visionexpowest.com.

■ **4.** *Hudson Valley Optometric Society Fall Seminar.* The Grandview, Poughkeepsie, NY. Hosted by: Hudson Valley Optometric Society. Featured Speaker: Eric Schmidt, OD. CE hours: 5. For more information, contact Brian Powell, OD, at drbrianpowell@gmail.com. Visit www.hvos.org.

■ **6-7.** *SECO London 2013.* Hosted by: SECO International and the Association of Optometrists. CE hours: 12. Visit www.secointernational.com/london-2013.html.

■ **8-12.** *COVD 43rd Annual Meeting.* Rosen Shingle Creek, Orlando, Fla. Hosted by: College of Optometrists in Vision Development. Visit www.covd.org or call (330) 995-0718.

■ **10-11, 11-13.** *VOSH International Meeting/COPR Annual Conference.* Ritz Carlton Hotel, San Juan, Puerto Rico. Hosted by: VOSH International and Colegio De Optómetras de Puerto Rico (COPR). Visit www.covd.org or call (330) 995-0718.

■ **12-13.** *3rd Annual Forum on Ocular Disease.* WDW Swan and Dolphin Resort in Orlando, Fla. Hosted by: PSS EyeCare. CE hours: 18. Contact Sonia at education@psseyecare.com or go to www.PSSeyecare.com and click on "Orlando."

■ **19-21, 23-25.** *CE in Italy: Florence and/or Castiglion Fiorentino, Tuscany.* To register for one or both of these programs, contact James Fanelli, OD, at jamesfanelli@ceinitaly.com or call (910) 452-7225. Visit www.ceinitaly.com.

■ **23-26.** *Academy 2013 Seattle.* Washington State Convention Center, Seattle. Hosted by: American Academy of Optometry. Visit www.aaopt.org/meetings/academy2013.

November 2013

■ **2-3.** *Essentials in Eyecare: Board Certification Preparatory & Optometric CE Program.* Marriott Pittsburgh North, Pittsburgh, Pa. Hosted by: Pennsylvania College of Optometry. CE hours: 16. Email ilene@poaeyes.org or visit http://pennsylvania.aoa.org.

■ **2-3.** *Glaucoma Grand Rounds Program with Live Patients.* Western University College of Optometry, Pomona, Calif. CE hours: 16. For more info, email ceoptometry@westernu.edu or

call (909) 706-3493. Visit www.westernu.edu/optometry-continuing-education.

■ **7-10.** *VOA Voyages in Vision Conference.* Frenchman's Reef & Morning Star Resort, St. Thomas, US Virgin Islands. Hosted by: Virginia Optometric Association. Featured speakers: Andrew Holzman, MD, Jeffrey Michaels, OD, and Kurt Steele, OD. CE hours: 8. For more information, call Bo Keeney at (804) 643-0309. Visit www.thevoa.org.

■ **8-9.** *WOA Primary Care Symposium.* Madison Marriott West Hotel, Middleton, Wis. Hosted by: Wisconsin Optometric Association. Contact Joleen Breunig at joleen@woa-eyes.org or (608) 824-2200. Visit www.woa-eyes.org.

■ **8-9.** *2013 CE Charleston.* Doubletree Suites, Charleston, SC. Hosted by: Pacific University College of Optometry. Contact Jeanne Oliver at jeanne@pacificu.edu or (503) 352-2740. Visit www.pacificu.edu/optometry/ce.

■ **8-10.** *ALOA Annual Convention.* The Wynfrey Hotel, Birmingham, Ala. Hosted by: Alabama Optometric Association. Contact Jo Beth Wicks at jobeth@alaopt.com or (334) 273-7895. Visit www.alaopt.org.

■ **10.** *Virginia Academy of Optometry Annual Educational Conference.* The Inn at Fredricksburg Square, Fredricksburg, Va. Hosted by: Virginia Academy of Optometry. CE hours: 4. Featured speaker: Bruce Onofrey, OD, RPh. For more information, email vaacadoptom@yahoo.com.

December 2013

■ **7-8.** *30th Annual Cornea, Contact Lens & Contemporary Vision Care Symposium.* Westin Memorial City, Houston, Texas. Hosted by: University of Houston College of Optometry. CE hours: 16. For more information, email optce@uh.edu or visit http://ce.opt.uh.edu.

January 2014

■ **11-12.** *Eye Care Associates Annual Meeting and Continuing Education Program.* Williamsburg Hotel, Williamsburg, Va. Hosted by: Eye Care Associates. Presenter: Scott Morris, OD. CE hours: 12. Contact Linda Cavasos at ECA_linda@hotmail.com or (804) 356-5165. Non-members are welcome.

■ **18-20.** *25th Annual Berkeley Practicum.* DoubleTree Hotel, Berkeley Marina, Berkeley, Calif. Hosted by: University of California, Berkeley, School of Optometry. CE hours: 20. For more information, email optoCE@berkeley.edu. Visit http://optometry.berkeley.edu/ce/berkeley-practicum. ■

To list your meeting, please send the details to:

Colleen Mullarkey
Senior Editor/Senior Web Editor
Email: cmullarkey@jobson.com
Phone: (610) 492-1005

Advertisers Index

Review Meetings 2013

SAVE THESE DATES FOR 2013

Join us for 14-15 CE* credits!

Educational Chair: Paul Karpecki, OD

New Technology & Treatments IN VISION CARE WEST COAST

SEPTEMBER 20-22, 2013

Marriott Del Mar, San Diego

NOVEMBER 22-24, 2013

Westin Alexandria, Virginia

For more information: www.revoptom.com/conferences

Please contact Lois DiDomenico with questions at ReviewMeetings@Jobson.com or 1-866-658-1772.

jmi REVIEW® OF OPTOMETRY

cope®

*Approval Pending

Merchandise Offered

Equipment and Supplies

Equipment and Supplies

Merchandise Offered

Professional Opportunities

Equipment and Supplies

Frames

Practice For Sale

Equipment and Supplies

Contact Lenses

Continuing Education

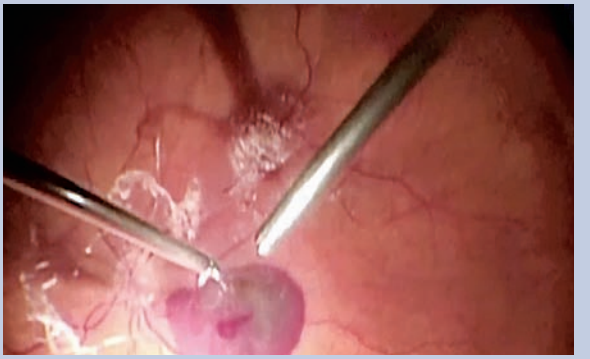
SOFTWARE

Products and Services


Rendezvous With RAMA

Optometrists play a vital role in coordinating intervention among specialists and the GP.

By Derek N. Cunningham, OD, and Walter O. Whitley, OD, MBA



Photo/video of RAMA treatment courtesy of Alan Franklin, MD, PhD.

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

On The Web ›› View a narrated video of subretinal hemorrhage evacuation in RAMA.

Retinal artery macroaneurysm (RAMA) is commonly referred to as an idiopathic, acquired dilation of a major arteriole. It typically occurs after the 6th decade of life and will usually develop within the first three bifurcations from the optic nerve head. It has a strong female predilection and is usually unilateral. Understandably, there is a strong association with hypertension (especially uncontrolled) and arteriosclerotic vascular changes.

Because these bleeds are painless, most patients will be non-symptomatic if the macula is not involved. Nevertheless, many macula-sparing cases of RAMA can be discovered during routine eye exams as well. If the macula is involved, the patient will report a sudden, painless loss of vision. Upon examination, you will observe the presence of characteristic blood in multiple retinal layers, including the preretinal, intraretinal, subretinal and sub-ILM spaces. In some cases, blood can even be present in the vitreous as well.

Macula-sparing RAMA usually can be observed and does not require direct treatment unless persistent edema of subretinal neovascularization is present. Even with mild macular involvement, most patients will spontaneously recover a significant amount of vision without intervention. In all presentations of RAMA, however, systemic risk factors should be addressed and treated appropriately. The optometrist can play a vital role here in patient education and in coordinating care after the initial diagnosis.

Indications for treatment of RAMA include moderate to severe macular involvement, chronic edema or exudative macular changes. Historically, laser photocoagulation has been used to speed recovery by applying treatment directly to the macroaneurysm, surrounding the macroaneurysm, or both.

In 2009, Tsujikawa reported that RAMA can cause destruction of the foveal outer photoreceptor layer, resulting in poor visual outcome.[1] This has led many surgeons to try and evacuate excessive subretinal hemorrhages, as seen in the accompanying video. This is a very tricky surgery that carries a high risk of complications, so it is reserved for cases where lack of intervention would almost certainly lead to poor visual outcome. Notice how the surgeon is working in both the preretinal and subretinal space in this video. The surgeon starts by delaminating the posterior hyaloid with a forceps and the vitrectomy instrument. He then peels the internal limiting membrane and injects tissue plasminogen activator subretinally to liquefy the clot (nicely displayed on video). This procedure will conclude with a partial air/fluid exchange.

This year, there have been several published case reports on the use of anti-VEGF injections to speed the recovery of macroaneurysms, but this treatment is still considered new and unproven.[2] At present, surgical intervention remains the prevailing approach.

There are several treatment options for RAMA if the macula is involved. If you come across this type of hemorrhage in your patient population, proper counseling and appropriate surgical consultation will often result in a high rate of visual recovery. ■

1. Tsujikawa A, Sakamoto A, Ota M, et al. Retinal structural changes associated with retinal arterial macroaneurysm examined with optical coherence tomography. Retina. 2009 Jun;29(6):782-92.
2. Cho HJ, Rhee TK, Kim HS et al. Intravitreal bevacizumab for symptomatic retinal arterial macroaneurysm. AJO. 2013 May;155(5):898-904.

thinkaboutyoureyes.com®

Kid Vision Television

IS NOW NATIONAL!

WILL PATIENTS BE ABLE TO FIND YOUR PRACTICE?

This national public awareness program emphasizes the importance of eye health and annual eye exams and uses television, print, radio, online advertising and social media. Its primary purpose is to direct patients to visit the **Think About Your Eyes** website to find their local member eye care provider.

BE FOUND! JOIN NOW!

STEP 1: BECOME A MEMBER $250 OR $500 PER YEAR

Enroll in a basic or premium membership by visiting thinkaboutyoureyes.com/enroll to be listed on the Dr. locator.

STEP 2: ADVERTISE YOUR PRACTICE

Members can advertise using **Think About Your Eyes** messaging in their local market at favorable rates that are unavailable at a local level! Options include: Online Banner ads, Online TV, Print and Accent Health TV network in MD offices.

Act now to advertise in the 4th quarter!

Eye Fatigue Television

LIST YOUR PRACTICE NOW!

Visit ThinkAboutYourEyes.com/Enroll

Make sure new patients can find you.

SHARE IN RESULTS LIKE THESE!

8% increase in eye exams! *Pilot results

120 more exams per practice per year!

thinkaboutyoureyes.com®

Brought to you by the AOA
American Optometric Association®

Diagnostic **Quiz**

Time to Clean Up

By Andrew S. Gurwood, OD

History

A 43-year-old white man required a bedside consultation for what the intensive care floor attending referred to as "recalcitrant bacterial conjunctivitis OD." The man suffered from multi-organ disease and was intubated, rendering him incapable of providing additional historical information.

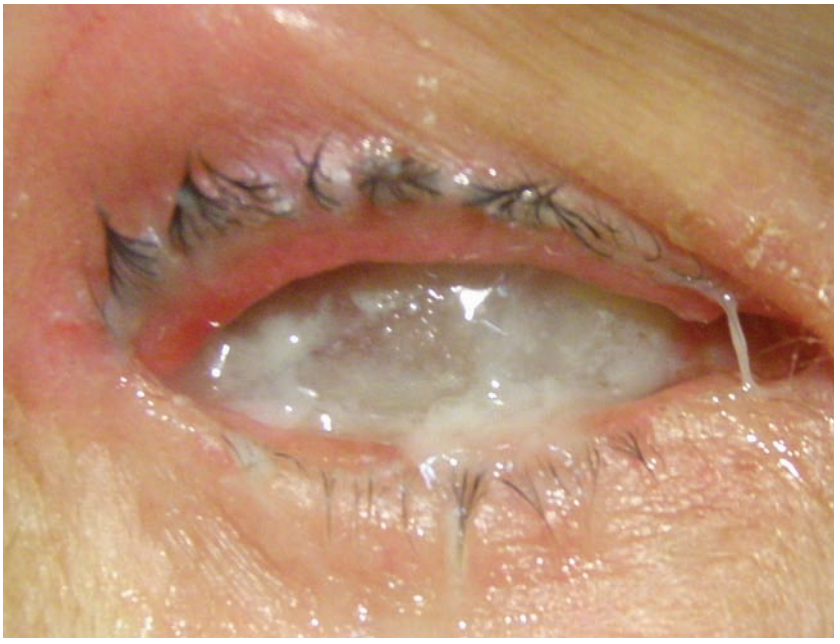
His medical chart indicated that he had hypertension, diabetes, chronic obstructive pulmonary disease and kidney disease. He reported no known allergies.

Diagnostic Data

His pupils were equally round, with no evidence of afferent defect. Extraocular muscle movements were full and unrestricted via doll's eyes (oculocephalic) reflex testing.

His intraocular pressure measured 16mm Hg OS. Slit lamp examination of the patient's left eye revealed normal and healthy anterior segment structures.

Dilated fundus examination uncovered normal posterior poles with healthy and intact peripheries OS. The accompanying photograph reveals a gross exterior view of his right eye.



Exterior view of our 43-year-old patient's right eye. What is your diagnosis?

Your Diagnosis

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

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

Retina Quiz Answers *(from page 69):* 1) d; 2) b; 3) a; 4) d; 5) a.

Next Month in the Mag

- *Optometric Study Center: 'Rare' Ophthalmic Presentations That Aren't So Rare Anymore* (earn 2 CE credits)
- *Case Report: Solar Maculopathy*
- *Learn to Compete with Online Dispensing*
- *Pediatric Frames: How to Stock and Sell*
- *The Clinical Benefits of UV Protection*
- *Front Desk Blunders*

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 2025, SKOKIE, IL 60076. 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 ONLY); OUTSIDE USA, CALL (847) 763-9630 OR FAX (847) 763-9631. PUBLICATIONS MAIL AGREEMENT NO: 40612608. CANADA RETURNS TO BE SENT TO BLEUCHIP INTERNATIONAL, P.O. BOX 25542, LONDON, ON N6C 6B2.

Tonometry Done Right

KAT
Keeler quality.

Pulsair Desktop
Smallest footprint and simple to use!

Purchase a Pulsair Desktop before September 30, 2013 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

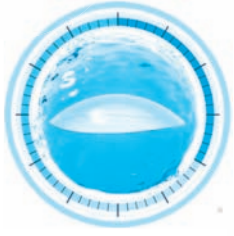
THIS IS WHY YOU CAN give your patients comfort that lasts.

ATTACHING AND
FORMING A HYDROPHILIC ENVIRONMENT
across the surface of the lens[1,2,4]

Proprietary HydraGlyde®
Moisture Matrix

CREATING A UNIQUE BARRIER
that reduces lipid deposition
and removes protein deposits[1-3]

PROVIDING MOISTURE
from morning till night[1,2,4]



OPTI-FREE® PureMoist® MPDS with HydraGlyde® Moisture Matrix

TALK TO YOUR PATIENTS ABOUT THE BENEFITS OF **OPTI-FREE®** BRAND PRODUCTS.
LEARN MORE AT **MYALCON.COM**

REFERENCES:
1. Data on file, Alcon Research Ltd. **2.** Lally J, Ketelson H, Borazjani R, et al. A new lens care solution provides moisture and comfort with today's CLs. *Optician* 4/1/2011, Vol 241 Issue 6296, 42 -46. **3.** Campbell R, Kame G, Leach N, et al. Clinical benefits of a new multi-purpose disinfecting solution in silicone hydrogel and soft contact lens users. *Eye & Contact Lens* 2012:38(2);93-101. **4.** Davis J, Ketelson HA, Shows A, Meadows DL. A lens care solution designed for wetting silicone hydrogel materials. Poster presented at: ARVO; May 2010; Fort Lauderdale, FL.

Alcon®
a Novartis company