As COVID-19 changes practice operations, telehealth is on the rise as a viable option for patients who may not obtain in-person eye care.

Currently, video and telephone-based consultations are garnishing the most attention; however, telemedicine has been making waves in eye care for the past several years, particularly when it comes to the retina.

Guided by the principles outlined by the Early Treatment Diabetic Retinopathy Study (ETDRS), an important function of primary eye care is the grading of diabetic retinopathy (DR) to allow for the appropriate identification of patients with vision-threatening disease. Recently, artificial intelligence and deep learning algorithms began offering alternate or adjunct mechanisms to grade diabetic retinopathy. Neural networks have demonstrated high levels of sensitivity and specificity in the detection of referral-warranted DR from single-field fundus photographs. The application of these algorithms in the management of DR represent opportunities to broadly screen the general population to greater identify disease.
NEW!

**drs**<sub>plus</sub>

**AUTOMATED TRUE COLOR RETINAL IMAGING**

- True color confocal imaging
- Fast image acquisition
- Ultra-high resolution
- No dilation (2.5mm pupil size)

**THE NEXT GENERATION IN RETINA & GLAUCOMA DIAGNOSTICS**

icare | centervue

Scan, call 888.422.7313, email info@icare-usa.com, or visit www.icarecentervue.com

**icare HOME**

**24-HOUR AT HOME TONOMETRY**

- Easy to use
- Remote diurnal IOP curve
- Long term monitoring
- Alert notifications
Moving on into the summer

By Mike Hennessy, Sr.

As our June issue goes to print, the country is opening up even more, and many more ODs are moving beyond non-emergent care. In that vein, this issue is chock full of solid clinical information.

In our cover story this month, Drs. Stacy Potwin and Michael Chaglasian look at pediatric glaucoma and how diagnosis and treatment differs from that of adult patients with the disease. Also featured on our cover this month is a look at how OCT and OCTA show promise in screening for diabetic retinopathy.

Dr. Ernie Bowling offers thoughts on better communication between patients and ODs to promote better contact lens care compliance. Dr. Crystal Brimer shares 11 things her patient wishes her previous OD had told her. Dr. Brimer asked for only 5!

Dr. Jeff Anshel explains the importance of lactoferrin in diagnosing dry eye, and Dr. Vin Dang shows how proper documentation helps ODs obtain prior authorizations for dry eye medications.

Dr. Kerry Salsberg outlines clinical advantages that swept-source and multimodal OCT technologies offer. In addition, in a story from sister publication Medical Economics, Dr. Sandeep Jain discusses using better tools for telehealth success.

Finally, Chief Optometric Editor Dr. Ben Cassella plans to better address contrast sensitivity with glaucoma patients after a patient comment.

Table of contents

**Contact Lenses**

**Patients aren’t hearing contact lens care information**
By Ernie Bowling, OD, FAAO
Doctors and staff need to better communicate recommendations to contact lens wearers 5

**11 things my patient wished her previous OD had told her**
By Crystal M. Brimer, OD, FAAO
Patients clearly want more, not less, information and data from their eyecare providers 9

**Ocular Surface Disease**

**Lactoferrin levels can diagnose dry eye disease**
By Jeffrey Anshel, OD, FAAO
New test allows distinction between causes of symptoms 11

**Proper documentation helps assure prior authorizations**
By Vin T. Dang, OD, FAAO
Newer dry eye medications require approval, and charting helps prove the need 12

**Technology**

**Swept-source and multimodal OCT technologies offer clinical advantages**
By Kerry Salsberg, OD
The expenditure of embracing new technologies is worthwhile 15

**Telehealth success hinges on better tools**
By Sandeep Jain, MD, FCCP, FAASM
Communication and respect for everyone’s time needed, as well 20

**Pediatric**

**Pediatric glaucoma: types, tests and treatments**
By Stacy Potwin, OD, and Michael Chaglasian, OD
The different concerns in pediatric glaucoma compared with adults 1

**Contrast sensitivity manifests in glaucoma patient with no cataracts**
By Benjamin P. Castella, OD, FAAO
A comment from a patient prompts a doctor’s change in testing and discussion 21

**Refractive**

**10 things I wish I knew earlier about vision therapy**
By Marc B. Taub, OD, MSE, FAAO, FCOVD, FAAOP
How to take on the challenge of providing therapy to improve vision 28

**Dermal**

**Resolved cotton-wool spot leaves RNFL defect in its wake**
By Leo Semes, OD, FAAO
Imaging reveals diabetic retinopathy, cotton wool spot, and RNFL defect 30

**Other**

**What a practice owner would advise her younger self**
By Dori M. Carlson, OD
An OD looks back 30 years of running a practice and recommends developing CEO skills 26
Physical and psychological changes of opening post COVID-19

By Benjamin P. Casella, OD, FAAO
Chief Optometric Editor
Practices in Augusta, GA, with his father in his grandfather’s practice
bpcasella@gmail.com
706-267-2972

Proceed with caution. This is one of several mantras I have been attempting to live by lately. As practices begin to “open back up,” the process has been beset with caution. Early on, when the Centers for Disease Control and Prevention (CDC) recommended postponing non-emergent, ODs knew that dipping our toes into the waters of “routine” clinical again would be slow.

For starters, there are the physical barriers to infection and transmission that need to be in place. We all went on shopping sprees for non-contact forehead thermometers, partitions, filters, wipes, gloves, masks, alcohol, hydrogen peroxide. We updated office protocols: health checks for all who enter, people calling ahead or knocking on the door, questions about COVID-19 specific symptoms and travel to regions deemed “hot spots,” frequent sanitation of all surfaces, changes to the flow of the building, and on and on.

I got used to the physicality pretty quickly. We are used to sanitizing surfaces, anyway. I’m not bothered by the mask and glasses. I will say I’m not smart enough to keep the glasses from fogging. I’m thankful for the slit-lamp partition compliments of Zeiss. The air filters aren’t all that noisy. I’m thankful for the slit-lamp partition. The air filters aren’t all that noisy. Not smart enough to keep the glasses from fogging. I’m thankful for the slit-lamp partition compliments of Zeiss.

In my head

What drives me nuts, however, is the psychology of the whole thing. Did I see any silent carriers today? Were my glasses on tight enough? Does my staff take things as seriously outside the office as I mandate at work? How many gloves are sufficient to store up? How long before I’m comfortable seeing more than a patient every hour? What are my bills going to look like as my Payroll Protection Plan (PPP) loan gets spent down? Will I miss checking a box somewhere on the loan forgiveness application and have to pay it all back? Will we have that second spike we keep hearing about?

I’d be lying if I told you these things weren’t all in my head at the time I penned this editorial. Many of these things are in your heads, too, and I want you to know you are absolutely not alone. As far as being a small business owner during all of this, I have felt alone at times. I was recently on a virtual happy hour with 8 friends, and I was the only one who wasn’t working from home. In fact, one friend was quick to say business was better than ever. Instead of counteracting that I had operated on less than 1 percent of my typical patient load for 2 months, I simply said, “Hear, hear.”

My motive is not to be rhetorical and not to solicit answers. It is to be honest with you as my friend in optometry. I firmly believe that brighter days are ahead for us. We are in this together, and it is together that we will overcome. Stay safe, take care, and I sincerely hope to see you soon.

Editorial Advisory Board

Benjamin P. Casella, OD, FAAO
Chief Optometric Editor
Practices in Augusta, GA, with his father in his grandfather’s practice
bpcasella@gmail.com
706-267-2972

Jeffrey Anshel, OD, FAAO
Ocular Nutrition Society
Encinitas, CA

Melissa Barnett, OD, FAAO, FLSLS
UC Davis Medical Center
Sacramento, CA

Sherry J. Bass, OD, FAAO
SUNY College of Optometry
New York, NY

Ernest L. Bowling, OD, FAAO
Editor Emeritus 2012-2017

Crystal Brimer, OD, FAAO
Crystal Vision Services
Wilmington, NC

Michael Brown, OD, MHS-CL, FAAO
U.S. Depart. of Veterans Affairs
Huntsville, AL

Mike Bruijic, OD, FAAO
Premier Vision Group
Bowling Green, OH

Michael A. Chaplaisian, OD, FAAO
Illinois Eye Institute
Chicago, IL

Clark V. Chang, OD, MSA, MSc, FAAO
Wills Eye Hospital
Philadelphia, PA

A. Paul Chous, OD, MA, FAAO
Chous Eye Care Associates
Tacoma, WA

Michael P. Cooper, OD
Solinsky Eye Care
West Hartford, CT

Melanie Benton, OD, MBA, FAAO
Salsbury Eyecare and Eyewear
Salisbury, NC

Marta Faltrykowski, OD, FAAO
Manhattan Eye, Ear and Throat Hospital Ophthalmology
New York, NY

Steven Fersuci, OD, FAAO
Sepulveda VA Ambulatory Care Center & Nursing Home
Sepulveda, CA

Barbara Fluder, OD
Williams Eye Institute
Memphisville, IN

Lisa Frye, ABCC, FAAO
EyeCare Associates
Birmingham, AL

Ben Gaddie, OD, FAAO
Gaddie Eye Centers
Louisville, KY

David L. Geffen, OD, FAAO
Gordon Weiss Schanzlin Vision Institute
San Diego, CA

Jeffry D. Gerson, OD, FAAO
WestGlen Eyecare
Shawnee, KS

Alan Blazej, OD, FAAO
Shady Grove Eye and Vision Care
Rockville, MD

Whitney Hauser, OD
Southern College of Optometry
Memphis, TN

Scott G. Hauswirth, OD, FAAO
University of Colorado School of Medicine
Aurora, CO

James Hill, OD, FAAO
Medical University of South Carolina
Charleston, SC

Milton M. Hom, OD, FAAO
Azuza, CA

David L. Kading, OD, FAAO
Specialty Eyecare Group
Kirkland, WA

Jennifer Lyerly, OD
Triangle Vision Optometry
Cary, NC

Katherine M. Mastrole, MS, OD, FAAO
Hotel Association of New York City
New York, NY

Pamela J. Miller, OD, FAAO, JD
Highland, CA

Andrew S. Morgenstern, OD, FAAO
Walter Reed National Military Hosp.
Bethesda, MD

Mohammad Rafiee, OD, FAAO
Charles Retina Institute
Memphis, TN

Stuart Richer, OD, PhD, FAAO
James Lovell Federal Health Care Facility
North Chicago, IL

John Rumpakis, OD, MBA, FAAO
Practice Resource Management
Lake Oswego, OR

Scott E. Schachter, OD
Advanced Eyecare
Pismo Beach, CA

Lee P. Semes, OD, FAAO
University of Alabama at Birmingham School of Optometry
Birmingham, AL

Diana L. Shectman, OD, FAAO
Nova Southeastern University
Fort Lauderdale, FL

Joseph P. Shovlin, OD, FAAO, DPNAP
Practice Resource Management
Lake Oswego, OR

John Rumpakis, OD, MBA, FAAO
Practice Resource Management
Lake Oswego, OR

Diana Canto-Sims, OD
Buena Vista Optical
Chicago

Joseph Souka, OD, FAAO
Nova Southeastern University College of Optometry
Fort Lauderdale, FL

Tracy L. Schroeder Swartz, OD, FAAO
Madison Eye Care
Madison, AL

Marc B. Taub, OD, MS, FAAO, FCOS
Southern College of Optometry
Memphis, TN

William D. Townsend, OD, FAAO
Advanced Eye Care
Canyon, TX

William J. Tullo, OD, FAAO
TLC Laser Eye Centers/Princeton Toric Optometric Physicians
Princeton, NJ

Thomas A. Wong, OD
State University of New York College of Optometry
New York, NY

Chris Wrenn, OD
Bond-Wrenn Eye Clinic
Hammond, LA
Patients aren’t hearing contact lens care information

Doctors and staff need to better communicate recommendations to contact lens wearers

By Ernie Bowling, OD, FAAO

A
n estimated 45 million U.S. residents enjoy the benefit of contact lens wear, but many of them might be at increased risk for complications stemming from improper wear and care.1

Unlike daily disposable, single-use contact lenses, those with longer replacement schedules must be maintained. Contact lens solutions perform the essential functions of disinfecting, cleaning, and preserving the lenses to prevent infection and improve wearing comfort.2

Patient-doctor disconnect

Far too often, the contact lens care regimen is given too little attention during the annual eye exam. Two surveys conducted to assess contact lens education revealed that one-third (32.9 percent) of contact lens wearers over 18 years of age recalled never hearing any contact lens wear and care recommendations, and only 19.8 percent recalled being told to avoid “topping off” their contact lens solutions.

Yet there is a disconnect between what the patient hears and what the provider says. The same survey reported that the majority of providers stated they shared care recommendations always or most of the time at initial visits, regularly checking up, and at complication-related visits.3

This gap between what providers say and what the patient hears might be a factor in the large proportion of contact lens wearers reporting behaviors that place them at risk for contact lens-related complications.4 Addressing this gap might improve contact lens wear and care practices.

There is a disconnect between what the patient hears and what the provider says

Patient recommendations

So, how does a busy practice accomplish this? Fortunately, there are resources available. The American Optometric Association makes the following recommendations for contact lens wearers:5

- Always wash and dry hands before handling contact lenses
- Carefully and regularly clean contact lenses as directed by your eye doctor. Rub the contact lenses with fingers and rinse them thoroughly before soaking the lenses overnight in multipurpose solution that completely covers each lens
- Store lenses in the proper lens storage case and replace the case every 3 months or sooner. Clean the case after each use, and keep it open and dry between cleanings
- Use only products recommended by your eye doctor to clean and disinfect your lenses. Do not use saline solution and rewetting drops to disinfect lenses—that is not what they are designed to do
- Use fresh solution to clean and store contact lenses. Never reuse old solution. Change contact lens solution according to the manufacturer’s recommendations, even if you don’t wear the lenses daily
- Always follow the recommended contact lens replacement schedule prescribed by your eye doctor
- Remove contact lenses before swimming or entering a hot tub
- See your eye doctor for regularly scheduled contact lens and eye examination

The American Academy of Ophthalmology also has recommendations for contact lens care,6 and the Centers for Disease Control and Prevention also has poster and patient information sheets available.7

Hydrogen peroxide

Finally, a word about an old stand-by: hydrogen peroxide. Despite its well-established disinfection and safety benefits, the use of hydrogen peroxide lens care systems remains low in comparison with multipurpose solution use.8 Hydrogen peroxide care systems currently account for about 25 percent of lens care recommendations by U.S. practitioners.9

Noncompliant contact lens care behaviors are common among multipurpose solution users, including “topping off” solution, failure to rub and rinse lenses, and infrequent lens case cleaning and replacement.10 Hydrogen peroxide lens care systems are easy to use and limit the number of steps necessary to achieve disinfection.

There is evidence of greater compliance with hydrogen peroxide care systems versus multipurpose care systems. A 2007 survey found compliance with directions for use was 100 percent among the users of a one-step hydrogen peroxide lens care system, in comparison with 37 percent among multipurpose system users.11 Hydrogen peroxide lens care systems provide practitioners with a means to address many of the concerns with lens care noncompliance. It definitely has its place in our arsenal of lens care regimens.

REFERENCES


See Contact lens care on page 10
Help your patients with DIABETIC RETINOPATHY (DR), and

HELP DRIVE
PATIENT OUTCOMES

Through early detection, monitoring, and timely referral, you can play a pivotal role in managing your DR patients’ vision.1 3

IF YOU SEE OR SUSPECT DR:

Educate your patients about living with DR and potential treatment options.2 3

Refer DR patients for timely intervention

Follow up to ensure they have visited a retina specialist

INDICATIONS AND IMPORTANT SAFETY INFORMATION

EYLEA® (aflibercept) Injection 2 mg (0.05 mL) is indicated for the treatment of patients with Neovascular (Wet) Age-related Macular Degeneration (AMD), Macular Edema following Retinal Vein Occlusion (RVO), Diabetic Macular Edema (DME), and Diabetic Retinopathy (DR).

CONTRAINDICATIONS

• EYLEA is contraindicated in patients with ocular or periocular infections, active intraocular inflammation, or known hypersensitivity to aflibercept or to any of the excipients in EYLEA.

WARNINGS AND PRECAUTIONS

• Intravitreal injections, including those with EYLEA, have been associated with endophthalmitis and retinal detachments. Proper aseptic injection technique must always be used when administering EYLEA. Patients should be instructed to report any symptoms suggestive of endophthalmitis or retinal detachment without delay and should be managed appropriately. Intraocular inflammation has been reported with the use of EYLEA.


EYLEA is a registered trademark of Regeneron Pharmaceuticals, Inc.

REGENERON

© 2020, Regeneron Pharmaceuticals, Inc. All rights reserved.
777 Old Saw Mill River Road, Tarrytown, NY 10591
• Intravitreal injections, including those with EYLEA, have been associated with endophthalmitis and retinal detachment. Proper aseptic injection technique must always be used when administering EYLEA. Patients should be instructed to report any symptoms suggestive of endophthalmitis or retinal detachment without delay and should be managed appropriately.

WARNINGS AND PRECAUTIONS (cont’d)

• Acute increases in intraocular pressure have been seen within 60 minutes of intravitreal injection, including with EYLEA. Sustained increases in intraocular pressure have also been reported after repeated intravitreal dosing with VEGF inhibitors. Intraocular pressure and the perfusion of the optic nerve head should be monitored and managed appropriately.

• There is a potential risk of arterial thromboembolic events (ATEs) following intravitreal use of VEGF inhibitors, including EYLEA. ATEs are defined as nonfatal stroke, nonfatal myocardial infarction, or vascular death (including deaths of unknown cause). The incidence of reported thromboembolic events in wet AMD studies during the first year was 1.8% (32 out of 1824) in the combined group of patients treated with EYLEA compared with 1.5% (9 out of 595) in patients treated with ranibizumab; through 96 weeks, the incidence was 3.3% (60 out of 1824) in the EYLEA group compared with 3.2% (19 out of 595) in the ranibizumab group. The incidence in the DME studies from baseline to week 52 was 3.3% (19 out of 595) in the combined group of patients treated with EYLEA compared with 2.8% (8 out of 287) in the control group; from baseline to week 100, the incidence was 6.4% (37 out of 578) in the combined group of patients treated with EYLEA compared with 4.2% (12 out of 287) in the control group. There were no reported thromboembolic events in the patients treated with EYLEA in the first six months of the RVO studies.

ADVERSE REACTIONS

• Serious adverse reactions related to the injection procedure have occurred in <0.1% of intravitreal injections with EYLEA including endophthalmitis and retinal detachment.

• The most common adverse reactions (≥5%) reported in patients receiving EYLEA were conjunctival hemorrhage, eye pain, cataract, vitreous detachment, vitreous floaters, and intraocular pressure increased.

Please see Brief Summary of Prescribing Information on the following pages.
BRIEF SUMMARY—Please see the EYLEA full Prescribing Information available on HCPEYLEAUS for additional product information.

1 INDICATIONS AND USAGE
EYLEA is a vascular endothelial growth factor (VEGF) inhibitor indicated for the treatment of Neovascular (Wet) Age-Related Macular Degeneration (AMD); Macular Edema Following Retinal Vein Occlusion (RV0); Diabetic Macular Edema (DME); Diabetic Retinopathy (DR).

2 CONTRAINDICATIONS
2.1 Ocular or Pericellular Infections
EYLEA is contraindicated in patients with ocular or pericellular infections.

2.2 Active Intravitreal Inflammation
EYLEA is contraindicated in patients with active intravitreal inflammation.

2.3 Hypersensitivity
EYLEA is contraindicated in patients with known hypersensitivity to aflibercept or any of the excipients in EYLEA. Hypersensitivity reactions may manifest as rash, pruritus, urticaria, severe anaphylactic/anaphylactoid reactions, or severe intravitreal inflammation.

3 WARNING AND PRECAUTIONS
3.1 Endotheliopathies and Retinal Detachments
Interruption of treatment, including those with EYLEA, have been associated with endotheliopathies and retinal detachments [see Adverse Reactions (6.4)]. Proper aseptic injection technique must always be used when administering EYLEA. Patients should be instructed to report any symptoms suggestive of endotheliopathies or retinal detachment without delay and should be managed appropriately [see Patient Counseling Information (5.7)].

3.2 Increase in Intraocular Pressure
Acute increases in intraocular pressure have been seen within 60 minutes of intraocular injection, including with EYLEA [see Adverse Reactions (6.1)]. Sustained increases in intraocular pressure have also been reported after repeated intravitreal dosing with vascular endothelial growth factor (VEGF) inhibitors. Intraocular pressure and the perfusion of the optic nerve head should be monitored and managed appropriately.

3.3 Thromboembolic Events
There is a potential risk of arterial thromboembolic events (ATEs) following intraocular use of VEGF inhibitors, including EYLEA. ATEs are defined as any acute, nontraumatic, ischemic or hemorrhagic, or vascular death (including death of unknown cause). The incidence of reported thromboembolic events in late AMD studies during the first year was 1.8% (32 out of 1824) in the control group (compared with 0.6% in patients treated with EYLEA). ATEs were noted in 2.9% (59 out of 2071) in the EYLEA group compared with 2.1% (66 out of 3105) in the control group. The incidence in the DME studies from baseline to week 52 was 1.9% (19 out of 578) in the combined group of patients treated with EYLEA compared with 2.8% (8 out of 291) in the control group; from baseline to week 100, the incidence was 4.4% (52 out of 1178) in the control group and 2.3% (12 out of 527) in the treatment group. There were no reported thromboembolic events in the patients treated with EYLEA in the first 6 months of the RVO studies.

4 ADVERSE REACTIONS
The following potentially serious adverse reactions are described elsewhere in the labeling:

• Hypersensitivity [see Contraindications (4.1)]
• Endotheliopathies and retinal detachments [see Warnings and Precautions (5.1)]
• Increase in intraocular pressure [see Warnings and Precautions (5.2)]
• Thromboembolic events [see Warnings and Precautions (5.3)]

4.1 General Adverse Reactions
4.1.1 Adverse Reactions Observed in ≥1% of Patients Treated with EYLEA Following Intravitreal Injection

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>EYLEA (N=287)</th>
<th>Active Control (N=595)</th>
<th>Baseline to Week 52</th>
<th>Baseline to Week 96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctival hemorrhage</td>
<td>5%</td>
<td>6%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>Injection site hemorrhage</td>
<td>2%</td>
<td>3%</td>
<td>3%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Lacrimation increased</td>
<td>1%</td>
<td>2%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Injection site pain</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Corneal epithelium defect</td>
<td>4%</td>
<td>5%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Ocular hyperemia</td>
<td>4%</td>
<td>8%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Intraocular inflammation</td>
<td>2%</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Vitreous detachment</td>
<td>6%</td>
<td>6%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Cataract</td>
<td>7%</td>
<td>7%</td>
<td>13%</td>
<td>10%</td>
</tr>
<tr>
<td>Vision blurred</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Foreign body sensation in eyes</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Conjunctival hemorrhage (or erosion)</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Retinal pigment epithelium tumor</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Retinal reattachment</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Less common adverse reactions reported in <1% of the patients treated with EYLEA were hypersensitivity, retinal tear and endophthalmitis.

Macular Edema Following Retinal Vein Occlusion (RV0). The data described below reflect 6 months exposure to EYLEA with a 2-mg dose in 2 double-masked, controlled clinical studies (VIVID and VISTA) and 9 patients following RVO in one clinical study (VIBRANT).

### Table 1: Most Common Adverse Reactions (≥5%) in Wet AMD Studies

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>EYLEA (N=287)</th>
<th>Active Control (N=595)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctival hemorrhage</td>
<td>26%</td>
<td>11%</td>
</tr>
<tr>
<td>Injection site hemorrhage</td>
<td>8%</td>
<td>5%</td>
</tr>
<tr>
<td>Corneal epithelium defect</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Injection site pain</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Ocular hyperemia</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Intraocular inflammation</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Vitreous detachment</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Cataract</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Vision blurred</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Foreign body sensation in eyes</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Conjunctival hemorrhage (or erosion)</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

### Table 2: Most Common Adverse Reactions (≥5%) in RVO Studies

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>EYLEA (N=287)</th>
<th>CRVO (N=170)</th>
<th>BRVO (N=182)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctival hemorrhage</td>
<td>26%</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>Injection site hemorrhage</td>
<td>8%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Corneal epithelium defect</td>
<td>5%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Injection site pain</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Ocular hyperemia</td>
<td>3%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Intraocular inflammation</td>
<td>2%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Vitreous detachment</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Cataract</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Vision blurred</td>
<td>2%</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Foreign body sensation in eyes</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Conjunctival hemorrhage (or erosion)</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Table 3: Most Common Adverse Reactions (≥5%) in DME Studies

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>EYLEA (N=170)</th>
<th>EYLEA (N=287)</th>
<th>Control (N=287)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctival hemorrhage</td>
<td>26%</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>Injection site hemorrhage</td>
<td>8%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Corneal epithelium defect</td>
<td>5%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Injection site pain</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Ocular hyperemia</td>
<td>3%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Intraocular inflammation</td>
<td>2%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Vitreous detachment</td>
<td>6%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Cataract</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Vision blurred</td>
<td>2%</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Foreign body sensation in eyes</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Conjunctival hemorrhage (or erosion)</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Less common adverse reactions reported in <1% of the patients treated with EYLEA were hypersensitivity, retinal detachment, retinal tear, corneal edema, and injection site hematoma. Safety data observed in 269 patients with nonproliferative diabetic retinopathy (NPDR) through week 52 in the PANORAMA trial were consistent with those seen in the phase 1 VIVID and VISTA trial (see Table 2 above).

5 IMMUNOLOGIC RESPONSE
As with all therapeutic proteins, there is a potential for an immune response in patients treated with EYLEA. The immunogenicity of EYLEA was evaluated in an open-label extension study in patients with nonproliferative diabetic retinopathy in any eye at baseline or who had a diabetes-related retinopathy with a mean visual acuity of at least 20/200 in any eye at baseline. The patients received aflibercept subcutaneously every 4 weeks beginning at week 52 through week 100. The immunogenicity data reflect the percentage of patients whose test results were considered positive for antibodies to EYLEA in immunoadsorbed samples. The detection of an immune response is highly dependent on the sensitivity and specificity of the assays used, sample handling, timing of sample collection, concomitant medications, and underlying disease. For these reasons, comparison of the incidence of antibodies to EYLEA with the incidence of antibodies to other products may be misleading.

Eylea is a registered trademark of Regeneron Pharmaceuticals, Inc. © 2021, Regeneron Pharmaceuticals, Inc. All rights reserved.
11 things my patient wished her previous OD had told her

Patients clearly want more, not less, information and data from their eyecare providers

Perhaps we should keep in mind that though glasses, contact lenses, dilation, pressure checks, and refractions may be fun for us (or not), they are definitely not enjoyed by patients. So, let’s start talking up the importance of sun protection! It is an area that is seen as both functional and fashionable. Many patients also see sunglasses as something extra they are doing to be good to themselves versus the functional necessity of contact lenses and back-up glasses. Sunglasses are a breath of fresh air.

EDUCATE ME ABOUT THE IMPORTANCE OF NUTRITION IN CARING FOR MY EYES
She also wants to know what foods to incorporate into her diet, how much, how often, and why? Again, I am so excited that a patient wants to hear this! But I fear that in many offices, patients want to know more than the doctor is equipped to answer when it comes to nutrition.

Nutrition is very trendy among younger generations. It is common for young patients to be into the effects of nutrition on all aspects of the body. Older generations also have an interest in nutrition, mainly for the preservation and recovery of the body.

This puts pressure on ODs to continually learn more and be able to provide information to patients. We have long been accustomed to recommending Age-Related Eye Disease Study (AREDS) supplements and more recently, omega supplements, to specific patients.

But I challenge optometrists to create more holistic value into their care by spending a couple of hours researching foods that are beneficial to patients.

EDUCATE ME ON THE IMPACT OF LONG-TERM CONTACT LENS WEAR
She wanted to know if her eyes need a break, when to call.

Another great question! It motivates me to create a postcard or rack card to educate contact lens patients on the importance of good care solutions, proper care, what to do before calling, and when to call.

It is also reminder to have a triage card at the front desk to guide staff when a caller needs to be seen emergently, urgently, or at the next available opening. This is especially important when the doctor is not in the office because once the patient calls, the practice is liable for what is said.

EDUCATE ME ON PREVENTATIVE THINGS I CAN DO TO KEEP MY EYES HEALTHY, LIKE TEA TREE EYEWASH
Disclosure: This came closely following a breakout of lice at her child’s school.

Many times, ODs focus energy educating the “entitled” contact lens wearer who believes there are no consequences for abusing lenses. ODs can become labored by repetitive discussions with such a patient.

If nothing more, perhaps this patient’s comment can serve as a ray of hope and encouragement to not become cynical and to keep learning and digging for more ways to educate patients because they generally do want to be healthy and proactive.

When should I call my eye doctor if I think I have scratched my eye or have redness?
The patient’s pre-existing belief was that she just needed to rinse and rest. But still, she wondered how to judge that (particularly on a weekend when she can’t get in touch with her doctor).

Another great question! It motivates me to create a postcard or rack card to educate contact lens patients on the importance of good care solutions, proper care, what to do before calling, and when to call.

It is also reminder to have a triage card at the front desk to guide staff when a caller needs to be seen emergently, urgently, or at the next available opening. This is especially important when the doctor is not in the office because once the patient calls, the practice is liable for what is said.

EDUCATE ME ON THE IMPORTANCE OF SUNGLASSES FROM INFANCY TO ELDERLY
I love that she added “from infancy to elderly.” Not unlike many of our patients, she cares for two children and elderly parents, and she wants to be a responsible caregiver. Additionally, remember that the mother is the CEO of the house. One piece of advice: Never forget her nurturing and logistical obligations because they make up what and who she represents to your practice.

We need a way to communicate with our patients that does not automatically put them on the defense

ODs often incentivize patients to add sunwear to their contact lens purchases. It is a target in many offices, but it still gets overlooked among the hustle and bustle.

I recall another patient conversation in which, despite our yearly persuasion attempts, it was the patient’s buddy’s cool sunglasses that motivated him to finally get a pair of glasses at all, enabling him to reduce his contact lens wear time and dependence.

Contact Lenses

By Crystal M. Brimer, OD, FAAO

ODs often talk about the state of the contact lens industry and patient behavior in an attempt to shape healthy habits. Positive clinical outcomes occur when ODs identify noncompliance hurdles before they appear, and steer patients clear of them.

Therefore, it is important that optometrists occasionally spend time connecting with patients to determine where gaps in knowledge lie. Doing so lets us discover our strengths and weaknesses and helps us become better educators.

I recently asked a contact lens wearer to tell me 5 things she wished her eye doctor had told her during previous visits. She replied not with 5—but with 11!

The most significant takeaway from our discussion was this: The topics that interested her most were the topics ODs address the most.

I asked her to rank them in order of importance.

Perhaps we should keep in mind that though glasses, contact lenses, dilation, pressure checks, and refractions may be fun for us (or not), they are definitely not enjoyed by patients. So, let’s start talking up the importance of sun protection! It is an area that is seen as both functional and fashionable. Many patients also see sunglasses as something extra they are doing to be good to themselves versus the functional necessity of contact lenses and back-up glasses. Sunglasses are a breath of fresh air.
Contact Lenses

Contact lens care
Continued from page 5


Dr. Bowling received his Doctor of Optometry and Master of Science in Physiological Optics from the UAB School of Optometry.
erniebowling@icloud.com

We could start with video education in the waiting room and online, but I think one of the best ways is to invest a few hours into writing key messages and printing them to accompany every contact lens exam. If nothing else, it will give the impression that you care about your patients’ wellbeing and wearing success.

Have a triage card at the front desk to guide your staff when a caller needs to be seen emergently, urgently, or at the next available opening.

Updated care
This past year, I have made a lot of changes to the physical appearance and functionality of my practice. Physical changes have transformed the tone of the practice, and this in turn affects patient demeanor. When patients walk through my practice’s door, they experience an undeniable sensation that I care.

I provide bound booklets with information to help them, not only through products and treatments that we offer, but with lifestyle changes that will improve stress levels, quality of sleep, exercise, and diet.

I chose a a three-tiered, good-better-best format for these booklets, which allows patients the option to choose a lesser form of over-the-counter (OTC) treatment or go directly for the best care my office can offer.

This helps keep patient expectations in line with the treatments they have chosen and ensures that patients are constantly aware of the advanced options I offer without me “selling” a specific contact lens or treatment.

I am trying to continually improve, listen to patients, and deliver what they need in a way that will encourage them to listen, absorb, and implement.

Perhaps this will have to be a life-long quest, but I would like to think I can get there sooner than that!
Lactoferrin levels can diagnose dry eye disease

New test allows distinction between causes of symptoms

By Jeffrey Anshel, OD, FAAO

It should come as no surprise to eye-care practitioners who address dry eye in their practices that a nutritional approach to this disorder is effective. Unfortunately, most practitioners do not adequately test for the source of dry eye and instead attempt to offer a “blanket” approach that might or might not work.

However, with proper testing, a comprehensive nutritional approach can be valuable for addressing both aqueous deficient dry eye (ADDE) and evaporative dry eye (EDE). This process would be more expedient if we could distinguish between the two forms quickly and accurately, as well as confirm the diagnosis of dry eye disease (DED) versus allergic conjunctivitis.

Clinical tests

Because there are many causes of DED, it is a challenge to efficiently test for the cause of the disorder. Most practitioners rely on one of the many questionnaires that are available, but these take some time to complete and depend on patient recall of their symptoms. Dry eyes and ocular allergies can have many overlapping complaints, making it more challenging to determine the specific disorder needing therapy.

Many clinical tests are available to determine the source of DED. These include tear film breakup time (TBUT), which determines tear film integrity; Schirmer’s test and Menicon Zone-Quick (phenol red thread) for tear volume; TearLab Osmolarity System (TearLab) for osmolarity; vital dyes rose bengal and lissamine green for cell integrity; lid twitch erythrogram for tear volume; TearLab Osmolarity System (TearLab) for osmolarity; and the Advanced Tear Diagnostics TearScan 300 microassay to measure lactoferrin protein and IgE levels in the tear film.

Evaluating the tear layer involves using more than just one of these tests. Because of the variety of causes and several factors involved in tear film instability, practitioners should incorporate these tests into a pre-examination routine. Any patient who complains of excessive or deficient tearing, redness, irritation, discharge, or any other typical anterior ocular complaint should be screened prior to seeing the doctor.

Getting to the “root”

While much of the media surrounding DED focuses on lipid layer enhancement due to meibomian gland dysfunction, just adding “fish oil” to a tear layer is not adequate to resolve the underlying source of the disease process.

One analogy to consider is a visit to the dentist with a cavity in one tooth. The dentist would not think of just “capping” the tooth without treating the underlying root to address the source of the degeneration. Likewise, simply enhancing the lipid layer of the tears without addressing the “root” of the tear layer (the mucin layer) will not manifest a complete solution to the problem.

Lactoferrin a DED indicator

Lactoferrin is an antiviral, antibacterial iron-binding glycoprotein that is vital to tear production. It is also a mucus-specific anti-inflammatory molecule. Serum lactoferrin is produced by acinar cells in the lacrimal gland and possibly also from tear neutrophils during infection and inflammation. By binding iron, lactoferrin prevents the pathogen from obtaining sufficient iron, which it relies upon for growth.1-3

The name comes from two root words: “lacto,” referring to milk (and specifically “first milk” from lactation); and “ferrin,” referring to its iron-binding nature. Due to its action in mucosal tissue, lactoferrin in tear fluid has been shown to be decreased in DEDs such as Sjögren’s syndrome.1-5 Lactoferrin was found to be negatively correlated to rose bengal staining, indicating that reduced lactoferrin was a marker of ocular surface damage. However, in EDE in the absence of epithelial defects, tear lactoferrin was also found to be reduced.4

A rapid, portable test utilizing microfluidic technology has been developed (TearScan 300 MicroAssay System) to enable measurement of lactoferrin levels in human tear fluid at the point of care, with the aim of improving diagnosis of Sjögren’s syndrome and other forms of DED.6

Lactoferrin’s primary role is to bind to free iron and, in doing so, remove the substrate required for bacterial growth.1 The antibacterial action of lactoferrin is also explained by the presence of specific receptors on the cell surface of microorganisms. Lactoferrin binds to bacterial walls, and the oxidized iron part of the lactoferrin oxidizes bacteria. This affects membrane permeability and results in cell lysis.

Lactoferrin has other antibacterial mechanisms, such as stimulation of phagocytosis.2 It not only disrupts the membrane but can also penetrate into the cell. Its binding to the bacterial wall is associated with the specific peptide lactoferricin, and it is produced by splitting lactoferrin with another protein, trypsin.2,4

Lactoferrin also has antiviral actions. One common mechanism of antiviral activity of lactoferrin is its separation of viruses from their target cells. Many viruses tend to bind to the lipoproteins of cell membranes and then penetrate into the cell.4 Lactoferrin binds to the same lipoproteins, thereby repelling the virus particles. Besides interacting with the cell membrane, lactoferrin directly binds to viral particles.4 Lactoferrin also suppresses virus replication after the virus has penetrated into a cell.1,3 Such an indirect antiviral effect is achieved by affecting natural killer cells, which play a crucial role in the early stages of viral infections.

Lactoferrin and lactoferricin, a similar but different protein, also act as antifungal agents, inhibiting the growth of fungi.6 Lactoferrin also acts against Candida albicans, a form of yeast that causes oral and genital infections.11 Lactoferrin seems to bind the plasma membrane of C. albicans, inducing apoptosis.12

Allergic conjunctivitis is also a common clinical presentation, especially during the spring. While the hallmark of itching can be useful in proper diagnosis, the condition features overlapping symptoms with dry eye. The immune system produces IgE antibodies in allergic reactions. These antibodies travel to cells that release chemicals which cause itching and other reactions. An increased total IgE level indicates that it is likely that a patient has one or more allergies. A test with high specificity can help with diagnosis and treatment protocol.

Summary

Differentiation of severe dry eye versus allergic conjunctivitis is important in a clinical setting. New technology is available to facilitate this process.
Prior authorizations, or PAs, are currently every medical optometrist’s nightmare, but there is hope if you know to plan ahead.

A PA according to the Center for Medicare and Medicaid Services (CMS) is “an approval...before you get care or fill a prescription.” The doctor must contact the patient’s insurance plan to show medical necessary reason for a particular drug or treatment for it to be covered.

Simply put, when ODs decide the medicine our patients need, the insurance is asking, “Do they really need it?” Addressing PAs can become a tiresome and frustrating process for the doctor, the staff, and the patient. However, with proper charting techniques and knowing the right language, ODs may be able to obtain approvals faster, with more consistency, and with fewer appeals.

Medical need

A successful prior authorization process begins long before hitting the e-prescribe button. To prove a clear, medical need for a medication, detailed charting must back up the doctor’s recommendation. A PA can frequently be denied simply for a lack of supporting evidence. The purpose of the PA is to prove all other viable options have been exhausted, and there is a medical need for the medication.

With new medications, therapies, and treatments continually coming to market, it is more important than ever to document any and all prior treatments. From 2016 to 2019, 181 new medications were approved by the FDA, most notably for dry eye Xiidra (lifitegrast 5%, Novartis) and Cequa (cyclosporine 0.09%, Sun Pharma).

The recent increase in PA requests can be linked to increases in medication choices and more Rxs being written, leading to increased costs to medical insurances. Because of this, new medications are held to higher scrutiny during the PA process. By adding additional steps to approve Rxs and requiring generics or lower-cost medications to be used first, insurers reduce upfront costs as well as make it harder to prescribe new medications.

Medications

A well-documented chart ready for PA approval shows that all medications, including over-the-counter (OTC) treatments, have been tried and listed clearly in the chart. Avoid non-specific documentation such as “continue present management.” Note under medications and in chart notes what medication the patient is using. The adage, “If you don’t note it in the chart, it didn’t happen,” applies perfectly here.

Dry eye PAs will often get denied for simple things like not trying over-the-counter tears at a high dosage. The doctor will counter saying the patient has been using them for years, but nothing is noted in the chart—which means there is no documentation to prove that statement.

Make sure doctors, technicians, or other staff write all medications by name and dose—and be specific. Do not list “artificial tears PRN,” or you are guaranteed a denial. Most insurances require documentation of 2 different OTC artificial tears used at least 2 weeks each with a dosage of 4 times a day. Without this documented in the chart, the PA will be denied, the patient will need to return to document failure of previous artificial tears, and the care plan goes backward.

It is important to list in the chart note adverse reactions to medications the patient may have. If the patient cannot handle the stinging from benzalkonium chloride (BAK) or has a preservative sensitivity, note it. This is especially helpful when the insurance company has a preferred formulary that does not work for the patient.

A separate point about medication charting is to describe why the doctor is switching medication. It can be as simple as “Formulary medication ineffective” or “Still dry with tears alone.”
Indication

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

Important Safety Information

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

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

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

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

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

Please see Brief Summary of Prescribing Information on adjacent page.

Prior authorizations
Continued from page 12

When completing the PA, these words can help make the case for the patient.

Testing
Testing is an integral part of charting for dry eye PA approval. In my experience, the more testing to document the condition, the better. At the very least, make sure to evaluate corneal or conjunctival staining with fluorescein or lissamine green and tear break-up time (see Figure 1). Chart notes must show how the patient has responded before and after treatment. This can demonstrate why the patient needs a change in therapy.

List treatments or procedures the patient has used.

The more documentation of failed treatment, the more likely the patient will receive a quick approval. Something as simple as trying and failing warm compresses or punctal plugs can make a difference.

While waiting
Fortunately, most pharmaceutical companies will offer coupons and product samples to help patients through the PA process. Some companies, such as Novartis, have set up an extensive program (Xiidra insider within Asik irisis) to help with cost lowering and PA approval. This company, as well as many others, also offers a patient assistance program to deliver the medication to patients who cannot afford it.

Summing up
With thorough documentation and notes, the PA process can be faster and less frustrating. However, some insurance companies will fight PAs. Clearly document what the patient has tried and why the doctor thinks those treatments have failed. When the insurance company is reviewing charts for keywords to base its approval or denial, it is important to use the terminology it is looking for. Such terminology varies based on the medication, but the insurance company is reviewing charts for keywords to base its approval or denial. It is important to use the terminology it is looking for.

The more documentation of failed treatment, the more likely the patient will receive a quick approval. Something as simple as trying and failing warm compresses or punctal plugs can make a difference.

REFERENCES

Dr. Dang focuses on ocular surface disease and dry eye. He earned his Doctorate of Optometry degree from Southern California College of Optometry. In 2016, he received his Fellowship with the American Academy of Optometry. Dr. Dang is fluent in English, French, and Cantonese and enjoys caring for patients of all ages and backgrounds. When he is not pursuing his passions within eye care, he travels the world with his wife and two young sons. In his free time, Dr. Dang used to play competitive table tennis but has now moved on to pickleball, the fastest growing sport in America. Dr. Dang speak on behalf of Johnson & Johnson Vision Care, Novartis, and ScienceBoard Health.
Swept-source and multimodal OCT technologies offer clinical advantages

By Kerry Salsberg, OD

Contemporary optical coherence tomography (OCT) devices are providing clinicians with incredible visual data, reporting tools, and operational benefits. Although “trading up” comes with a considerable (and often intimidating) price tag, in my experience the clinical and business value inherent to these instruments justifies the expenditure.

The modern OCT devices available today—whether those devices offer swept-source (SS) or spectral-domain (SD) imaging technology—are multimodal, meaning clinicians can capture an incredible amount of information both quickly and easily. In one scan, for instance, ODs can observe a patient’s macular thickness, ocular nerve health, retinal nerve fiber layer (RNFL) thickness, cup-to-disc ratio, and more.

Beyond image acquisition, these systems often come equipped with highly sophisticated reporting functions. Software collates key images and data streams in one place, compares results to normative databases (where possible), and, ultimately, allows ODs to make a diagnostic decision with deep and wide data readily available.

The net sum of this functionality is an enhanced ability to quickly and confidently diagnose and monitor posterior segment and glaucomatous disease, as well as other applications in the anterior segment. Here, I’ll review some of the ways we have put modern OCT to work in our practice.

SS imaging benefits posterior segment

Many physicians use OCT to image, diagnose, and monitor posterior segment disease, such as diabetic macular edema (DME), retinal vein occlusion (RVO), and diabetic retinopathy. In this domain, SS-OCT imaging technologies, which scan at higher speeds and use a longer wavelength light source than SD-OCT devices, provide compelling clinical advantages.

The primary advantage of SS-OCT, as evidenced by recent literature and my own clinical experience, is superior visualization of deep anatomical topography, including the choroid.

SD-OCT, combined with the increased signal-to-noise ratio inherent in SS-OCT, better penetrates ocular tissue and challenging media, such as blood and cataracts, to produce high-resolution images of key posterior segment structures. Although contemporary SD-OCT devices remain capable of capturing detailed images, it is often more cost-effective to invest in the speed and resolution provided by SS-OCT systems.

TAKE-HOME MESSAGE: Investing the time, money and resources in new technologies is vitally important, allowing earlier diagnosis, increasing patient confidence and ensuring that decisions are made based on the best data available.

Figure 1. Small, full-thickness macular hole prompts immediate referral for pars plana vitrectomy.

Figure 2. 12.x9 mm widefield scan collated with B-scan, RNFL, and GCL +/- thickness scans OS.
OCT
Continued from page 15

ING quality, high-fidelity B-scans, SS-OCT offers consistency across a broader range of anatomical structures.

As an added benefit, Topcon’s DRI OCT Triton swept-source device is capable of capturing 12×9 mm widefield scans, helping us assess both disc and macula in one scan.

OCT and glaucoma diagnosis
Another exciting area in OCT application lies in the realm of glaucoma, in which increasingly sophisticated imaging and reporting tools may facilitate confident, early diagnoses. Multimodal platforms available on the market today can produce a wide range of crucial images and data points, providing information we can use to find abnormalities associated with early glaucomatous disease.

More specifically, practitioners experienced at diagnosing glaucoma can use these systems to (among other applications) quantify circumpapillary RNFL thickness, identify defects of the retinal ganglion cell complex (RGCC), and assess optic nerve health. Clinical research has demonstrated that pathological changes to the RNFL and ganglion cell layer (GCL) in the macula can occur before noticeable changes to the optic nerve head and before identifiable visual field (VF) changes, making early, routine diagnostics work-ups valuable.

The reporting capabilities offered by the most recent generation of OCT devices are remarkable in both scope and presentation, and these capabilities are especially pertinent in the area of glaucoma, where clinicians must lean on many data points—many of which, as we are learning, are not directly correlative—to make a confident, early diagnosis. The dense data sets enabled by the scanning speed of SS-OCT devices further strengthen this capability. Modern reporting tools collate a large amount of data and compare data to established normative databases in real time, increasing analytical confidence at the point of care.

Case studies
Macular analysis leads to immediate surgical referral
A female patient, age 46, presented with “blurred vision.” Visual acuity OS registered at 20/40−2. Using our swept-source system’s macula report function, we identified a small, full-thickness macular hole (see Figure 1). We immediately referred the patient for a pars plana vitrectomy. Postoperatively, the patient now sees 20/25+2 OS.

TLC parent company Vision Group Holdings files for bankruptcy

WEST PALM BEACH—LVI Intermediate and 17 of its affiliates including the Laser Vision Institute and TLC Laser Eye Center brands, doing business as Vision Group Holdings, filed for voluntary protection from creditors in Delaware under Chapter 11 of the U.S. Bankruptcy Code.

The filing will facilitate the sale of the company’s business as a going concern. The company’s plan is to quickly transition to a new ownership group through an expected 90-day process and use the time to restructure and strengthen its balance sheet and debt profile, while continuing to operate normally. The company’s investment banking advisor reports strong interest from multiple potential acquirors, including the company’s current financial backers. The company expects to close a sale sometime in September.

“The action we are taking is largely the result of the negative impact that the COVID-19 pandemic has had on the economy,” says Lisa Melamed, interim CEO for Vision Group Holdings.

Based in West Palm Beach, Vision Group Holdings oversees and manages 2 of the leading LASIK surgery providers in the nation: The LASIK Vision Institute and TLC Laser Eye Centers. The company has performed more than 3.2 million LASIK eye procedures and serves multiple markets—63 cities—in the U.S. and Canada.

The planned sale will position the company for future growth, provide access to capital, and cement the company’s position, according to the company.

Melamed confirmed that stay-in-place orders and the mandatory closure of non-essential businesses including elective medical procedures forced the company to close all locations and temporarily lay off most of its team members. She advised however, “while our centers were closed in response to the pandemic, we are excited to report that we have started to reopen and are currently treating new patients.”

“We expect to emerge from the proceedings stronger than ever,” she added. “Already we are seeing strong demand for our services at the centers we’ve reopened.”

IN BRIEF
Suspected glaucoma revealed as nutritional deficiency
Another 46-year-old female patient presented to our prac-
tice without complaint. A fundus exam revealed sub-
teleal optic nerve head (ONH) pallor OU. OCTs revealed
bilateral temporal RNFL thinning as well as bilateral diffuse macular GCL thinning (characterized by reduced average thickness). The patient’s best-cor-
corrected VA was 20/25+2 OD/OS. The patient also exhib-
tited difficulty with color vision testing. No other neuro-
logical symptoms were apparent (Figures 2-5).

The patient is a vegetarian and adhering to a low-cal-
orie diet. The patient was sent for blood tests and results
indicated severely low vitamin B12 levels, most likely
resulting in this optic neuropathy. The patient was imme-
diately placed on weekly intramuscular injections of cya-
nocobalamin for 5 weeks, then oral B12 and folic acid.

Important patient and practice benefits
Beyond raw imaging power and usability, modern OCT
devices provide several advantages in the patient expe-
rience and practice development. Chiefly, the fast image
acquisition speed inherent to newer devices, especially
swpt-swept-source devices, reduces patient chair time. In ad-
terior to expediency, this is typically more comfortable for
patients and also helps reduce the number of “retakes”
required in my experience.

Tangentially, we have found that implementing state-
of-the-art technology increases patient confidence. The
visualization inherent to our SS-OCT device makes patient
education easy and engaging, and we find that patients
often respond well to our perceived technological sav-
iness. As a practice that emphasizes patient–physician
dialogue and constructive consultation, our device has
been a boon in this regard.

From a business standpoint, our device’s rapid speed
and ease of use allows us to provide comprehensive,
high-quality care to more patients in a shorter amount of
time. We are able to accelerate a key part of our work-
flow, meet with more patients, and positively impact our
bottom line.

New horizons for imaging technology
As an eyecare professional who is passionate about deliv-
ering my patients the best care possible, I view the assess-
ment and integration of new technology as imperative.
Although it inevitably costs time and resources to onboard
a new OCT system, the value of new iterations cannot be overstated. Even the most expe-
rienced clinicians benefit from having deep and wide topographical data at their disposal.

Ultimately OCT offers a compelling argument for why clinicians should continue to invest in new and innovative sys-
tems as a whole, and imaging devices in par-

REFERENCES
1. Miller AR, Roisman L, Zhang Q, Zheng F, Rafael
de Oliveira Dias J, Yehoshua Z, Schaal KB, Feuer W,
Gregori G, Chu Z, Chen CL, Kubach S, An L, Stetson
PF, Durbin MK, Wang RK, Rosenfeld PJ. Comparison
between spectral-domain and swept-source optical
coherence tomography angiographic imaging of choroidal
neovascularization. Invest Ophthalmol Vis Sci. 2017
2. Oiso Y, Tan C, Zhang M, Sun X, Chen J. Comparison
of spectral-domain and swept source optical coherence
tomography for angle assessment of Chinese elderly
3. Liu T, Tatham AL, Gracitelli CP, Zangwill LM, Weinreb
RN, Medeirois FA. Rates of retinal nerve fiber layer loss
in contralateral eyes of glaucoma patients with unilateral
progression by conventional methods. Ophthalmology
4. Medeirois FA, Zangwill LM, Bowed C, Mansouri K,
Weinreb RN. The structure and function relationship
in glaucoma: implications for detection of progression and
measurement of rates of change. Invest Ophthalmol Vis
BPI® Blepharospasm and Headache protection!
Say goodbye to light induced headaches!

Reduce your patients’ eyestrain, tension headaches, and migraines


Rose-colored sunglasses. Preliminary research at the University of Utah suggests that specially tinted lenses may help some people with photophobia. Anecdotally, many photophobic patients prefer an FL-41 tint on their sunglasses instead of green or yellow. The FL-41 tint, which has a pinkish look to it, is a mixture of colors that blocks the blue-green wavelengths.

"We randomized patients with Blepharospasm to wearing FL-41 sunglasses for two weeks and then to wearing plain sunglasses for two weeks," said Dr. Katz. "The patients filled out questionnaires at the end of each period. We found that patients with blepharospasm definitely preferred wearing lenses with the FL-41 tint to wearing conventional sunglasses. So there does seem to be some therapeutic benefit." In a new study, the researchers have used electromyography to measure blink frequency, duration and amplitude in blepharospasm patients while they read for five minutes at a time with regular eyeglasses, glasses with a light gray tint or glasses with an FL-41 tint. The results are still being analyzed, but Dr. Katz said they appear to provide more objective evidence that FL-41 does reduce blepharospasm. "FL-41 lenses are non-invasive, they have no side effects and they're not expensive," Dr. Katz added. "So it's a cheap, easy way to improve the lives of these patients, who in some cases are very disabled by their disease."

Be sure glasses block blue-green. FL-41 lenses are available in optical shops, but Dr. Dirci cautioned that some so-called FL-41 lenses are not the real thing. "You really have to know whether the lenses are real or not," she said. "Some lenses can look like FL-41, but they don't act like it. We have done spectral analysis of our lenses to make sure they are blocking the right light."

Newest protection and vision enhancement for color blind patients
**BPI® Diamond Dye 550/570nm™ Cut-Off tint**

**Newest protection and vision enhancement for color blind patients**

BPI introduces another cut off tint, joining the ranks of BPI UV-Blue Barrier 440, BPI Winter Sun 450, BPI Diamond Dye 500/550, and BPI Deep Red Monochrome 600. This red-orange to red tint is beneficial when the short wavelength end of the spectrum (violet, blue green) needs to be blocked. These uses include blue blocking for greater out-of-doors contrast against the blue sky and blocking of blue/violet for ARMD purposes. It may also provide a higher transmittance lens option for red/green color blind patients.

For those seeking a true 550nm cut-off, this tint will reach that point much more quickly than the 500/550 tint.

**BPI® UV - Blue Barrier™ 440 Protective Series**

**Newest protection and vision enhancement for AMD patients**

Sunlight contains UV and blue light. UV light is part of the non-visible light spectrum that we are exposed to every day. It can cause damage to our eyes, particularly the surface and deeper layers of the cornea and the crystalline lens of the eye by cataract formation as well as the increased potential for dry eyes, dryness, and pterygium of the cornea. Blue light, which is part of the visible light spectrum, may also be a cause for concern. It reaches deeper into the eye than the UV and its cumulative energy effect can cause irreparable damage to the retina. Blue light is one of the major causes of damage to our eyes as we age and is an important factor that can cause the worrisome loss of sight-enabling pigmentation in the back of the eye.

**BPI® Diamond Dye 460/510nm™ a new addition to our protective series**

BPI® Diamond Dye 460/510 is a new addition to the therapeutic tint line-up of BPI® UV-Blue Filter Vision 450, Diamond Dye 500/550 and BPI® Diamond Dye 540. BPI® Diamond Dye 460/510 is a cut-off tint which blocks light of wavelength shorter than 460nm when tinted light and values up to 510nm when tinted more darkly. This tint blocks violet/blue in this spectral range very well, and should be helpful in protecting the eye from these light colors, which have been implicated with macular degeneration. This tint does not inhibit seeing the traffic signal colors - it passes the European traffic signal recognition requirements, so it can be used while driving. Since the blue sky is darkened to a gray green when viewed through this tint, sport shooting enthusiasts will find this tint an aid in spotting skeet targets against the sky.

**BPI® Diamond Dye 460/510nm™ Cut-Off tint**

**NEW!**

BPI® Therapeutic tint, 4oz bottle PC: 37887
Tint your own therapeutics or let BPI® do it for you

- BPI® Melanin™, a yellowish-brown tint which mimics the absorption spectrum of natural melanin. This color reduces the destructive high-energy side of the visible spectrum while allowing passage of enough blue light to provide natural perception of color.

- Helpful with brain trauma and also useful for patients with dyslexia, BPI® Omega™ is magenta in color.

- May help patients with dyslexia, BPI® Mu™ needs to be applied to tintable prescription lenses. It is lime green in color.


- Parkinson’s Disease Tremors, BPI® Electric Blue™ has been beneficial to those suffering from tremors such as those sometimes associated with Parkinson’s disease.

- Reduce photosensitive epilepsy seizures with BPI® Deep Blue Zee™. This dark blue tint was found to reduce the number of seizures dramatically in about 95% of the patients using it (see a study in Epilepsia, 2006 Mar;47(3):529-33: “Suppressive efficacy by a commercially available blue lens on PPR in 610 photosensitive epilepsy patients.” by G. Capovilla, et al).

Verify proper tinting densities with a BPI® Spectrometer

- Absolute Spectrum, the intensity of light received at each wavelength, plotted as a graph, and the basis for all other measurements.

- Illuminance, the human perception of the brightness of visible light received at the eye (lux).

- Chromaticity, the color of light based on the wavelengths and intensity that combine to make a color.

- Correlated Color Temperature, the temperature of a black body light source that would produce similar shade of white to the measurement-how blue or red a white light appears.

- Color Rendering, how truthfully a color is shown by the light measured compared to if the color was lit by bright sunlight.

- Flicker, the speed and characteristics of repeated changes in light intensity particularly noticeable with LED lighting or fluorescent.

Choose from 28 digital and analog tinting systems available at BPI®

- Every BPI® lens tinting system includes a free set-up kit. Tints, chemistry and accessories!
- Valued at $250
- Space-saving Mini Tank™ systems
- High production systems
- Computer-controlled & direct heating systems

CALL: 1-800-CALL-BPI  FAX: 1-888-CALL-BPI  BPI USA CALL: 305-264-4465

© 2020 BPI®. All specific names mentioned herein are trademarks of Brain Power Inc® Miami, Fl. The following are registered trademarks with the US Patent Office and with similar offices in other countries: Transchromatic® Solar Surf®, There isn’t a lens we can’t improve®, Safari®; Designed Spectrum® Blue Barrier®; Brain Power Inc®; “BPI®” Buy now, save later®; Dye Hard®; EVA®; Spectracolor®; Safari®; Solar®; The Pll® and Ziplint®. The BPI® bottle shape and design are trademarks of BPI®. BPI® is not responsible for typographical errors. Offers are subject to change without notice. Prices quoted do not include sales tax or shipping charges. Item availability and price are subject to change without notice. OT/ April 2020
Telehealth success hinges on better tools

Communication and respect for everyone’s time needed as well

By Sandeep Jain, MD, FCCP, FAASM

While the practice of telemedicine is hardly a new concept, there is no question that the current COVID-19 health care crisis has jump-started this new approach to patient care.

Due to the virus, it is clear that telemedicine, once viewed as simply a convenience, is now an essential method of treating patients. At its best, telemedicine is an efficient way for doctors to manage time, make appointments, “meet” with patients and next of kin, and provide treatment such as medications, referrals, and further investigations.

However, there is a risk of overwhelming doctors with demands on their time at all hours of the day. The key is in the development of a communications platform that is available to the doctor at all times and yet limits distractions.

New way of communicating

For telemedicine to succeed, a totally new way of communicating is necessary that is direct and respects the patient’s needs as well as the doctor’s time. The communication may be synchronous, as in a video call, or asynchronous, with messaging and sharing information that balances patient convenience with minimal distraction for the doctor.

It is most efficiently implemented through phone apps because everyone—doctors, patients, next of kin, and hospital personnel—are familiar with these devices and use them all the time.

The platform should allow direct communication among doctors in addition to data sharing to reduce data overload and avoid errors

The following are some of the criteria that must be met if the practice of telemedicine is to succeed during the current crisis and beyond:

- All parties should be connected on one platform. Today, doctors use their own electronic health record (EHR) system to conduct telemedicine or traditional medicine, then fax or electronically send their consultations to other doctors. These voluminous notes have to be signed off, even if not urgent, and create more work. At times, the essential point is lost in the long notes written mainly to justify the billing.

- The platform should allow any doctor to send a message about any office or hospital patient to any other doctor on that patient’s care team, no matter what location, organization, or electronic health record. The messages should be prioritized and sent in an optimal way to avoid unnecessarily disturbing that doctor. The receiving doctor should get this message in a delayed but reliable manner to reduce distraction but yet be able to request this message sooner if the need arises. A feature such as this can encourage doctors to opt in to connect with their colleagues and provide timely attention to their patient’s needs without getting overwhelmed.

- The platform should allow direct communication among doctors in addition to data sharing to reduce data overload and avoid errors. Though EHR systems are in the process of becoming interoperable, simply allowing any doctor to access data from other doctors will cause data overload unless the doctors communicate.

- Patients must be an integral of this platform and be able to add all of their health care providers and give consents to encourage communication among their doctors. The patients should share their appointments and treatments with all of their doctors on a single app rather than sign into different portals to connect with different doctors. They can thus encourage their doctors to talk to each other.

- The platform should be usable anytime from anywhere and yet respect the doctor’s time and privacy. Communication with patients should not be limited only to the time a doctor is in the office. The doctors should be able to communicate with patients at all times as necessary and still maintain a record of that communication to add to the EHR later.

- The platform must allow doctors to secure consent from the patient and create a note for the EHR to assure payment from the insurance company, Medicare, or Medicaid.

- Doctors should have access to a platform that allows simultaneous secure video communication with patients inside isolation rooms as well as the next of kin at home during the viral epidemic and beyond. This same platform could be used for hospital rounds to communicate with other doctors and for charge capture.

Extend the visit

This type of practice management and communications app is much more than technology. It gives doctors the ability to “visit” with clients not only during scheduled video appointments but also at other times when a patient needs help but without creating undue distraction to the doctor.

Today, due to the extreme levels of contagion, doctors are likely to make in-office visits short. They are wearing protective equipment that hides the face and limits the ability to “connect” with a patient.

Doctors can use a video chat after the in-office visit to discuss care with patients and family at the same time via app.

While this doesn’t replace the actual face-to-face meetings, it does relieve stress, isolation, and possible depression that COVID-19 patients experience.

The current situation has identified the urgent need for universal distraction-free communication technology that literally allows physicians a connection with their patients and their doctors at their fingertips.
I have spoken to glaucoma patients and suspected glaucoma patients about the risk of visual field loss many times for several reasons. They need to know, they have a right to know, it is part of my fiduciary obligation, and it may improve compliance. I usually end the conversation by saying “if glaucoma goes untreated for long enough, it can affect your central vision, as well”.

A recent conversation with a glaucoma patient of mine led me to the unfortunate conclusion that I really need to rephrase my concluding remarks in this conversation (which I have often).

Initial presentation
A Caucasian male who is now 51 years old first presented to me in 2015 for a comprehensive eye examination. He was a low myope and an early presbyope looking to update his current glasses. Best-corrected visual acuity (BCVA) was 20/20 OU. His family history was noncontributory.

Of note, his intraocular pressures (IOP) were 20 mm Hg OD and 21 mm Hg OS in the early afternoon. Upon posterior segment examination through dilated pupils, his right optic nerve head appeared suspicious for glaucoma with a slightly larger cup than his left optic nerve head. I thought his retinal nerve fiber layer, as examined with the use of a pre-corneal lens and a red-free filter, appeared asymmetric as well. There was no frank history of trauma. I took photos of his optic nerves and invited him back in a week or two for baseline glaucoma testing.

Follow up
He eventually returned in October 2019. He apologized and stated he remembered our conversation about the need for glaucoma testing well but that he had just gotten busy and put it off until the present time. At that visit, his BCVA was 20/20 in each eye. IOPs were measured at 32 mm Hg OD and 16 mm Hg OS in the mid-morning.

Unfortunately, his right optic nerve appeared to be obviously glaucomatous with a vertical cup-to-disc ratio of 0.8 and a clearly evident notch superiorly at 11 a.m. His left optic nerve looked unchanged from his previous exam in 2015. Gonioscopy showed relatively symmetric angles open to the ciliary body OU with mid-pigment. There was no evidence of angle recession. Central corneal thickness values were 533 µm OD and 537 µm OS.

Spectral-domain optical coherence tomography (OCT) studies OU showed a thin ganglion cell complex and diffuse retinal nerve fiber layer thinning OD. The OS study was essentially clear. Visual field studies were conducted, and the OD showed dense arcuate defects superiorly and inferiorly. OS was unremarkable.

I told the patient that he had unilateral open-angle glaucoma OD and that he needed to be treated. He consented to treatment, and I started him on a prostaglandin analog at bedtime OD with a target of 50 percent pressure reduction in that eye.

When he returned in a month IOPs were 14 mm Hg OD and 17 mm Hg OS at the same time of day. The dense arcuate defects in the OD visual field were repeatable, and the OS field remained unremarkable.

Contrast sensitivity is an often-overlooked aspect of one’s visual quality of life

I congratulated him on his right eye’s remarkable response to glaucoma monotherapy and invited him to return again in 3 months for an IOP check. At that visit in February 2020, his IOPs were unchanged. It was at that visit that he intrigued me with a comment and a piece of paper he brought with him.

Contrast sensitivity
This man is a highly intelligent and astute observer.

Contrast sensitivity manifests in glaucoma patient with no cataracts

A comment from a patient prompts a doctor's change in testing and discussion

By: Benjamin P. Casella, OD, FAAO

Figure 1. The print which the patient reported having difficulty seeing with his right eye due to reduced contrast sensitivity.
patients will require significantly more surgeries than adults with glaucoma. Pediatric glaucoma can become agressive very quickly. Children can lose vision from the glaucoma itself but, unlike adults, can have permanent vision loss from amblyopia and corneal scarring that occur before treatment. Treating an infant, child or adolescent with glaucoma requires a team approach, and optometrists have an important role to play.

Childhood blindness occurs in 0.03 percent of children in high-income countries and up to 0.12 percent in undeveloped countries worldwide. Glaucoma accounts for 4.2 to 5 percent of childhood blindness. The main cause of vision impairment in children with glaucoma is amblyopia.2

Primary congenital glaucoma

Accounting for 50 to 70 percent of childhood glaucoma, primary congenital glaucoma (PCG) is the most common form. PCG is diagnosed from birth to early childhood (80 percent in the first year of life). There is reduced aqueous outflow through an abnormally developed filtration angle/trabecular meshwork, which begins to form in the fourth gestational month and reaches adult structure by age 8.1,3 PCG has an autosomal recessive inheritance.4 It is bilateral 70 to 75 percent of the time and can be asymmetric.1,4

Early diagnosis is imperative because PCG can be aggressive, and children can lose vision quickly. Interestingly, if treatment is successfully performed early enough, glaucomatous cupping can actually be reversed, owing to the immature, elastic lamina cribrosa.1,2,4,5

Unlike silent glaucoma in older children or adults, PCG presents as a triad of epiphora, photophobia, and blepharospasm. These symptoms are due to the extremely elevated intraocular pressure (IOP), which causes corneal clouding and buphthalmos at the corneoscleral junction, eventually overburdening the endothelium and leading to Haab striae of Descemet’s membrane. This, in turn, can lead to permanent corneal scarring and vision loss.1,3,5,6

As opposed to adults with glaucoma, whose outflow system becomes faulty over many years of use, children born with faulty drainage systems that cause PCG require surgery as first-line treatment, usually goniotomy or trabeculotomy if the cornea is clear.7 If the cornea is not clear, or if the angle surgeries do not control the IOP, the next step is trabeculectomy or aqueous shunt devices (e.g., Molteno, Ahmed, Baerveldt implants).1

Minimally invasive glaucoma surgery (MIGS) shows emerging potential for reduced trauma to the conjunctiva, preserving this area in a population who may need multiples surgeries, but further investigation is needed.7,8

Cycloablation is the last resort for a blind, painful eye that is refractory to other treatments.1,4,8

Medications are used for PCG as a secondary option. For infants and young children, they can be used to lower IOP and reduce pain and photophobia prior to surgery or in those with only partially successful surgical outcomes.1,4,9 A total of 70 to 90 percent of PCG patients who undergo 1 to 2 procedures after 3 months of age but before 2 years of age are cured of the condition without further surgical or medical intervention.3,5,6

The success rate is lower for those who receive surgery from birth to 2 months of age, most likely due to the more severe filtration anomaly and thus immediate diagnosis and treatment.4 Children with PCG are at a lifelong risk of retinal detachment and increased risk of age-related cataract surgery complications.2

Secondary to cataract removal

The second most common form of childhood glaucoma is secondary to congenital cataract removal. This type of glaucoma is usually open angle and can occur immediately or years after surgery. Anyone who has had congenital cataract surgery is a lifelong glaucoma suspect. The risk of developing glaucoma is 17 percent at 5 years post-surgery and is similar for those receiving initial intraocular implant and those initially left aphakic.1,10

Early cataract surgery is associated with improved visual outcomes but increased risk of glaucoma development. This secondary type of childhood glaucoma is treated first with medications.1,10

Juvenile open-angle glaucoma

The final type of childhood glaucoma is another primary glaucoma, juvenile open-angle glaucoma (JOAG), which is considered to be diagnosed from age 4 to age 35 and accounts for 0.2 percent of glaucomas. This disease has autosomal dominant inheritance and affects 1 in 50,000 people. JOAG is often more severe than POAG and can be markedly asymmetric. Risk factors for JOAG include ocular hypertension (often above 40 mm Hg), being male, myopia (can be significant and progressive from axial elongation), and family history of glaucoma. Patients often present with irreversible optic disc cupping and visual field defects.1,4,5,11,13

Puaberty can make treating JOAG more challenging, with rapid growth and development along with hormonal changes causing IOP to change during this time (usually lowering during puberty, then increasing after).2 Secondary causes of glaucoma (pigment, steroid, inflammation, trauma) should be ruled out before diagnosing JOAG. Often, the diagnosis is made incidentally, but patients can present with a headache, which can be unilateral and severe. The first line of treatment for JOAG is medication. Due to their elevated IOP, these patients require laser or surgical interventions more often than POAG patients.12 Medications used to treat childhood glaucoma are similar to those used for adults, with some differences. Brimonidine (Alphagan P, Allergan), which crosses the blood–brain barrier, is absolutely contraindicated in infants and young children due to central nervous system toxicity. It should even be used in caution in older children and has been shown to not have a significant effect on IOP reduction.1,4,5,9

Beta blockers are often first-line treatment and show a 20 to 30 percent reduction in IOP but are best used at the lowest dose possible and gel formulation; selective betaaxolol (Betopin-S, Alcon) should be considered in children with asthma or other breathing conditions. Topical carbonic anhydrase inhibitors (CAIs) are safer (contraindicated if clear corneal transplant) but not as effective as oral CAIs (contraindicated in infants due to risk of metabolic acidosis) and are usually reserved for short-term use to help clear the cornea prior to angle surgery in POAG.1,4,5,9

Finally, prostaglandin analogs (PGAs), considered first-line treatment in adults, are also well tolerated in children but not as effective. The greatest effect is seen in older children who have been diagnosed with JOAG, who use it as monotherapy.1,4,5,9,14

Children and steroids

Let’s talk more about steroid responders and steroid-induced glaucoma in children. In total, 20 percent or more of children treated with steroids will develop glaucoma, and this glaucoma can be more severe with an earlier onset and more rapid progression as compared to adults. Additionally, the steroid response may not be reversible, and the patient can be asymptomatic. Steroids cause increased IOP by increasing the resistance within outflow pathways. Many ocular conditions in childhood are treated with topical steroids, including uveitis, blepharoconjunctivitis, and vernal keratoconjunctivitis.
Why stop at the last page?

Visit Optometry Times® online.
The magazine in your hands is only the beginning. Breaking news, topic centers, event coverage and engaging partner content make optometrytimes.com an ideal resource for the smart clinician.
Pediatric glaucoma

Topical steroids are the most common cause of steroid response or glaucoma in children. Topical steroids with the lowest effect on IOP are fluorometholone, loteprednol (Lotemax, Alrex; Bausch + Lomb), rimexolone (Voxol, Alcon), and medrysone (HMS, Allergan). An alternative option is topical cyclosporine (Restasis, Allergan; Cequa, Sun Pharma), which has been shown to be effective at treating ocular surface inflammation in children.15

Contrast sensitivity

Continued from page 21

He is an engineer with a PhD. He told me that he didn’t notice his visual field defect at all but that he did have a noticeable and bothersome change to his contrast sensitivity OD.

In fact, he brought in what he considered to be the quintessential demonstration of his complaint, an example of white writing against a yellow background (Figure 1).

He was kind enough to leave this with me so I could test contrast sensitivity on glaucoma patients. I thanked him and told him I would brush up on the topic. He said he will continue to self-monitor the disparity of contrast sensitivity between OD and OS and let me know if there is improvement in the future.

A pertinent negative finding to note is that this patient does not have a cataract in either eye (a potential lurking variable in patients for whom contrast sensitivity is a concern).

His BCVA is normal and symmetrical, and his cornea, aqueous, and vitreous humor are unremarkable.

The effect of glaucoma on contrast sensitivity is well documented.1,4 This parameter of visual function is related to numerous activities of daily living.1 Contrast sensitivity has been postulated to be a likely culprit of visual complaints in glaucoma patients with good visual acuity.2 Indeed, contrast sensitivity is an often-overlooked aspect of one’s visual quality of life.

I often talk about contrast sensitivity with patients with cataracts, but I am going to do a better job of addressing this aspect of glaucoma, as well. I am equipped to test for it, and I am going to do so more often after having this conversation with my patient. I am also going to rework how I explain visual function in glaucoma to include something about contrast sensitivity.

REFERENCES


Examining infants and children

Optometrists are primary ocular health providers and have a responsibility to be aware of these conditions, know what to look for in each age group and population, and when to refer. ODs who are InfantSEE providers may be the first to be aware of changes indicative of PCG, such as large-looking eyes, possibly signifying an abnormally large horizontal corneal diameter.

Abnormal corneal diameters (>11 mm in an infant, >12 mm in a child less than 1 year of age, or >13 mm in any age) are suggestive of glaucoma.

Other signs to be aware of include a cloudy, tearing eye with corneal scarring in a baby who avoids opening her eyes, especially with bright lights. ODs may get the referral from the pediatrician to delineate nasolacrimal duct obstruction or conjunctivitis from PCG.4,4

Start a pediatric exam by first noticing visual behaviors and the appearance of the face and eyes, noting nystagmus or strabismus. ODs may see a child for a pre-kindergarten eye exam and notice that, even with cycloplegic refraction, the child is myopic. Knowing that children should still be hyperopic at that age (any myopic child should be a glaucoma suspect), make sure that IOP is checked and closely evaluate the cornea, iris, and anterior segment after taking a detailed case history.1,4

For infants and young children especially, Icare tonometry will likely be the easiest way to obtain IOP, although it is known to have slightly higher readings than other techniques.10 Tono-Pen (Reichert) is another good option, but it requires numbing. IOP will be higher in a crying, lid-squeezing, breath-holding, or fighting child.2,4,11

Amblyopia is the most common cause of visual impairment in children with glaucoma, and the brain can suppress an eye very quickly at a young age; IOP cannot be the only element treated in childhood glaucoma. Optometrists will also diagnose potential for or already present amblyopia, and treat it with appropriate glasses, patching, and vision therapy.2 ODs can readily diagnose, treat, and manage amblyopia, high refractive error, and necessary contact lens fittings for these patients.

Other beneficial testing includes stereoscopic fundus photos (document abnormalities that can mimic glaucoma such as optic disc pits, tiled discs, optic nerve hypoplasia), visual field testing (not useful until at least age 6, preferably age 8 or older). A handheld slit lamp would also be helpful for evaluating children not old enough to sit in the slit lamp.5,11,12

The pachymetry of children who had congen-
If treatment is successfully done early enough, glaucomatous cupping can actually be reversed, owing to the immature, elastic lamina cribrosa.

Scanning of the optic nerve can be helpful as well, although there is no normative database for ages less than 18 years. Confirmation of larger than average discs (and therefore larger cups) can be documented, and changes over time can be monitored when comparing back to baseline.

Ocular coherence tomography (OCT) has confirmed that the ISNT rule (inferior ≥ superior ≥ nasal ≥ temporal) applies in children. If an OD is suspicious of glaucoma in a child, the decision to treat OHTN to decrease risk is important. The Childhood Glaucoma Research Network (CGRN) can be a resource for anyone who sees pediatric patients. There is information available for parents and caregivers of children with glaucoma, including a visual impairment toolkit and a link to connect with others. Optometrists should not hesitate to seek the support of a pediatric glaucoma specialist, pediatric ophthalmologist, or adult glaucoma specialist for surgical consultation, especially in infants. ODs must remember that children are not just miniature adults and have different clinical considerations as patients.

REFERENCES

Dr. Petrowin has no disclosures.

Dr. Chaglasian is also professor at Illinois College of Optometry and the current president of the Optometric Glaucoma Society. He discloses relationships with Allergan, Bausch + Lomb, Carl Zeiss Meditec, and Topcon.

MCtaglas@icc.edu
What a practice owner would advise her younger self

An OD looks back 30 years of running a practice and recommends developing CEO skills

By Dori M. Carlson, OD

I am intrigued by the articles floating around the internet. One that always makes me pause is related to a theme about what would you tell your younger self. Often, it involves advice about smelling the roses, not sweating the small stuff, traveling more, or advice about life being short and to spend more time with the people you love.

This year will mark 30 years since my optometrist husband and I opened our office in a 500-square-foot space in the basement of the community hospital in our rural part of America. We have since grown to two locations, each occupying a space 8 times that of where we originally started.

We took out loans. We paid them off. We built new offices. We hired more staff and doctors. We took out more loans. We had sleepless nights and worrying over different aspects of the business.

CEO skills

As I look back at those years, I cannot help but pause and wonder what I would tell my younger self as it relates to business. I would say to myself to be more intentional about working “on” the practice instead of “in” the practice.

As doctors, we often believe we must spend all of our time seeing patients. Yes, we know we should delegate, but no one else can see patients, so we must be the ones to generate that income to offset the daily expenses of running a practice.

Several years ago, I started taking time from patient care and began thinking more strategically about running the business. In a sense, I spent time developing my CEO skills.

A while ago, I read the book The CEO Next Door:1 In it, the authors describe how they used predictive software, similar to that used by the Internal Revenue Service (IRS) for predicting if someone will cheat on their taxes. They looked at 17,000 data sets to determine the 4 most common behaviors of successful CEOs:

- Decisiveness
- Reliability
- Adapting to change
- Engaging for impact

They found being decisive as one of the top traits. Some 94 percent of leaders who rated poorly on decisive competency made decisions too slowly rather than too quickly.2 The desire to get it right often prevented them from making any decision at all.

As I read this book, I could think of many colleagues who are paralyzed by perfection. On a personal level, I recently fired an employee who should have been gone long ago. About 30 minutes after I escorted the former staffer out, an employee of 27 years sent me a text with a quote: “Nothing will kill a great employee faster than watching you tolerate a bad one.”

Another behavior identified was being intentional about reasoning for decisions and engaging for impact. In Simon Sinek’s book, Start With Why,3 being able to articulate why you do something, rather than what or how, inspires both employees and customers. Conflict is inevitable, but the more you communicate the reasoning behind decisions, the easier it will be to not only embrace conflict but create loyalty among employees and customers.

The last two behaviors were being consistent in actions and decisions and having the ability to embrace change. Change is inevitable. We are all held captive by our habits. Identify those that hold you back, pick the easiest to change, and let go.

I am a huge fan of John Maxwell’s writings. In his book, Developing the Leader Within You 2.0,4 he writes that all leaders should have a vision. As ODs in the year 2020, it may sound cliché to talk about vision, but I think practices with a vision and mission statements have a clear direction for their businesses. They are the direction that acts as a guiding star for all ODs do in their offices.

If you have not created one for your business, it is easy enough to search the internet for advice to create one. I advise creating one with your team’s input. People will support that which they create.

Vision applies to yourself as well. While ODs might have a vision and mission statement for our businesses, few have one for themselves. Creating your personal vision and mission statements can be a rewarding exercise that allows you to grow as a leader in all aspects of your life.

As part of my master’s program, I had to do such an activity. The process made me pause and think of what was important to me.

Work smarter

So, what would I tell my younger business owner self? I would ask her to take the time to develop her CEO skills. I found that even as little as 2 hours a week spent working “on” the business helped me get more organized, be more efficient, and reduce the stress of running the business. It is about working smarter, not harder.

REFERENCES


Dr. Carlson served as the first woman president of the American Optometric Association. She will earn a MA in leadership in October 2020.

dori.carlson@gmail.com

HOW I HAVE BEEN USING TELEMEDICINE AMID COVID-19

Melanie Denton Dombrowski, OD, MBA, FAAO, started her practice 4 years ago and when COVID-19 happened, her office was shut down for routine care. So, to keep patients safe and improve access to care, she jumped into telemedicine with both feet.

Within 1 day of the American Optometric Association’s (AOA) communication advising all optometrists postpone routine eye care visits, Denton was able to update her practice’s protocol and implement a new approach to eyecare.

Find out how she planned for and incorporated telemedicine into her practice’s operations by going to OptometryTimes.com/Denton_telemedicine
Providing Education for Optometrists

As the official provider for *Optometry Times*, PER® is leading the way in advancing CME, while continuing our tradition of delivering world-class conferences. Whether taking place in-person or virtually, PER® will still provide the same high-impact education clinicians have trusted for more than 20 years.

- **Up-to-date** evidence-based clinical information that can be immediately implemented into patient care
- **Unrivaled interaction** with renowned thought-leaders
- **On-demand** programming that provides access whenever and wherever you need it

Visit gotoper.com/go/OptometryTimes to check out our virtual conferences and webcasts, and we’ll see you in-person soon!
10 things I wish I knew earlier about vision therapy

How to take on the challenge of providing therapy to improve vision

By Marc B. Taub, OD, MS, FAAO, FCOVD, FNAP

Vision therapy is both an art and science. Even though I graduated from optometry school in 2001 and have been teaching vision therapy in an academic setting since completing my residency in 2004, I am still learning. I learn from my colleagues, mentors, students, and, yes, my patients. While I am sure the learning process will continue until the day they pry the Brock string from my dead hands, there are so many things that I wish I knew before I started on this journey.

1. No such thing as too much education

I love learning. I can’t even fathom the number of hours of education that I have taken since graduating, but it was the courses related to vision therapy and pediatrics from which I have learned the most.

I have taken, and taught at, many of the major meetings, and they have excellent 1- to 2-hour educational bites on a variety of topics to whet the beak. It is through organizations like the Optometric Extension Program Foundation (OEPF), College of Optometrists in Vision Development (COVD), and Neuro-Optometric Rehabilitation Association (NORA) that I have developed my model of vision. Each provides education in larger chunks ranging from 10 to 35 hours on a specific topic.

Learning extends past formal education as well. COVD and NORA offer fellowship processes, while OEPF publishes a multitude of books. Both OEPF (Optometry & Visual Performance) and COVD (Vision Development and Rehabilitation) publish world-class open-access journals as well, so the opportunity for life-long learning abounds.

2. You won’t know everything; keep it simple

I promise that the complicated and puzzling cases will find their way to your offices, but, for the first few, stick to the easier ones. You need to prove to yourself, the office staff, other doctors in the office and community, and the patients that you know what you are doing.

Start with the basic binocular cases of the accommodative and/or vergence genres. Do not start with a 40-year-old esotrope with a history of three strabismus surgeries who has never seen stereo or an autistic child who is non-verbal.

3. Start low and go high over time

Patients love the amazing technology they get to use at my clinic…and so do I. It is great for moti-
vation and allows you to challenge the patient in a different manner.

The concern of course is that technology can be expensive for a new office. Start with a low-tech approach. Yes, buy Brock strings, lens flippers and vectograms…they will never steer you wrong (Figure 1). Over time, consider adding a computer program or larger-ticket item like a touch screen to enhance your therapy offerings and get that “wow” factor from the patients. There are many options, so do your research on the web, at meetings, and by talking to those in the field.

4 Results take time
You may have been taught that a “basic” convergence or accommodative therapy case will take 12 weeks to treat. Perhaps that is true for a handful of hard-charging patients who actually do the home activities prescribed or whose conditions are not embedded, but it is not true most of the time.

The longer I perform therapy, the more time I estimate is needed. I adjust my projection based on the findings but also on the patient demographics and parental involvement.

A young child will inherently require more time, and perhaps breaks in the therapy process, than a teenager. A patient with amblyopia, strabismus, developmental challenges, or who has suffered a brain injury will take significantly longer.

Be honest at the start with the patient, parent, or family member—it is OK to tell them that treatment may take a year. In most cases, patients have taken a lifetime to develop their adaptations to survive; it will take more than 3 months to break them back down and build the patients back up.

5 Every patient has a different ceiling
Honesty is the best policy. It is no different in the therapy room. In the consultation process, I always talk about removing vision as a barrier for the patient.

If she is in school, we are working toward school performance and attention but never promise that vision therapy will improve grades—this will only advance quickly, while in other cases they can deeply embed maladaptive behaviors. For these reasons, eyeglasses/lenses should always be prescribed judiciously.”

I could not agree more with this statement from former New England College of Optometry professor, Richard Laudon, OD, FAAO, in a personal email. I have always fit into the “less is more” philosophy when it comes to prescribing, and my experiences have only strengthened in that regard.

If there is no test that I can point to that backs up a change in, or even giving, the prescription, it is not going to happen. This is especially true if I am recommending the patient for therapy or the patient is in an active therapy process.

There is no harm in waiting until therapy is completed, then reassessing the visual system to provide the prescription that best supports the patient and the gains that he has made.

8 A good vision therapist makes the difference
The importance of a vision therapist who has the right training and works independently from the doctor cannot be understated. This can happen only if the doctor spends time with the therapist in the therapy room and therapy programming for the patients.

While this can impact the bottom line because it is not efficient use of the doctor’s time, this practice will reap benefits down the line. In a busy office, the therapist is seeing patients at the same time as the doctor, so setting the stage early on with good training is crucial.

A good therapist is also vital to patient outcomes. Therapists need to think outside the box and find not only what motivates each patient but also what activities patients enjoy and how to find the appropriate level of challenge.

9 The proof is in the results
You will always have your fans and your haters—show them the same attention, but always take the high road. Don’t try to prove the haters wrong; show them they are wrong through your patient care.

There will always be those in the medical community who do not only disregard but actively put down vision therapy as a treatment option. Don’t waste time sending them research studies—they most likely won’t read them. Instead, show them the impact through patient care outcomes. Let the patients and their families be your ambassadors to spread the news of success to those doubters and to anyone who will listen.

10 Vision therapy is not for everyone
Despite your best intentions, not everyone is ready to commit to the therapy process. This hesitation can be due to parent or patient concerns. The child may not be on board because he is “too cool” for therapy or he does not see a need in the first place. There can also be family challenges, including financial or divorce. This can lead to problems with show rate and homework compliance, leading to poor outcomes.

Choosing patients and their families who are ready to make the commitment to the therapy process is just as important as the therapy itself.

11 Take the leap
For those who are ready to take on the challenge of providing vision therapy, my last piece of advice is to take the leap.

Be smart; do your research. Don’t forget that you are not alone. You will find that vision therapy doctors will literally give you the plans to their offices and therapy; don’t hesitate to ask for help.

Go to a meeting, shadow an office, and join the DOC List (a listserv with over 1,000 clinicians worldwide; email me for more details) or VTODs on Facebook.

There is no need to reinvent the wheel. Vision therapy is not only fun, but it can change lives, yours and the patients’. What are you waiting for?

Dr. Taub teaches in the vision therapy and pediatric clinics. He is also the co-supervisor for the Pediatric and Vision Therapy residency. Dr. Taub is the editor-in-chief of Optometry & Visual Performance. He is a Fellow of the College of Optometrists in Vision Development and is active in the Optometric Extension Program Foundation.

mtaub@scs.edu
A 55-year-old patient with a 20-year history of insulin-dependent diabetes presented for periodic ophthalmic evaluation. He was new to our area and did not recall the timing of his previous examination.

Symptoms
He reported no visual symptoms. In addition to his history of diabetes, he had also been treated for systemic hypertension (medications unreported) for 20 years. Significant in his history was the admission of blood sugar levels in the 140 to 200 range. He was unaware of his HbA1c levels.

At examination, best-corrected visual acuity was 20/25 in each eye. The appearance of the right and left fundi is depicted in Figure 1. Note the vascular abnormalities in each eye consistent with diabetic retinopathy, including hemorrhages and microaneurysms, cotton-wool spots, intra-retinal microvascular abnormalities, and a specific cluster of exudates affecting the left eye within 500 µm of the macula. In the fundus photo of the right eye, note particularly the vascular irregularity associated with cotton-wool spot superior temporal to the optic disc.

Diagnosis
The patient was diagnosed with moderate to severe diabetic retinopathy, and optical coherence tomography (OCT) was ordered. Normal foveal contour with mild thickening as well as absence of intra- and sub-retinal fluid are noted in the cross-sectional presentation of each eye. See Figure 2.

Topographical analysis revealed mild thickening within the posterior pole of each eye. See Figure 3. The retinal nerve fiber layer (RNFL) profile captured a portion of the cotton-wool spot superior temporal to the optic disc of the right eye. See Figure 4.

The patient refused consultation with a retinologist and was subsequently advised to follow up in 3 months. At this visit, his visual acuity was unchanged, but there were some changes to the fundus appearance in each eye. See Figure 5 for changes to the right eye.

Most significantly, the prominent cotton-wool spot in the right eye had resolved but left in its wake a distinct RNFL defect. Refer to Figure 5.

The OCT at this visit revealed intra-retinal and sub-retinal fluid perilously close to the center of the fovea of the right eye. See Figure 6.

This was considered potentially treatable although not center-involving, and the patient was referred to a retinal specialist.
He received a single treatment to the left eye but was lost to subsequent follow-up.

REFERENCES


Assessment
It is well known that cotton-wool spots are consistent with underlying ischemia, perhaps of a single retinal arteriole. They have been reported to correspond with arcuate visual-field defects.

The specific pathophysiology for the manifestation of CWS appears to begin with retinal arteriolar obstruction. As such, CWS can be regarded as sentinels for neovascularization.

A previous report of CWS resolution with subsequent RNFL defect was published. The case involved a patient with severe arterial hypertension whose CWS appeared inferior to the optic disc. Upon CWS resolution, the patient exhibited a distinct wedge-shaped RNFL defect. The report also included OCT analysis showing characteristic inner retinal tissue loss.

On further follow-up, the current patient eventually developed center-involving macular edema in the right eye and high-risk vitreous hemorrhage (nasal to the optic disc) in the left eye.

Figure 3. Topographic OCT presentation showing focal inner retinal elevations within the arcades of each eye.

Figure 4. RNFL profile which captures a portion of the CWS, especially prominent in the right eye.

Figure 5. Color fundus photograph of the right eye showing resolved CWS replaced by the distinct RNFL defect.

Figure 6. Cross-sectional and topographic OCT showing fluid accumulation inferior to the right macula.
OCT, OCTA show promise in screening for DR

Continued from page 1

Other retinal imaging technologies have been suggested as prime platforms for screening, particularly optical coherence tomography (OCT) and OCT angiography (OCTA). OCTA is a novel imaging technique that provides depth-resolved images of retinal vasculature. With a focus on OCTA’s application in DR, this article will highlight advantages and disadvantages of OCTA and provide a short preview of new avenues of research.

OCTA basics

Fluorescein angiography (FA) remains the standard of care in examining ocular perfusion and retinal vascular anomalies. FA involves the intravenous injection of sodium fluorescein dye. This introduces the possibility of adverse reactions, the most serious of which is an anaphylactic reaction.

Using FA, a dynamic examination of retinal vasculature can be made. Transit time and dynamic dye changes (leakage, pooling, staining) can be used in order to distinguish among ocular pathologies. However, leakage can obscure underlying structure detail from view. Additionally, FA is limited to a 2-dimensional view of all retinal vascularization; the depth of an abnormality cannot be examined. While FA remains the standard of care, it is important to recognize the advantages and limitations of the technology.

OCT angiography (OCTA) offers certain advantages over traditional FA. A refresher on the fundamentals of OCTA is important in understanding its potential advantages and disadvantages. OCTA is an application of existing OCT technology to identify flow signal within a section of tissue. When repeating OCT B-scans in a single location, pixel by pixel differences within a short allotment of time suggests motion. Extraction of these differences allows for the creation of a 3-dimension matrix of flow signals that can be visualized using en-face methods or flow signal overlay onto OCT B-scans.

Significant advantages arise from this methodology. Most importantly, OCTA is a non-invasive, non-contact method to visualize the vascular architecture. This allows for repeated image acquisition in order to monitor disease progression or response to treatment over time. For example, Ishibazawa et al found that OCTA could be used to quantify neovascularization at the disc and could be repeated frequently to monitor response to treatment with intravitreal injections of ranibizumab. OCTA images are not obscured by dye leakage that can obscure pathology in traditional FA. The images are depth-resolved and can allow for the localization of pathology to the superficial or deep retinal vascularplexuses. Suldice et al examined OCTA images in patients with macular telangiectasia type 2 and found that vascular changes occur in primarily in the deep capillaryplexus.

Most importantly, for the application to telemedicine and automated screening, several vascular characteristics can be quantified, such as fractal dimension and vessel density, which will be discussed in some detail later.

While OCTA offers advantages and exciting possibilities, the current limitations of the technology must be considered. OCTA images are limited in size, offering at most a 6x6 mm acquisition area in commercially available versions. It is possible to piece together multiple images in a montage to expand the area of examination. In order to acquire a reliable image, patients are required to fixate precisely for several seconds. If unable to do so, motion artifacts degrade the quality of the scan.

Due to the robust data that is created, interpretation of the images can be lengthy and challenging, particularly with significant retinal pathology. The inability to detect vascular leakage is a disadvantage in several settings. Without leakage information, similar-appearing pathology such as neovascularization and intraretinal microvascular abnormalities (IRMA) may be difficult to differentiate in en-face images.

Further limitations that can result in misinterpretation of OCTA images include projection artifact (the visualization of flow signal from superficial structures onto deeper slabs) and segmentation artifact (incorrect identification of the depth of a lesion). In addition, OCTA’s ability to detect motion has limitations in both slow movement (such as stagnant blood within a retinal maculoneovascularum or polyp) and fast movement (in high-flow choroidal vessels).

Nevertheless, OCTA has already become a powerful tool for assessing retinal vascular pathology, such as DR. The natural history of DR is a stepwise progression of vascular changes that can ultimately result in vision-threatening disease. OCTA can reliably identify and quantify these features, making OCTA a useful tool in the management of diabetic patients.

OCTA in DR

In the office setting, OCTA can detect early diabetic retinal changes before they are visible in a fundus examination. Thompson et al found that 40 percent of diabetics with no retinopathy on clinical exam had maculoneovascularum visible on OCTA versus fundus examination.

When compared to color fundus photography, OCTA demonstrated significantly higher detection rates of microaneurysms and IRMA. This shows that OCTA can identify subclinical retinopathy. Whether this translates to improved clinical outcomes is yet to be seen, but the earlier identification of vascular changes may provide an opportunity for earlier counseling and lifestyle intervention for diabetic patients.

In clinically apparent DR, the optometrist’s ability to accurately stage the severity of retinopathy is crucial to establishing appropriate interventions. The progression from moderate/severe non-proliferative DR (NPDR) to proliferative DR (PDR) can be subtle.

Periretinal neovascularization can mimic IRMA on clinical exam, and, in 50 percent of cases, arises adjacent to areas of IRMA, making differentiation between the two difficult. Segmentation slabs on OCTA can simplify this task.

Unlike other diabetic retinal changes, neovascularization will breach the inner limiting membrane and sit above the surface of the retina or optic nerve. As such, the vitreoretinal interface slab or B-scans with flow signal overlay can screen for and detect periretinal neovascularization. If present, patients should immediately be referred for evaluation by a retinal specialist.
cular ischemia predicts retinopathy progression [research to date shows that patients with NPDR, DMI, and DME may progress to PDR despite monthly anti-vascular endothelial growth factor (VEGF) treatment]. Additionally, the more ischemic the macula, the worse the visual prognosis. If optometrists can identify ischemia early on, proper counseling can be provided.

OCTA may allow optometrists to intervene sooner and make better recommendations

Early detection and prompt treatment of DR can prevent severe vision loss in 90 percent of diabetic patients. The noninvasive technology with OCTA now detects these changes quickly and reliably. Ultimately, the use of OCTA may allow optometrists to intervene sooner and make better recommendations for improved long-term patient outcomes.

Future research

Current research in OCTA involves further refinement of the quantification techniques of vascular anatomy. Vascular density, non-perfusion area, and the foveal avascular zone area have been suggested as quantitative biomarkers to identify disease and track disease progression.

Fractal dimension analysis is a concept with growing importance in analyzing the stages of DR with OCTA. It allows for an assessment of the microvascular disease present in DR. Fractal dimension is a dimensionless number providing an index of “self-similarity” within an image. The basic premise is that the retinal vascular tree holds some degree of self-similarity as it progresses from first-order vessels down to third-order and fourth-order vessels, in terms of branching morphology. Perturbations in branching morphology may suggest development of vascular abnormalities such as DR and may manifest as changes in the fractal dimension of an OCTA image. Other avenues of research in OCTA include the quantification of blood flow volume and velocity. Variational interscan time analysis (VISTA) may prove to be an opportunity to quantify blood velocity by repeating B-scans at varying interscan times to distinguish subtle changes in flow signal. Another recent development is the application of swept-source OCT technology to OCTA. Due to the longer wavelength of light, SS-OCTA may allow for better visualization of deeper structures, such as the choroidal vasculature.

Future clinical applications

OCT and OCTA technology have greatly advanced ODs’ ability to diagnose and manage retinal disorders. Currently, OCTA has a qualitative ability to identify diabetic changes in early stage DR, to distinguish early neovascularization, and to identify diabetic macular ischemia. Refinement of quantitative techniques remains the next great challenge.

REFERENCES

**Optometry Times blogs**

The strongest voices in the optic field are featured each week in Optometry Times® blogs with tips, techniques, breaking news and what it means to you and your practice. Read a physician’s perspective on the latest and greatest in glaucoma, retina, dry eye, refractive surgery, contact lenses, technology and practice management at OptometryTimes.com/topic/blog.

---

**HOMEOSTASIS IS THE HOLY GRAIL IN DRY EYE DISEASE**

As knowledge of ocular surface disease increases, it becomes critically important to continue to siphon down the information into clinically relevant, actionable items that empower eye care practitioners to provide treatments that allow measurable improvements.

OptometryTimes.com/Homeostasis

---

**TOP HEADLINES** Check out what your colleagues are reading.

1. At-home therapy can alleviate contact lens discomfort
   OptometryTimes.com/WarmCompress

2. Engineer a specialty contact lens practice
   OptometryTimes.com/SpecialtyCLPractice

3. Why I wear scrubs in the office during COVID-19
   OptometryTimes.com/COVIDscrubs

---

**TOP SOCIAL** See what others are reading on Facebook, Twitter, and Instagram.

1. Misdiagnosis when clinical findings don’t make sense
   OptometryTimes.com/Misdiagnosis

2. 5 facts about contact lens wear with COVID-19
   OptometryTimes.com/5Facts_COVID19

3. NASA awards $5 million to artificial retina development efforts
   OptometryTimes.com/NASA_retina

---

**MISSION STATEMENT** Optometry Times delivers easily digested, practical information by ODs for ODs. This information can be immediately applied to improve the clinical experience of the next patient in your chair as well as your practice performance.

OptometryTimes.com provides data, analysis, tools, and resources which are available whenever and wherever our readers want them.
XIIDRA® (lifitegrast ophthalmic solution), for topical ophthalmic use
Initial U.S. Approval: 2016

BRIEF SUMMARY: Please see package insert for full prescribing information.

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

4 CONTRAINDICATIONS
Xiidra is contraindicated in patients with known hypersensitivity to lifitegrast or to any of the other ingredients in the formulation [see Adverse Reactions (6.2)].

6 ADVERSE REACTIONS
The following serious adverse reactions are described elsewhere in the labeling:
- Hypersensitivity [see Contraindications (4)]

6.1 Clinical Trials Experience
Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

In five clinical studies of DED conducted with lifitegrast ophthalmic solution, 1401 patients received at least one dose of lifitegrast (1287 of which received lifitegrast 5%). The majority of patients (84%) had ≤ 3 months of treatment exposure. One hundred-seventy patients were exposed to lifitegrast for approximately 12 months. The majority of the treated patients were female (77%). The most common adverse reactions reported in 5%-25% of patients were instillation-site irritation, dysgeusia, and reduced visual acuity.

Other adverse reactions reported in 1%-5% of the patients were blurred vision, conjunctival hyperemia, eye irritation, headache, increased lacrimation, eye discharge, eye discomfort, eye pruritus, and sinusitis.

6.2 Postmarketing Experience
The following adverse reactions have been identified during post-approval use of Xiidra. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Rare cases of hypersensitivity, including anaphylactic reaction, bronchospasm, respiratory distress, pharyngeal edema, swollen tongue, and urticaria have been reported. Eye swelling and rash have been reported [see Contraindications (4)].

8 USE IN SPECIFIC POPULATIONS
8.1 Pregnancy
Risk Summary
There are no available data on Xiidra use in pregnant women to inform any drug-associated risks. Intravenous (IV) administration of lifitegrast to pregnant rabbits during organogenesis produced an increased incidence of omphalocele at the lowest dose tested, 3 mg/kg/day (400-fold the human plasma exposure at the recommended human ophthalmic dose [RHOD], based on the area under the curve [AUC] level). Since human systemic exposure to lifitegrast following ocular administration of Xiidra at the RHOD is low, the applicability of animal findings to the risk of Xiidra use in humans during pregnancy is unclear [see Clinical Pharmacology (12.3) in the full prescribing information].

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

8.2 Lactation
Risk Summary
There are no data on the presence of lifitegrast in human milk, the effects on the breastfed infant, or the effects on milk production. However, systemic exposure to lifitegrast from ocular administration is low [see Clinical Pharmacology (12.3) in the full prescribing information]. The developmental and health benefits of breastfeeding should be considered, along with the mother’s clinical need for Xiidra and any potential adverse effects on the breastfed child from Xiidra.

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

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

Manufactured for:
Novartis Pharmaceuticals Corporation
One Health Plaza
East Hanover, NJ 07936
T2019-110
Indication

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

Important Safety Information

• Xiidra is contraindicated in patients with known hypersensitivity to lifitegrast or to any of the other ingredients.
• In clinical trials, the most common adverse reactions reported in 5-25% of patients were instillation site irritation, dysgeusia and reduced visual acuity. Other adverse reactions reported in 1% to 5% of the patients were blurred vision, conjunctival hyperemia, eye irritation, headache, increased lacrimation, eye discharge, eye discomfort, eye pruritus and sinusitis.
• To avoid the potential for eye injury or contamination of the solution, patients should not touch the tip of the single-use container to their eye or to any surface.
• Contact lenses should be removed prior to the administration of Xiidra and may be reinserted 15 minutes following administration.
• Safety and efficacy in pediatric patients below the age of 17 years have not been established.

Please see Brief Summary of Prescribing Information on adjacent page.