Challenge of leadership presents hurdles for many practices

DURING CRISIS NO EASY TASK

Surgeons getting back to basics

ASSESSMENT OF THE RIGHT ANGLE:

Gonioscopy is offering an option in treating patients with glaucoma

By Lynda Charters;
Reviewed by Suber Huang, MD, MBA.

There are several minimally invasive procedures that also require energy to the trabecular meshwork. It is important to consider the possibility of combining these procedures.

“Office management in the time of a crisis always falls on the shoulders of leadership,” said Huang, president and CEO, Retina Center of Ohio, and voluntary assistant professor, University of Miami, Bascom Palmer Eye Institute.

“Practitioners are finding themselves dealing with a new set of demands. Coronavirus disease 2019 requires dealing with Suber Huang, MD, MBA. and sustainability of a practice, according to the recognition that the long-term outcomes of the practice organization. Collaborative parts of the physician team and the patient help foster leading the professional culture of the practice. The desire to assign blame is rarely productive.”

The angle must be visualized in order to perform laser trabeculoplasty. However, she questioned if this is the best route to take.

The study found that the sensitivity of the van Herick method, which can be performed rapidly, as a substitute for indirectly assessing the width of the angle, was questioned if this is the best route to take.

Radhakrishnan cited a study that evaluated the capability of the van Herick test when performed by observers with different levels of expertise who are not at all clear,” said Huang, president and CEO, Retina Center of Ohio, and voluntary assistant professor, University of Miami, Bascom Palmer Eye Institute.

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By Lynda Charters; Reviewed by Sunita Radhakrishnan, MD

Image shows an open angle in a patient. The arrows indicate the scleral spur.

(Photo courtesy of Sunita Radhakrishnan, MD)

Brief Summary of Prescribing Information for XELPROSTM (latanoprost ophthalmic emulsion) 0.005%, for topical ophthalmic use

XELPROSTM (latanoprost ophthalmic emulsion) 0.005%
See package insert for Full Prescribing Information.

INDICATIONS AND USAGE
XELPROS is indicated for the reduction of elevated intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension.

CONTRAINDICATIONS
Known hypersensitivity to latanoprost, or any other ingredients in this product.

WARNINGS AND PRECAUTIONS
Pigmentation
XELPROS may cause changes to pigmented tissues. The most frequently reported changes are increased pigmentation of the iris, periorbital tissue (eyelid), and eyelashes. Pigmentation is expected to increase as long as XELPROS is administered. After discontinuation of XELPROS, iris pigmentation is likely to be permanent. Patients who receive treatment should be informed of the possibility of increased pigmentation. The long-term effects of increased pigmentation are not known.

Eyelash Changes
XELPROS may gradually change eyelashes and vellus hair in the treated eye, including increased length, thickness, pigmentation, and number of lashes. The changes are usually reversible upon discontinuation of treatment.

Intraocular Inflammation
XELPROS should be used with caution in patients with a history of intraocular inflammation (iritis/uveitis) and should generally not be used in patients with active intraocular inflammation.

Macular Edema
XELPROS should be used with caution in aphakic patients, in pseudophakic patients with a torn posterior lens capsule, or in patients with known risk factors for macular edema.

Herpetic Keratitis
XELPROS should be used with caution in patients with a history of herpetic keratitis. XELPROS should be avoided in cases of active herpes simplex keratitis because inflammation may be exacerbated.

Bacterial Keratitis
There have been reports of bacterial keratitis associated with the use of multiple-dose containers of topical ophthalmic products.

Use with Contact Lenses
Contact lenses should be removed prior to administration of XELPROS and may be reinserted 15 minutes following administration.

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

Across multiple clinical trials conducted with XELPROS, the most frequently reported ocular adverse reactions were eye pain/stinging upon instillation and ocular hyperemia, reported in 55% and 41% of patients treated with XELPROS, respectively. Other adverse reactions reported (incidence ≥5%) were conjunctival hyperemia, eye discharge, growth of eyelashes, and eyelash thickening. Less than 1% of patients discontinued therapy because of intolerance to the eye pain/stinging or to the ocular hyperemia.
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DRUG INTERACTIONS
Precipitation may occur if drugs containing thimerosal are used concomitantly with XELPROS. If such drugs are used, they should be administered at least 5 minutes apart.

USE IN SPECIFIC POPULATIONS
Pregnancy
Pregnancy Category C
Reproduction studies have been performed in rats and rabbits. In rabbits, an incidence of 4 of 16 dams had no viable fetuses at a dose that was approximately 80 times the maximum human dose, and the highest nonembryocidal dose in rabbits was approximately 15 times the maximum human dose. There are no adequate and well-controlled studies in pregnant women. XELPROS should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nursing Mothers
It is not known whether latanoprost or its metabolites are excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when XELPROS is administered to a nursing woman.

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

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

PATIENT COUNSELING INFORMATION
Potential for Pigmentation
Advise patients about the potential for increased brown pigmentation of the iris, which may be permanent. Patients should also be informed about the possibility of eyelid skin darkening, which may be reversible after discontinuation of XELPROS.

Potential for Eyelash Changes
Inform patients of the possibility of eyelash and vellus hair changes in the treated eye during treatment with XELPROS. These changes may result in a disparity between eyes in length, thickness, pigmentation, number of eyelashes or vellus hairs, and/or direction of eyelash growth. Eyelash changes are usually reversible upon discontinuation of treatment.

Handling the Container
Instruct patients to avoid allowing the tip of the dispensing container to contact the eye or surrounding structures because this could cause the tip to become contaminated by common bacteria known to cause ocular infections. Serious damage to the eye and subsequent loss of vision may result from using contaminated emulsions.

When to Seek Physician Advice
Advise patients that if they develop an intercurrent ocular condition (eg, trauma or infection) or have ocular surgery, or develop any ocular reactions, particularly conjunctivitis and eyelid reactions, they should immediately seek their physician’s advice concerning the continued use of the multiple-dose container.

Use with Contact Lenses
Advise patients that contact lenses should be removed prior to administration of the emulsion. Lenses may be reinserted 15 minutes following administration of XELPROS.

Use with Other Ophthalmic Drugs
Advise patients that if more than one topical ophthalmic drug is being used, the drugs should be administered at least 5 minutes apart.

Rx Only
Distributed by: Sun Pharmaceutical Industries, Inc.
Crabury, NJ 08512

Potential for Pigmentation
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Bacterial Keratitis
Because inflammation may be exacerbated.

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ASSESSMENT OF THE ANGLE

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Telemedicine continues to make waves in ophthalmology

Cryopreserved amniotic membrane continues to make waves in ophthalmology

IMAGING

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Herpetic Keratitis: XELPROS should be used with caution in patients with a history of herpetic keratitis. XELPROS should be avoided in cases of active herpes simplex keratitis because inflammation may be exacerbated.

Bacterial Keratitis: There have been reports of bacterial keratitis associated with the use of multiple-dose containers of topical ophthalmic products.

Use with Contact Lenses: Contact lenses should be removed prior to administration of XELPROS and may be reinserted 15 minutes following administration.

ADVERSE REACTIONS

The most common ocular adverse reactions in clinical trials (incidence ≥5%) for XELPROS were eye pain/stinging, ocular hyperemia, conjunctival hyperemia, eye discharge, growth of eyelashes, and eyelash thickening.

DRUG INTERACTIONS

Precipitation may occur if drugs containing thimerosal are used concomitantly with XELPROS. If such drugs are used, they should be administered at least 5 minutes apart.

Please see brief summary of Full Prescribing Information on the reverse side.

BAK=benzalkonium chloride.

Assessing the right angle:
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Gonioscopy is offering an option in treating patients with glaucoma

**Image shows an open angle in a patient. The arrows indicate the scleral spur.**

(PHOTO CREDIT: Sunita Radhakrishnan, MD)

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**SPECIAL SECTION**

**Assessing the right angle:**
Surgeons getting back to basics

Gonioscopy is offering an option in treating patients with glaucoma

**By Lynda Charters;**
Reviewed by Sunita Radhakrishnan, MD

**ASSESSMENT OF THE ANGLE**

*It is important for managing glaucoma. It can identify various mechanisms of IOP elevation, such as pigment dispersion and angle recession, and it is critical for diagnosis and staging of primary angle closure.*

*It is also important for the treatment of glaucoma.*

*The angle must be visualized in order to perform laser trabeculoplasty, for example, at least when using the devices that are currently available.**

said Sunita Radhakrishnan, MD. “A new technology is in the pipeline that enables transscleral laser trabeculoplasty but for now, visualization of the angle is necessary to deliver laser energy to the trabecular meshwork. There are several minimally invasive glaucoma surgeries that also require angle visualization.”

Radhakrishnan is associate, Glaucoma Center of San Francisco and research director, Glaucoma Research and Education Group.

In a clinic setting, physicians often use the van Herick method, which can be performed rapidly, as a substitute for indirectly assessing the width of the angle.

However, she questioned if this is the best route to take.

Radhakrishnan cited a study that evaluated the diagnostic capability of the van Herick test when performed by observers with different levels of expertise who may all be involved in angle assessment.

The study found that the sensitivity of the test decreases when the observer is not the primary physician.

**Continues on page 16: Gonioscopy**

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**PRACTICE MANAGEMENT**

**NAVIGATING OFFICE MANAGEMENT DURING CRISIS NO EASY TASK**

Challenge of leadership presents hurdles for many practices

**By Lynda Charters;**
Reviewed by Suber S. Huang, MD, MBA

**IN NORMAL TIMES**, the physician sets the tone in developing and leading the professional culture of the practice organization. Collaborative partnering approaches between the physician team and the patient help foster efficient and effective patient care. Of equal importance are patient satisfaction and patient retention, which are fundamental to the financial success and sustainability of a practice, according to Suber Huang, MD, MBA.

However, the current times are not normal, and management during the coronavirus disease 2019 requires dealing with a different set of demands.

**FIVE-STEP PLAN**

"Office management in the time of a crisis is fundamentally a challenge of leadership," Huang said and outlined 5 ingredients in the recipe for managing the office climate.

1. **KNOWLEDGEABLE REASSURANCE.** Whether practicing in a solo or group practice, the managing physicians and/or senior administrative staff must set the tone regarding knowledgeable reassurance on handling all aspects of the crisis.

2. **WORK SHORT TERM, THINK LONG TERM.** Practice leadership must think carefully about all priorities over time, that is, what is immediately important, what is important in the medium term, and potentially what is important in the long term, with the recognition that the long-term outcomes are not at all clear," said Huang, president and CEO, Retina Center of Ohio, and voluntary assistant clinical professor, University of Miami, Bascom Palmer Eye Institute.

3. **FLEXIBILITY.** Developing flexible strategies for the office is necessary to educate patients, staff, and community as part of a larger public health perspective.

4. **WORK THE PROBLEMS.** Problems, then, must be prioritized and solved as they arise. “The goal is not to live in the past, not worry about the future, but do what can be done in the present,” he advised.

The desire to assign blame is rarely productive. Understanding root causes, adapting to challenges, and making actionable plans is a much-preferred approach.

5. **YOU MAKE THE WEATHER.** When a physician is anxious, the anxiety will be communicated to patients, staff, and community.

**Continues on page 9: Crisis**

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**Issue Highlights**

**SURGERY**

MIGs in children: Is there a role?

**THERAPEUTICS**

Helping patients who do not respond to anti-VEGF therapy

**CLINICAL DIAGNOSIS**

Cryopreserved amniotic membrane surgery addresses recalcitrant MDE

**DEVICE TECHNOLOGY**

Telemedicine continues to make waves in ophthalmology

**IMAGING**

Fundus autofluorescence offers edge in white dot syndrome imaging

**GENE THERAPY**

TANGO: Helping target genes produce more protein

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Ophthalmology Times®

**CUTTING-EDGE ADVANCEMENTS**

JUNE 1, 2020

VOL. 45, NO. 9

**SALUTE TO GRADS:** A MESSAGE TO THE CLASS OF 2020 PAGE 4

OphthalmologyTimes.com
WE STAND WITH OPHTHALMOLOGY during this unprecedented time.

This is bigger than one company, one organization, and one physician.
Together, we will persevere.
June shows us all the path to a new ‘normal’

Mike Hennessy Sr, Chairman and founder of Ophthalmology Times® parent company, MJH Life Sciences®

WELCOME TO THE June 1 issue of Ophthalmology Times®

On the digital side, the Ophthalmology Times® team continues to offer outstanding coverage of COVID-19-related issues and for the American Society of Cataract and Refractive Surgery virtual annual meeting. Be sure to visit our website for content and videos. As ophthalmology takes steps to return to work, we are learning that we are on a path to a new “normal.”

On the cover, we examine how assessing the angle is key to the management of glaucoma. Sunita Radhakrishnan, MD, explains the angle must be visualized in order to perform laser trabeculoplasty, for example, at least when using the devices that are currently available. She offers an interesting option in treating these patients. This article kicks off our special section, which focuses on advances in MIGS and glaucoma surgery.

The cover also features excellent advice for navigating office management during a crisis. Suber Huang, MD, MBA, tells us how collaborating physician teams and the patient can help foster effective partnering approaches between the physician team and the patient.

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The aforementioned special section in this issue also includes a look at apps that are available to assist patients with visual impairment. Yvonne Ou, MD, explains how many patients find that their iPhones and Android devices are their most valuable personal assistants, with both having accessibility features. The section also looks at normal-tension glaucoma, which can prove to be difficult to pinpoint and manage. James C. Tsai, MD, MBA, examines this topic, including a look at factors other than IOP that may be responsible for progressive disc cupping and VF loss in the setting of normal eye pressures. He also notes that genetic and other factors also play a role.

Our surgery content looks at how MIGS may help surgeons avoid long-term complications associated with tubes and trabeculotomy in children. James D. Brandt, MD, notes that ophthalmologists are playing a long game, trying to preserve vision for a lifetime. As a result, translimbal MIGS may be a key in managing childhood glaucoma.

On the therapeutics side, researchers are looking for options to help patients who do not respond to anti-VEGF therapy. Their study rejects the idea of “nonresponders” to therapeutic options. Shan C. Lin, MD, also looks at some glaucoma treatment alternatives, which may expand beyond surgery, medication, and lasers.

Clifford Salinger, MD, shares an interesting clinical diagnosis topic, examining cryopreserved amniotic membrane surgery as a way to address recalcitrant mechanical dry eye.

Salinger notes that the best method to look for MDE is with fluorescein and a cobalt blue light, preferably with a slit lamp.

Device technology remains a hot topic, particularly when you consider the importance of telemedicine amid the COVID-19 pandemic. Andrew G. Lee, MD, discusses how telemedicine continues to make waves in ophthalmology. He points out that new alternatives to the modus operandi of traditional health care delivery have been necessary during these uncertain times.

Imaging coverage featured in this issue focuses on fundus autofluorescence as a particularly useful tool in the imaging white dot syndromes because of the involvement of the outer retina and the retinal pigment epithelium. Phoebe Lin, MD, PhD, explains how this provides myriad information not readily available with other imaging techniques.

Our gene therapy content focuses on Targeted Augmentation of Nuclear Gene Output (TANGO), a novel therapeutic approach. Aditya Venkatesh, PhD, has conducted research showing it has been validated in vitro and in vivo as a way to address autosomal dominant optic atrophy, one of the most commonly occurring optic neuropathies.
A message to the Class of 2020
An open letter to my department’s graduates

By Peter J. McDonnell, MD
director of the Wilmer Eye Institute,
Johns Hopkins University School of Medicine, Baltimore, and chief editorial officer of Ophthalmology Times®.

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600 N. Wolfe St. Baltimore, MD 21287-9278
Phone: 443/287-1511 Fax: 443/287-1514
E-mail: pmcdonnell1@jhu.edu

“And so, to all you graduates... as you go out into the world... my advice to you is... don’t go! It’s rough out there. Move back with your parents. Let them worry about it!”
—Thornton Melon (played by Rodney Dangerfield) in Back to School

DEAR CLASS OF 2020 Residency Graduates (aka soon-to-be FGYs) and Graduating Fellows:

For the first time in the 95-year history of our institute, we will have no large public gathering to mark the completion of the final year of residency training and allow your faculty (now colleagues) to wish you continued success in person. We will miss the chance during the cocktail hour to shirk your hands and those of your family and friends who have supported you during your years of hard work in medical school, internship, and residency that got you to this point. We will miss the speeches, humorous anecdotes, baby photos, embarrassment comments, and laughs that always seem to come up each year at this event.

What we won’t miss is “The Skit,” in which residents use their musical, vocal, and dancing skills to poke fun at the foibles and idiosyncrasies of the chairman and professors. (OK, maybe the jokes about the professors are funny—but not those about the chairman!)

But mostly, we will simply miss you. This has been a remarkable year for your class, for American ophthalmology, and for medicine in general.

In some ways, this coronavirus disease 2019 pandemic reminds me of the appearance of a mysterious illness that popped up when I was a resident. Now known as AIDS, that illness had a number of ophthalmic manifestations. No one knew what caused it or how it was spread, and there were no effective therapies. Many physicians, nurses, and the public were scared. Some projections said this new disease would kill one-third of the world’s population. Of course, biomedical science rose to that challenge, and today, seeing a patient who is HIV positive is more or less a non-event.

A result of the need to protect patients and health care workers and save protective equipment, the number of nonurgent surgical procedures you will have completed in residency is less than projected. This is a non-issue. You will be constantly learning and mastering new techniques in the OR over the coming decades of your career. Ten years from now, you will neither remember nor care how many procedures you performed as a resident.

This is the opportunity for an old person (ie, me) to pass on to the graduating youth (ie, you) the secrets for successful pursuit in your careers. I have to tell you that the secret is that there is no secret. The qualities that allowed you to excel in medical school, secure a competitive residency training position, and form so well as residents are qualities that will ensure your future success.

You have worked very hard all along, and that work ethic will continue to stand you in good stead. Your love of learning will allow you to come the opportunity to master new techniques and surgical procedures that inevitably will come along in our highly innovative specialty. You have delayed gratification along the way, and that quality will allow you to resist the urge to rush out and buy the unnecessary material goods (a luxury car, an excessively large home) that others will tell you are required possessions of “rich doctors” like you.

The gift of being able to help others is what attracted you to a career in medicine and keeping that first and foremost will help you when things like pandemics come along and your fellow citizens look to you for help and reassurance in their hour of need. Finally, this experience with “lockdowns” and “social distancing” will allow you to fully appreciate the joy of being with friends, family, and patients whenever possible.

Rodney Dangerfield was right—it can be rough out there. But it can also be astonishing, rewarding, humbling, and a lot of fun. You’ll be fine. And, please, stay in touch.

Peter J. McDonnell
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.

References:
1  INDICATIONS AND USAGE

XIIDRA® (lifitegrast ophthalmic solution) 5% is indicated for the treat-
ment of the signs and symptoms of dry eye disease (DED).

2  USE IN SPECIFIC POPULATIONS

2.1 Pregnancy

Risk Summary

There are no available data on Xiidra use in pregnant women to inform
drug 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 Phar-
macology (12.3) in the full prescribing information].

6.2 Postmarketing Experience

The following adverse reactions have been identified during post-
approval use of Xiidra. Because these reactions are reported volun-
tarily 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, bron-
chospasm, respiratory distress, pharyngeal edema, swollen tongue,
and urticaria have been reported. Eye swelling and rash have been
reported [see Contraindications (4)].

8.4 Pediatric Use

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

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

17 Microinvasive glaucoma surgery in children: Is there a role?
MIGS may help surgeons avoid long-term complications associated
with tubes and trabeculectomy.

22 Helping patients who do not respond to anti-VEGF therapy
Study rejects ‘nonresponders’ to therapeutic option.

23 Glaucoma treatment alternatives: Thinking outside the box
For patients whose glaucoma is progressing, other options such as
supplements and meditation may have potential value.

27 Cryopreserved amniotic membrane surgery addresses recalcitrant MDE
The best way to look for MDE is with fluorescein and a cobalt blue
light, preferably with a slit lamp.

30 Telemedicine continues to make waves in ophthalmology
Amid the COVID-19 pandemic, innovation is key to providing
health care delivery.

32 Fundus autofluorescence offers edge in white dot syndrome imaging
Subclinical lesions are detected that are not apparent in other
imaging platforms.

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With a clear reimburse-
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21 Helping patients who
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anti-VEGF therapy
Study rejects ‘nonresponders’
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that are not apparent in other
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THE OUTBREAK OF COVID-19 is having a financial impact on private practices nationwide, with experts noting that many practices are seeing a decline in patient volume as people try to avoid doctors’ offices unless they have no other choice, and that decline is expected to continue as the crisis broadens.

“This is especially true for primary care offices,” said Lisa Stevens Anderson, president of Equality Health’s Management Services Organization division, which oversees 1,200 primary care physicians. “They are the lowest paid on the physician spectrum and have the busiest offices. They are the ones during the initial phase that are the hardest hit as they try to adjust to the new normal and how to maneuver in this business environment.”

Right now, there are so many unknowns that keeping a practice profitable is a daunting challenge. If the crisis lasts for months, as many expect, it could threaten the viability of practices that were already struggling as patient volume continues to decline. Experts say practice leaders need to accept that their practice is most likely going to take a financial hit and start planning accordingly.

Dahl suggests to start running projections on what the practice finances would look like if revenue dropped 10, 20, 50 or even 80 percent.

“Building pro formas on what the impact would be is critical,” he said. “Start there, then look at what patients you need to see and what you can do to generate revenue in some fashion.”

With the loosening of telehealth restrictions, some practices may be able to keep patient volume up while still getting reimbursed by Medicare and commercial payers.

“If a practice does not have a line of credit, Dahl said, now is a good time to apply for one. The money could be the difference between practice survival or going out of business. “It is for these kind of emergency situations,” Dahl explained. The pro-forma projections will help determine where the money needs to be spent.

Valenti noted that an SBA loan is another option if a line of credit is not available, and that doctors should not be reluctant to reach out to vendors to renegotiate or ask for more repayment time. Because some vendors will not send more products if payments are in arrears, Valenti says it is important to reach out and explain the situation to see if they will grant an exception.

“The same thing goes with rent—you may need to ask for a lease abatement,” he said. “You have to make your practice as trim and fit as possible. All you can do is ask, and the worst thing they can say is no.”

Don’t forget professional associations, Anderson added. For example, the American Academy of Family Physicians (AAFP) recently called on Congress to establish a 24-month, interest-free loan program for small and independent practices that have been negatively impacted by the COVID-19 crisis.

Doctors should also look at a worst-case scenario. If the practice had to close because too many employees are sick, or all the doctors are sick, it could trigger business interruption insurance coverage.

TEAMWORK AND FOCUS

Boosting staff morale is also key to maintaining focus on patient care and to getting everyone to work toward keeping the practice open. “It is important, so say to the staff: ‘Let us get through today and not think about the future, but two to four weeks from now, let us start to think about what the future holds,’” Dahl explained. “What does it hold, how can we make sure we improve care and come out of this whole?”

“Recognize the stress the staff is under,” Anderson added. “Make regular, timely communications about efforts to maintain the office, take care of patients, and maintain financial viability. If employees don’t have information, they get scared.”

If staff cuts are being considered, Anderson says to explain the situation to the staff and see if they have any ideas. Instead of assuming no one wants their hours reduced, for example, someone may volunteer because of their current life circumstances.

Valenti concluded that the crisis might help reframe the important role of physicians in the healthcare system.

“With the relaxation of some of the CMS rules, I think we are about to demonstrate why over-regulation is not a good thing,” he said. “We all need some regulation, but when it is overridden, it hinders our ability to practice and we become less efficient.”
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the staff and diminish his or her effectiveness.

“This is the most important factor in leadership,” Huang said. Huang offered the following steps to aid employees and patients in an unsettled environment: (1) normalize anxiety by channeling energy into learning and action steps; (2) offer perspective by not over- or underestimating the dangers; (3) shift the spotlight, which has the effect of minimizing anxiety when attention is turned to helping others; (4) encourage distraction by taking a break from information seeking and giving your mind a rest; and (5) manage your own anxiety with the goal of reducing staff and patient anxiety.

FOCUSING ON THE STAFF

Huang chooses to focus first on his employees when faced with such an all-encompassing problem such as the coronavirus disease 2019.

He pointed out that it is important to first address the largest looming concern for staffers, which, in this case, is their own health. The second issue is the worry that employees will infect their family members or friends, followed closely by the fear of infecting patients, and last but certainly not least, the effect of the crisis on the practice’s livelihood.

During this time, staff members can work from home to minimize their exposure to the virus while they are engaged in contacting patients by mail or phone to reschedule appointments or answer health-related questions.

If the staff alternates between time in the office and time at home, this schedule may provide more flexibility for safety of patients, staff, and community. In a practice with 3 or more offices, a pod design is a working plan of action that everyone in the practice can embrace and execute,” he said.

This approach creates work for staff even when the practice income is in limbo. Projects also help alleviate anxiety regarding loss of patient volume.

IMPLEMENTING CHANGE

IN CRISIS

Flexibility can differ in a solo practice compared with a larger practice that has satellite offices and larger staffs. In the former, decisions can be made and implemented instantly.

“In my practice, we huddle once or twice a day to work the problems, and we can change practices on the fly. In larger offices, there is flexibility but it is harder to move quickly,” Huang pointed out.

In a practice with 3 or more offices, the principles could consider alternating schedules.

“In this scenario, the staff members can isolate during the off-week and if no symptoms develop during that time, they can continue on with the alternating schedule,” Huang suggested. In a practice with 3 or more offices, a pod design is a possibility, in which each doctor would have 1 set of staff members and use 1 office. In this case, if the virus developed in 1 office in a clinician or patient, that office can be closed, quarantined, and the other offices can remain in practice and be unaffected.

THE GIFT OF TIME

An unexpected blessing during this crisis is the availability of extra time.

Huang pointed out that during this period, most routine practices are open for emergencies or continuing care, that is, about 25% of the normal time. During the rest of the time, the staff can continue to engage with patients by calling directly from their homes to allay any patient fears about their care and keep them informed.

The patients who are contacted should include those engaged in clinical research studies as well as regular patients. Those in trials need to be reassured about the study visit protocol during the crisis, and those not in a trial need reassurance about their continuing care and their need for or rescheduling of an examination.

This slow period provides an opportunity to review office efficiency, drill for potential disasters, role-play regarding patient encounters, and prepare for when patients return to the practice.

“With planning, a surge of patients returning for care need not be overwhelming, instead, it could be a happy reunion of old friends looking to resume timely, compassionate, expert care, Huang concluded.

TAKE-HOME

For many ophthalmology practices, special times deserve special actions.

REFERENCE


SUBER S. HUANG, MD, MBA
Dr Huang has no financial disclosures related to this content.
EYLEA Offers Dosing Flexibility in Wet AMD

3 FDA-Approved Dosing Regimens in Wet AMD

The recommended dose for EYLEA is 2 mg (0.05 mL) administered by intravitreal injection every 4 weeks (approximately every 28 days, monthly) for the first 3 months, followed by 2 mg (0.05 mL) via intravitreal injection once every 8 weeks (2 months). AMD = Age-related Macular Degeneration; Q4 = every 4 weeks; Q8 = every 8 weeks; Q12 = every 12 weeks.

**IMPORTANT SAFETY INFORMATION AND INDICATIONS**

**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.
- 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.

**REFERENCES**

*Please see Brief Summary of Prescribing Information on the following page.*
Although EYLEA may be dosed as frequently as 2 mg every 4 weeks (approximately every 25 days, monthly), additional efficacy was not demonstrated in most patients when EYLEA was dosed every 4 weeks compared to every 8 weeks. Some patients may need every-4-week (monthly) dosing after the first 12 weeks (3 months).

Although not as effective as the recommended every-8-week dosing regimen, patients may also be treated with one dose every 12 weeks after one year of effective therapy. Patients should be assessed regularly.

WARNINGS AND PRECAUTIONS (cont’d)
• 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 578) 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.

INDICATIONS
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).

EYLEA is a registered trademark of Regeneron Pharmaceuticals, Inc.
Intraocular inflammation 2% 3% 3% 4%
Lacrimation increased 3% 1% 4% 2%
Retinal detachment <1% <1% <1% 1%
Corneal edema 1% 1% 1% 1%
Foreign body sensation in eyes 3% 4% 4% 4%
Intraocular pressure increased 5% 7% 7% 11%
Cataract 7% 7% 13% 10%
Eye pain 9% 9% 10% 10%

5.2 Increase in Intraocular Pressure.

5.3 Thromboembolic Events.

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

In two embryofetal development studies, aflibercept produced adverse embryofetal effects when administered every three days in pregnant rats. These included fetal deaths, hydroptic fetuses, cardiac malformations, and skeletal malformations. The highest dose of aflibercept used in these studies produced systemic exposures (based on AUC for 2 mg/kg) that were 4- to 5-fold higher than those observed in humans after administration of a single intravitreal injection of 2 mg of aflibercept.

8.3 Females and Males of Reproductive Potential

8.4 Pediatric Use.

For additional information, please see the EYLEA full Prescribing Information available on HCP.EYLEA.US for product information. BRIEF SUMMARY—Please see the EYLEA full Prescribing Information available on HCP.EYLEA.US for product information.
n our increasingly complicated world, accessible technology is of major importance for individuals who are visually challenged. From the perspective of patients with visual impairments, their iPhones and Android devices are their most valuable personal assistants, with both having accessibility features, according to Yvonne Ou, MD, codirector of the Glaucoma Division and vice chair for Postgraduate Education, University of California, San Francisco.

A major feature of the iPhone is VoiceOver, a screen reader that can be activated within the iPhone settings. When anything on the iPhone is touched, the text is read to the iPhone user. This feature works with all apps built into the phone as well as with third-party apps. The camera in the iPhone can be used as a magnifier, a screen reader, and can help describe images.

A new technology is audio description enabling, a feature that is made available by, for example, Netflix and other online content providers. This feature comes in handy when watching a movie with a scene in which there is no dialogue.

“Movies that have audio description enabling embedded in them will describe the scene to the visually impaired viewer,” she explained.

Another useful program is called Seeing AI. This free app was developed by a Microsoft employee who is visually impaired.

“This app completes multiple tasks within 1 app instead of the user having to manipulate a large number of apps,” Ou said.

The tasks include identifying currency, identifying products using the QR code, and reading documents by detecting the edges of the document; it also uses artificial intelligence-enabled features that are more experimental, such as a scene feature that describes the surrounding environment, people, and facial expressions.

**BE MY EYES AND AIRA**

Be My Eyes is a free app that helps individuals who are visually challenged by connecting them with sighted volunteers via phone when they require visual assistance. When a person with visual impairment needs assistance, he or she can call and request the help of a sighted volunteer, who in turn, can then use the back camera on the phone to describe the scene to the caller. For example, Ou described helping people read labels on canned food and set the thermostat.

Currently, about 3.5 million volunteers are signed up to this app to help about 200,000 individuals with visual impairment. The app guarantees that the call for assistance will be answered within 45 seconds. In cases in which more privacy is needed than might be afforded by Be My Eyes, such as with legal or medical documents, one of Ou’s patients recommended an app named Aira (pronounced ira).

When using Aira, the person wears a pair of glasses, and a phone connects him or her to an agent to help with a desired task. The standard service costs about $100 per month for 120 minutes of service; if the subscriber opts to use the glasses but just the phone, the guest cost is free. The user also has access to free calls through this service when used in stores such as Walgreen’s or Target, or in some airports.

The Aira app was invaluable, according to Ou, to aid a runner with retinitis pigmentosa in completing the Boston Marathon without a guide. The runner was connected to a remote agent who described the course to him as he ran.

Although there are still many kinks to be worked out with the various tools, patients at least now have some options. However, as Ou pointed out, human interaction is a very important factor that facilitates tools such as Be My Eyes and Aira for patients.

Numerous challenges exist and accessibility is a huge issue for patients.

“Our websites need to be accessible to screen readers,” Ou said. “As ophthalmologists, optometrists, and vision care providers, we should make certain that our websites are accessible to screen readers. Online guidance can help with this.”

Artificial intelligence–enabled text descriptions of images remain problematic in her experience.

Sighted individuals can contribute to better accessibility for individuals with visual impairment by providing a description of the scene in their Instagram posts, for example. This has the effect of helping those who are visually challenged better experience what is being shared.

“Ophthalmologists can help their visually challenged and blind patients with their local communities,” Ou concluded. “Representatives from the Lighthouse for the Blind, for example, can help patients with the various available technologies as well as new technologies and getting connected.”

**YVONNE OU, MD**

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Dr Ou has no financial interests to disclose.
NORMAL TENSION GLAUCOMA (NTG) is a common entity—in the United States, it comprises approximately one-third of glaucoma cases and in Japan and China, respectively, about 80% to 90% and 70% to 85% of all cases.

IOP is the only medically treatable factor associated with glaucoma, but in NTG, IOP-lowering treatment may not always prevent progression of visual field (VF) and disc damage.

“Factors other than IOP may be responsible for progressive disc cupping and VF loss in the setting of normal eye pressures; genetic and other factors also play a role,” according to James C. Tsai, MD, MBA, president, New York Eye and Ear Infirmary of Mount Sinai and the DelafIELD-Rodgers Professor and System Chair, Department of Ophthalmology, Icahn School of Medicine at Mount Sinai, New York.

According to the American Academy of Ophthalmology, NTG is a subset of primary open-angle glaucoma (POAG) that has very characteristic optic disc, nerve fiber layer, and VF signs consistent with glaucoma: adult onset.

Tsai recounted and added that in isolated cases, the IOP can fluctuate slightly higher than 21 mm Hg. He cited a study1 that suggested NTG may have a different threshold for retinal ganglion cell death at a certain IOP compared with POAG. In addition, in a population-based study in the United States, the Beaver Dam Eye Study2 reported that approximately one-third of patients diagnosed with glaucoma had NTG.

It is noteworthy that NTG may be associated with older patient age compared with patients who have POAG. In addition, more women seem to develop NTG compared with men, and in cases with asymmetric disease, the eye with the higher IOP tends to have greater damage. Age, familial glaucoma history, myopia, peripapillary disc atrophy, vascular disease, vaso- spasms, migraines, and nocturnal hypotension are also associated risk factors for NTG.

Of note, the appearance of the optic discs in highly myopic young adults and middle-aged Chinese men resembles NTG, but the difference in these patients is that the VF damage progresses differently from that seen in POAG.3

“There are other mimickers of NTG that should be kept in mind,” Tsai said. These include nonglaucoma-tous optic nerve anomalies (eg, optic nerve coloboma/pit), vascular etiologic diseases (eg, temporal arteritis), neurological diseases (eg, pituitary tumor), and tonometric error (eg, thin central corneal thickness).

When taking a medical history in patients who may have NTG, he pointed out that in many cases they will report Raynaud phenomenon, migraines, coagulopathies, and autoimmune diseases. Some patients are thought to have serum autoantibodies and possibly some T-cell subset alterations in certain patients with NTG.4

The optic discs in patients with NTG often have thin disc rims with associated disc hemorrhages. Tsai cautioned that these disc hemorrhages can be extremely subtle and difficult to detect.

He mentioned that in the Collaborative Normal-Tension Glaucoma Study, the presence of disc hemorrhages was correlated strongly with NTG progression.5 It remains controversial whether the disc hemorrhages are the cause and/or the effect of NTG.

Some early studies have reported the presence of disc hemorrhages in eyes that were thought to be healthy, but in which the IOP later increased. Tsai pointed out, adding that this observation was confirmed later by the Ocular Hypertension Treatment Study.

Because NTG can be difficult to nail down, Tsai pays particular attention to the patients’ presenting complaints, such as difficulty reading or playing golf or tennis. He explained that clinicians first rule out ocular hypertension.

“When confirm glaucomatous cupping,” he said. “The glaucomatous VF has to correspond to a type of retinal nerve fiber layer loss that is observed on optic disc/peripapillary examination. Then, the extensive differential diagnosis must also be excluded.”

NTG is a diagnosis of exclusion, and Tsai warned that the list of exclusions is long. To rule out untreated OAG, Tsai advised measuring the IOP more often and throughout the day. Other disorders to look for are intermittent IOP elevations, angle closure, and corticosteroid-induced glaucoma. He also suggested that doctors consider glaucomatocystic crisis.

Burnt-out pigmentary glaucoma is another component of the differential diagnosis. In this disorder, patients have elevated IOP that is undetected when they are in their 20s to 30s; later on, the IOP decreases to the normal range (as the reverse pupillary block of their disease abates), and these patients present with marked disc cupping and VF defects, while the untreated IOP is measured in the normal range, Tsai explained. He emphasized that it is important to rule out a nonglaucomatous optic nerve.

The diagnoses that are more ominous and more important to rule out are neurologic in nature, such as a meningioma, adenoma of the pituitary gland, empty sella syndrome, Leber optic atrophy, and syphilis.

On top of this, there is the possibility that the patient has a tonometric error, a thin cornea, or just underwent LASIK. Tsai emphasized the importance of evaluating the cornea due to its impact on correctly making a diagnosis of NTG.

Another consideration when making a diagnosis is distinguishing compressive lesions from NTG. He cited a study by Greenfield et al in which the authors evaluated 52 eyes of 29 patients with glaucoma associated with normal IOP and 44 eyes of 28 control patients with compressive lesions.

The study showed that younger age, lower visual acuity, vertically aligned VF defects, and neuroretinal rim pallor are likely associated with an intracranial lesion. Another report added to that higher risk list and suggested that a mismatch between the degree of cupping and the size of the defect.

The checklist that points to NTG includes age 50 years and older, vision 20/40 or better, family history of glaucoma, no afferent pupillary defect, normal color vision, optic disc cupping symmetry, horizontal visual field defect, cupping greater than pallor, and presence of disc hemorrhage, Tsai enumerated.

Acuity below 20/40 is worrisome but is not always a positive indicator of NTG or a central nervous system lesion. In contrast, younger age, an afferent pupillary defect, abnormal color vision, vertical defect, and sharply defined areas of pallor greater than areas of cupping, all point to an intracranial lesion.

REFERENCES

By Lynda Charters; Reviewed by James C. Tsai, MD, MBA
IN THE RACE AGAINST GLAUCOMA, DURABILITY WINS

Glaucoma demands outcomes that endure. Results from the largest MIGS pivotal trial to date have shown that the Hydrus® Microstent delivers the greatest improvement compared to cataract surgery alone for IOP reduction and medication elimination at 24 months.1-4,*

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IM-0008 Rev D
van Herick to detect gonioscopic angle closure ranged from 58% among technicians to 79% among residents. “This is low sensitivity when screening patients for angle closure,” she noted.

A different study2 addressed risk factors associated with misdiagnosis when using the van Herick test to detect angle closure. Indirect assessment using the van Herick test can not miss angle closure but it also cannot detect angle pathology that could be present in patients with a deep anterior chamber and no obvious glaucoma risk factors. A classic example, Radhakrishnan said, is angle recession in a patient with an old and forgotten ocular injury.

These studies underscore the importance of directly viewing the angle structures with gonioscopy. This test provides a 360° assessment of the angle configuration.

“What the observer can perform indentation in angle closure and identify peripheral anterior synechiae as well as plateau configuration. We can also detect various other causes of elevated pressure,” Radhakrishnan said.

**GONIOSCOPY CANDIDATES**

In her glaucoma practice, Radhakrishnan performs gonioscopy on every patient. However, there is an argument that gonioscopy should be performed even in patients who do not have known risk factors for glaucoma.

“This is a strategy to opportunistically screen for angle closure,” she pointed out. It is also important to periodically repeat gonioscopy in phakic patients because even those in whom the angle is open at baseline can ultimately develop angle closure as a result of lens thickening over time.

**WHY TO LOOK FOR**

When performing gonioscopy, the main landmark and usually the most easily recognized one is the scleral spur, which lies between the pigmented trabecular meshwork and pigmented ciliary body.

Radhakrishnan said when she performs gonioscopy, she first locates the scleral spur. If it is not visible in the first quadrant examined, then she looks in another quadrant in which the trabecular meshwork pigmentation may be more prominent. If the scleral spur still is not visible, Radhakrishnan suggests tilting the gonioscopy lens slightly; if the spur remains undetectable, then she performs indentation gonioscopy to differentiate appositional from synechial angle-closure.

Pale trabecular meshwork may increase the difficulty in visualizing the scleral spur. In such patients, she recommends starting at the Schwalbe’s line (which can be identified with the corneal wedge technique) and working backward from there. Schwalbe’s line often is pigmented, especially in the inferior quadrant, and can be mistaken for the trabecular meshwork so care should be taken in interpreting the angle status to avoid misclassifying a closed angle as open.

When gonioscopy is performed in the operating room, different steps are necessary from those performed in the clinic.

Radhakrishnan referred residents, fellows, and novice surgeons to the American Academy of Ophthalmology website (www.aaa.org) for tips on gonioscopy in the operating room.

“The main consideration is that the microscope illumination changes from coaxial for cataract surgery to being directed along the iris plane and onto the angle,” she explained. “The microscope is tilted about 30° toward you and the patient’s head is turned about 30° to 40° away from you. This increases the working distance by several inches, which takes a little time to become accustomed to.”

Another difference from the examination performed in the clinic is that a surgical (direct) gonio lens is used in contrast to the indirect lens in clinic. A coupling agent is used on the cornea as well as adequate viscoelastic in the anterior chamber. She prefers Healon GV (Johnson & Johnson) for the cornea as well as the trabecular meshwork and pigmented ciliary body.

Radhakrishnan recounted:

**REFERENCES**


**ADVANCES IN MIGS & GLAUCOMA SURGERY**

Special Report 

**GONIOSCOPY**

(Continued from page 1)

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Radhakrishnan referred residents, fellows, and novice surgeons to the American Academy of Ophthalmology website (www.aaa.org) for tips on gonioscopy in the operating room.

“The main consideration is that the microscope illumination changes from coaxial for cataract surgery to being directed along the iris plane and onto the angle,” she explained. “The microscope is tilted about 30° toward you and the patient’s head is turned about 30° to 40° away from you. This increases the working distance by several inches, which takes a little time to become accustomed to.”

Another difference from the examination performed in the clinic is that a surgical (direct) gonio lens is used in contrast to the indirect lens in clinic. A coupling agent is used on the cornea as well as adequate viscoelastic in the anterior chamber. She prefers Healon GV (Johnson & Johnson) for the cornea as well as the trabecular meshwork and pigmented ciliary body.

Radhakrishnan recounted:

**REFERENCES**


**ADVANCES IN MIGS & GLAUCOMA SURGERY**

Special Report 

**GONIOSCOPY**

(Continued from page 1)
Microinvasive glaucoma surgery in children: Is there a role?

MIGS may help surgeons avoid long-term complications associated with tubes and trabeculotomy

By Steve Lenier; Reviewed by James D. Brandt, MD

Children's glaucoma is rare enough that it remains in many ways an orphan disease, according to James Brandt, MD, of the University of California Davis Medical Center.

According to Brandt, goniotomy and trabeculotomy for the treatment of children did not change much from the 1950s until the 1980s, when some progress was seen. Although we are now “in the midst of a golden age of surgical innovation,” children remain largely an afterthought.

Brandt emphasized that childhood glaucoma comprises many diseases and syndromes, pathophysiologies and treatment pathways, but that there are 2 key principles to keep in mind.

“First, we are playing a long game, trying to preserve vision for a lifetime,” he said. “In the first few years of life, amblyopia is the often-neglected enemy. So, it is important to move quickly to clear the visual axis and move on if your initial treatment fails. Second, think ahead and preserve options for subsequent procedures.”

There are several current microinvasive glaucoma surgery (MIGS) options that are either on the market or coming soon. Brandt said he divides them between angle-based and translimbal or fistulizing procedures.

In general, the preferred initial approach for the management of pediatric glaucoma is to resect the angle using, when feasible, an ab interno approach to preserve the conjunctiva for future surgery.

Despite the excitement about new angle-based MIGS procedures, Brandt said he believes that for childhood glaucoma, the most interesting area to watch in the coming years is the fistulizing translimbal space.

Angle surgery does fail in many children over time, he points out, and having less-invasive options that can be performed before moving on to more aggressive and invasive alternatives such as trabeculectomy and tubes will represent an important advance.

**ANGLE-BASED MIGS**

Brandt says the answer to whether there is a role for angle-based MIGS in children is both yes and no. It is always preferable to resurrect the patients’ own drainage system with incisional angle surgery, especially because this can work for years, if not a lifetime, in selected patients. However, implant-based angle surgery such as the iStent Inject (Glaukos Corporation) or Hydrus (Ivantis, Inc) probably adds no additional benefit and may result in further risk with a piece of metal in the eye for decades.

“I do not think any of the implanted angle devices are appropriate in young children and probably should be avoided,” he said.

Brandt said he believes that the mechanism of goniotomy and trabeculotomy in childhood glaucoma is more than just establishing flow into Schlemm’s canal. He has followed many children into adulthood. He described 1 patient in whom he performed an ab externo trabeculotomy in infancy, treating only the superior angle.

Upon gonioscopy 28 years later, a few superior peripheral anterior synchia could be seen, but the rest of the angle is now completely normal. Brandt suggests that in infants, goniotomy and trabeculotomy both restart the embryologic maturation of the anterior chamber angle. Currently, most pediatric glaucoma specialists perform circumferential trabeculotomy as their preferred initial approach, and childhood glaucoma is clearly benefiting from innovation in the adult space. This began with circumferential ab externo approaches introduced by Allen Beck, MD, and Mary Lynch, MD, in the 1990s. The introduction of the illuminated microcatheter made this procedure more predictable and safer. Surgeons have since moved to an ab interno approach—goniopsy-assisted translimbal trabeculotomy. Brandt says this procedure can be challenging to perform in infant eyes.

“This is my go-to procedure in primary congenital glaucoma but primarily in older children. Because excising tissue in primary congenital glaucomas that might be needed to regenerate the scaffold of the meshwork may not be a good thing, Brandt said he does not use the Kahook Dual Blade in very young children but finds it extremely useful in older children with steroid-induced or uveitic forms of glaucoma. Published cases are limited and show mixed results in very young children, but it promises to play an important role in older children, especially those with secondary glaucomas.

**TRANSLIMBAL MIGS**

Brandt predicts translimbal MIGS will play an important and increasing role in the management of childhood glaucoma.

“I have been performing glaucoma drainage device implants and trabeculectomies in children for 30 years,” he said, “Long-term follow-up can be very humbling when patients return decades later with late hardware erosions or bleb leaks. Translimbal MIGS may offer a safer option before we move on to these invasive options.”

The XEN implant (Allergan) can be used off label to perform translimbal MIGS in children while the PreserFlo MicroShunt (Santen), a minimally invasive glaucoma drainage microtube, is currently under FDA review in the United States.

Smith and colleagues recently published an observational study of 3 eyes with the XEN implant. Brandt says the results look promising, but he has some concerns. Although the XEN is touted as “permanent,” there are little published data on degrad-
Is the time right for crosslinking?
For practices yet to jump into CXL, changes may warrant closer look

By Eric D. Donnenfeld, MD; Special to Ophthalmology Times

CORNEAL COLLAGEN CROSSLINKING (CXL) for the treatment of keratoconus is a procedure that has stood the test of time. Available in Europe for the past 15 years and nearly 4 years in the United States, it is by now well established as a great option for patients with progressive keratoconus.1 Unlike any other treatment for keratoconus, CXL is effective at slowing or halting disease progression,2-4 while improving vision-related quality of life.5,6

Many cornea practices were early adopters of CXL technology, but the time may be right for comprehensive ophthalmologists to explore this technology, as well. CXL is certainly well within the skill set of any anterior segment surgeon. As our practices emerge from the global health and financial crisis caused by the COVID-19 pandemic, CXL is a procedure that can begin sooner than some others, given its minimally invasive nature and younger candidate pool. Recent data suggest a higher level of patient need for treatment than previously thought.7 And we now have a much clearer reimbursement path and lower barriers to entry than existed in the early years of CXL availability in the United States.

HIGHER INCIDENCE AND PREVALENCE OF KERATOCONUS
The prevalence of keratoconus (Figure 1, Page 19) has generally been accepted to be approximately 1 in 2,000 or 1 in 3,000, making it a relatively rare condition.8 More recently, an analysis of 4.4 million patients covered by the Netherlands’ largest health insurer found an annual incidence and estimated prevalence of keratoconus that is 5–10-fold higher than historical estimates (Figure 2, Page 19).9 The researchers found that keratoconus affected about 1 in 7,500 people in the 10- to 40-year-old age group each year, for an overall prevalence within the population of 1 in 375 people, or 265 per 100,000.7 A number of factors have likely contributed to this jump in prevalence. First, computer-based corneal imaging technologies have improved dramatically, leading to earlier and more accurate diagnoses.8 We know that keratoconus has a genetic predisposition, which is often compounded by iatrogenic factors such as eye rubbing, and that it is more common in patients with longer axial length and more highly myopic eyes.10 So, with rising rates of myopia/high myopia and obesity, which have been associated with sleep apnea and eye rubbing, it is not surprising that we are seeing more cases of keratoconus. Given the higher estimates of keratoconus prevalence in the population, we likely do not have enough cornea specialists or current CXL providers to treat all of the cases that are currently emerging.

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For several years, Brandt has held discussions with the FDA about how to design pediatric MIGS studies, or at least collect early safety data. He proposed a pediatric study of the PreserFlo MicroShunt and then worked with the FDA and a team at Santen to refine a compassionate-use Investigational Device Exemption, in order to start using the device under a tightly controlled institutional review board-approved protocol. The compassionate-use Investigational Device Exemption was granted by the FDA in November 2019, and Brandt received institutional review board approval in December. He has since placed 3 of the PreserFlo MicroShunt devices in young children. All are doing well with IOPs in the low teens, now up to 5 months out, according to Brandt.

“Of course,” said Brandt, “we are not collecting safety data prospectively for children.”

FDA CONCERNS
For several years, Brandt has held discussions with the FDA about how to design pediatric MIGS studies, or at least collect early safety data. He proposed a pediatric study of the PreserFlo MicroShunt and then worked with the FDA and a team at Santen to refine a compassionate-use Investigational Device Exemption, in order to start using the device under a tightly controlled institutional review board-approved protocol. The compassionate-use Investigational Device Exemption was granted by the FDA in November 2019, and Brandt received institutional review board approval in December. He has since placed 3 of the PreserFlo MicroShunt devices in young children. All are doing well with IOPs in the low teens, now up to 5 months out, according to Brandt.

“The is anecdotal, but really pretty scary,” he explained. “We are not collecting safety data prospectively for children.”

Brandt concluded that he looks forward to working further with the FDA and other stakeholders to develop study design guidance so that the surgical management of childhood glaucoma is no longer an afterthought.

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JAMES D. BRANDT, MD
Dr Brandt receives research and travel support from ForSight VISIONS Laboratories, is a consultant and conducts research for Allergan, is a consultant to Aerie Pharmaceuticals, and is a stockholder and former advisory board member for Glaukos Corporation.
Everyone who would benefit right now. There is a need for CXL, providing the procedure is a significant service to the community.

Reimbursement Path

Early on, as with many new ophthalmic procedures, there were problems with reimbursement for CXL that made many practices hesitant to offer it. Today, the majority of commercial health plans in the United States—representing more than 95% of commercially covered lives—recognize CXL with the FDA-approved drugs and device as covered services, so the barriers to launching CXL within a practice have been significantly lowered.

The procedure can be performed in the office or in a surgery center environment. There is only 1 CXL system approved in the United States: The KXL system, used along with Photrex Viscous (riboflavin 5'-phosphate in 20% dextran ophthalmic solution) and Photrex (riboflavin 5'-phosphate ophthalmic solution) (all from Avedro, now part of the Glaukos Corneal Health Division). The return on investment is rapid, with most practices able to recoup their investment in a year or less. The company has recently expanded both its reimbursement support and financing options to ease the acquisition process for practices.

The ophthalmic solutions now have a J code for reimbursement, so there is not as much concern about receiving adequate compensation for needed supplies. The procedure typically takes a total of 1 to 2 hours, so practices need to allocate appropriate clinical staff time and space in the office for a procedure of that duration.

CXL is indicated and reimbursed for progressive keratoconus, so it is important to establish procedures for documenting progression. This process does not need to be daunting. Although the ideal would be to have serial topographies demonstrating progression, we also know that the chance of progression in patients younger than 25 years of age is very high, and historical topography may not be available.

In these younger patients, a significant increase in the manifest refraction (myopia or cylinder) over the course of 1 to 2 years with a keratoconus topography map may be sufficient evidence of progression. In the absence of patient records, prior spectacles may be useful in evaluating changes in refraction. Although keratoconus progression slows or stops, on average, by age 40, there are certainly individuals who progress well beyond the typical range, into their 60s.11 In my experience, these patients are most likely to be significant eye rubbers, particularly with floppy eyelid syndrome12 and sleep apnea,13 so I follow such patients carefully.

With a clear reimbursement pathway and fewer hurdles to beginning CXL, ophthalmologists can now viably perform the procedure, meeting a significant patient need.

This, of course, also requires a redoubling of efforts to educate local physicians and optometrists about keratoconus and CXL. I believe we are moving rapidly toward a new paradigm in which any young patient who develops myopia and astigmatism should undergo corneal topography.

We need low-cost, accessible topographers so that more optometrists can routinely perform this diagnostic test as part of their exam. Making the diagnosis and undergoing CXL even a year or 2 earlier can mean the difference between a lifetime of quality vision with glasses and the need to wear specialty rigid gas permeable or scleral contact lenses. Patients who are able to successfully remain in contact lenses have a reduced risk of requiring a corneal transplant in the future.14 We owe it to our patients to give them the opportunity to achieve the best possible outcomes.

References


Eric D. Donnenfeld, MD

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Helping patients who do not respond to anti-VEGF therapy

Study rejects notion of ‘nonresponders’ to therapeutic option

By Lynda Charters; Reviewed by Saghar Bagheri, MD, PhD, and Demetrios G. Vavvas, MD, PhD

Anti-vascular endothelial growth factor (VEGF) drugs reduce vision loss in patients with neovascular age-related macular degeneration (AMD). As a result, these drugs have become the primary go-to therapies for ophthalmologists.

However, a substantial number of patients do not respond to this therapy, or do so to an inadequate degree. Those calculations have been reported to range from 10% to 50% depending on the study, despite receiving monthly injections of anti-VEGF therapies.

A team of researchers from Harvard disagree with the notion that there are high percentages of patients who do not respond to anti-VEGF therapy for neovascular AMD. In fact, they claim there are no nonresponders to anti-VEGF therapy. They maintain that the so-called non-responders actually respond, but for a shorter duration than most, according to principal investigator Demetrios G. Vavvas, MD, PhD, associate professor of ophthalmology, and co-first author Saghar Bagheri, MD, PhD, clinical research fellow at Massachusetts Eye and Ear Infirmary, Department of Ophthalmology, at Harvard Medical School, in Boston.

The investigators pointed out that for many patients, the maximum anti-VEGF treatment effect occurs prior to the standard week-4 assessment, and on average occurs at 3 weeks postinjection. They explain that this was anticipated by the pharmacokinetic data. For this reason, the phase 2 tolerability and efficacy study of dose escalation of ranibizumab (Lucentis, Genentech Inc) included a cohort of patients dosed at 2-week intervals.

This study showed that the 2-week interval was tolerated and showed trends for superior outcomes compared with the longer interval. However, in the phase 3 study, only monthly dosing was tested out of convenience.

The PrONTO study recorded data on weeks 1, 2, and 4 after the first injection of Lucentis (40 patients) and reported that visual acuity levels were similar at 2 and 4 weeks. They also reported that the status of subretinal or intraretinal fluid was not statistically significantly different between these time points (~30%–25% of patients had subretinal fluid). This study unfortunately reported averages of all patients and did not report details on the cohort with persistent subretinal fluid.1 A previous pharmacokinetic study reported that the optimal dose interval is less than 4 weeks and more likely 2 to 3 weeks.2

This finding was confirmed by a recent biweekly bevacizumab study (Avastin, Genentech, Inc), which showed that 20% of patients had improved central macular thickness and total macular volume.

Based on the lack of prior consensus, co-first authors Bagheri and Georgios Bontzos, MD, and colleagues conducted a multicenter observational study that included 48 patients with neovascular AMD; 25 patients were treatment-naïve, and the remainder had been treated with ranibizumab (mean number of previous injections, 8.5).

All patients in the study were treated with ranibizumab (0.5 mg/0.05 mL) and were examined weekly for 4 weeks using spectral-domain optical coherence tomography. The investigators assessed the time to maximal reduction of the central retinal thickness (CRT) and the presence of sub- and intraretinal fluid. The main outcome measure was the time to the maximal reduction of the CRT and the intra- and subretinal fluid, Bagheri recounted.

VALUE OF WEEKLY ASSESSMENTS

The study comprised 19 men and 29 women (mean age, 74 years). Interestingly, during week 1 after injection, 3 patients (6.3%) had the smallest CRT value, 11 patients (22.9%) had the smallest value during the second week, and 17 patients (35.4%) each had the smallest value during the third and fourth weeks. Considered together, “Two-thirds (64.6%) reached the maximal CRT reduction earlier than the standard 4-week interval,” they emphasized.

Analysis also showed that 20% of patients who were treatment-naïve and 34.8% of patients who underwent treatment had a CRT at week 4 that was actually more than 35 mm thicker than the earlier lowest CRT value. The study showed the time to reach the lowest CRT value was not associated with the axial length, age, lens status, or history of injections.

The authors suspect that disease load and drug clearance from the eye rather than ocular volume and intracocular drug concentration may be stronger determinants responsible for the duration of anti-VEGF treatment effect and time to maximal structural response.

Invasive studies with aqueous tap will be needed to determine the variability of anti-VEGF response with more certainty.

The important points of this study are that optimal dosing might be shorter than 4 weeks for a sizable percentage of patients, and most patients who were considered poor or nonresponders may be seen as responding if they are evaluated prior to the standard 4-week assessment. The authors conclude that these results imply that with a current dosing regimen of 4 weeks or more, there is a partial escape of VEGF suppression for many patients, which may have implications for progression of neovascular and nonneovascular components of the disease.

Finally, the disease load seems to drive the anti-VEGF treatment duration rather than the ocular volume. The limitations of this study are the small patient number, the investigation of structural treatment response without description of visual outcomes, and the short study duration. The results were reported in Ophthalmology Retina.3

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DEMETRIOS G. VAVVAS, MD, PhD
Dr Vavvas is a consultant to OI Pharma Ventures, Inc and to Fovista, Inc.

SAGHAR BAGHERI, MD, PhD
Dr Bagheri is a consultant to NIH and medical director of clinical research at OI Pharma Ventures, Inc.
Glaucoma treatment alternatives: Thinking outside the box

Treatment options may expand beyond surgery, medication, and lasers

By Lynda Charters; Reviewed by Shan C. Lin, MD

Most patients with glaucoma respond to some degree to medical, laser, or surgical therapies designed to lower IOP; however, there are some who may or may not prefer additional routes to lower IOP or protect their optic nerves.

Although the only proven therapies are those that lower IOP and include medications, lasers, and surgeries, patients frequently inquire about using marijuana, ginkgo biloba, Memantine, acupuncture, meditation, blood pressure modification, and perhaps certain supplements as possible therapeutic candidates, Shan C. Lin, MD, commented.

Marijuana, which is legal for use in California, does lower IOP, but the duration of the effect is very short—about 3 hours—which would require that the patient use the drug almost continuously. Potential downsides, Lin noted, are concomitant lowering of the ocular perfusion pressure (by lowering the blood pressure) and addiction. The American Academy of Ophthalmology does not recommend marijuana as a primary treatment for glaucoma. “There are better treatments to lower eye pressure, and it is not something that I recommend to my patients,” Lin said.

Ginkgo was described by Lin as a “relatively interesting agent” to treat glaucoma and other diseases. It is an herbal supplement obtained from the leaves of the ginkgo tree and has been used in Chinese medicine for 5000 years. The compounds in the herb include flavonoids, lactones, and cyanidins—all antioxidants.

While it has not been completely established exactly how these molecules work, they may be helpful in the treatment of Alzheimer disease, stroke, and possibly glaucoma,” he said.

In addition to antioxidant activity, ginkgo also preserves the mitochondria, inhibits apoptosis, and possibly increases blood flow. A study supporting the use of ginkgo appeared in Ophthalmology, patients who had glaucoma with a significantly affected pretreatment mean deviation were instructed to take ginkgo for 4 weeks, and improved visual fields were observed with a substantial decrease in the amount of mean deviation. The results of a retrospective study of ginkgo for normal tension glaucoma found a positive effect in that the herb may stop disease progression.

Memantine seemed to be a promising option at the point and was studied in a large clinical trial for 5 years, but neither doses of the drug were superior to placebo in preventing progression.

Memantine works to prevent apoptosis by blocking the calcium channels in the retinal ganglion cells, Lin explained. “Calcium influx into the retinal ganglion cells starts the apoptotic cascade; Memantine starts early in the cascade to prevent cell damage and death,” he clarified. Memantine is approved in the United States and Europe to treat dementia, but it can cause some neurologic adverse events.

Acupuncture has been used to treat glaucoma, but no effects were seen regarding IOP lowering, visual fields, or nerve scans in a recent University of California, Los Angeles study. In fact, slight increases in the IOP were seen after the acupuncture sessions. The blood pressure was lower in the non-eye-related treatment group. Lower blood pressure for patients with glaucoma may be harmful to their optic nerve perfusion.

Meditation in patients with glaucoma who were randomized to this activity was found to lower IOP by about 4 mm Hg compared with a control group in a study by Dada et al. Lin noted that although positive effects were seen in IOP and specific chemical mediators in the body, a drawback is that patients are reluctant to undertake meditation.

Perfusion pressure, that is, the difference between blood pressure and IOP, is also a factor for consideration when treating glaucoma. Interestingly, Lin noted lower blood pressure is detrimental for patients with glaucoma. “This is the new paradigm,” he said and cited the results of the Barbados Eye Study in which lower blood pressure was associated with lower ocular perfusion pressure. He also mentioned the Early Manifest Glaucoma Trial, which found that glaucoma progression was associated with lower ocular perfusion pressure.

Lin asks his patients about the status of their blood pressure and often coordinates his treatment with primary care doctors if there is pathologically low blood pressure. Another powerful finding is that taking blood pressure medications at night (as many patients do) results in lower stroke and heart disease risk. However, taking blood pressure medications at night is less than beneficial for the perfusion pressure because blood pressure is typically lower at night already.

Other available supplements that patients can consider to possibly counteract progressive glaucoma are black currant, Mirtogenol tablets (a combination of blueberries and pine bark extract), palmityloethanolamide, and omega-3 fatty acids. Small studies have shown that they may lower IOP, increase ocular blood flow, or be neuroprotective. Generally, the go-to treatments for glaucoma remain drops, laser, and surgeries.

“However, for patients whose glaucoma is progressing, these other agents, such as supplements and meditation, may have potential value,” Lin concluded.

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Dr. Lin has no relevant financial interests to disclose. Dr. Lin is investigator of research at the Glaucoma Center of San Francisco.
Myths and misconceptions about autologous serum for dry eye

The logistics of prescribing ASEDs have changed dramatically in recent years

By Joseph Tauber, MD; Special to Ophthalmology Times

**AUTOLOGOUS SERUM EYE drops (ASEDs) have become a mainstay of therapy for certain categories of patients with dry eye and those with underlying immunologic disease or poor epithelial healing. The logistics of prescribing ASEDs have changed dramatically in the past few years, making their use far more convenient for patients and physicians alike. Many still hold on to myths and misconceptions about ASEDs that are no longer true.**

**MYTH NO. 1: AUTOLOGOUS SERUM IS A TREATMENT OF LAST RESORT MOSTLY USED BY CORNEA SPECIALISTS**

**FACT:** Although ASEDs are not an entry-level treatment for dry eye, they are certainly not the most aggressive treatment option available either. In the dry eye setting, ASEDs are commonly prescribed for very symptomatic patients who do not achieve sufficient relief from artificial lubricants and for those with concerning levels of keratitis (regardless of symptoms). We also use ASEDs very early in the treatment course. In my view, every comprehensive ophthalmologist should consider ASEDs as part of their armamentarium, for 3 reasons. First, the drops, which are derived from a patient’s own serum, are very safe for the patient, with very few adverse events reported in the literature.1,2 For the clinician, the process of prescribing ASEDs today is no more difficult than writing any other prescription (see myth No. 2). And finally, ASEDs offer a unique mechanism of action that complements other therapies.

**MYTH NO. 2: GETTING ASEDs INTO PATIENTS’ HANDS IS A COMPLEX PROCESS**

**FACT:** This used to be true, but today, I can prescribe ASEDs as I would any other therapy, thanks to a turnkey operation available from Vital Tears. I simply write a prescription, which my technician enters into a web order form with the patient identification details, and Vital Tears arranges the rest. The patient can choose to have blood drawn at a designated lab facility, in a doctor’s office, or by a mobile phlebotomist at home. The blood is centrifuged to separate the solid platelets and red and white blood cells from the liquid serum. The serum is sent to a central lab in Kansas City, where it is diluted, bottled, and packaged for delivery.

**MYTH NO. 3: PATIENTS WILL NOT BE WILLING TO ABSORB THE COST OR HASSELS OF ASEDs**

**FACT:** ASEDs need to be frozen or refrigerated and typically are not covered by insurance, so there are some differences between these and ordinary topical medications. However, patients who are prescribed ASEDs are often in considerable distress and are very willing to follow the simple storage directions for the tradeoff of easing their pain and improving their vision. They keep 1 bottle per week in the refrigerator, with the rest frozen until needed. Patients can expect to see an improvement in their symptoms within 7 to 10 days. When I think about my patients with dry eye on ASEDs, there are very few instances when patients have said, “You know, this really isn’t helping me and I want to stop it.” I get that report all the time from patients on the topical anti-inflammatory agents we prescribe for dry eye, due to lack of efficacy, discomfort, inconvenience, or cost.

**MYTH NO. 4: IT’S NOT SAFE TO USE BLOOD PRODUCTS**

**FACT:** In the past, this was absolutely true, because preparing ASEDs could expose the physician, pharmacist, and/or technicians to bloodborne infectious agents. Today, with the Vital Tears ASEDs that we use or other local phlebotomy/eye bank sources that doctors have identified, blood products are handled by those trained to work with blood and human fluids and are prepared under sterile conditions with strict quality controls. Under these conditions, ASEDs are arguably safer for patients than many other medications we prescribe because an autologous drop would not be expected to have any corneal toxicity.

**MYTH NO. 5: THERE IS NO EVIDENCE THAT ASEDs ARE EFFECTIVE**

**FACT:** ASEDs have been shown in the literature to have very good results in many subsets of patients, including those with dry eye.3,4,5 Autoimmune disease, slow or nonhealing epithelial defects,7,8 and chemical injury.9 Randomized, controlled studies would be beneficial, but clinicians can feel very comfortable that ASEDs have a long history of safe and effective use. Moreover, treatment algorithms from the American Society of Cataract and Refractive Surgery, the Tear Film and Ocular Surface Society, and the International Task Force on Dry Eye all incorporate ASEDs as a recommended treatment for moderate to severe dry eye.10,12

**REFERENCES**


**JOSEPH TAUBER, MD**

Dr. Tauber is fellowship-trained in both cornea and uveitis. He is in private practice at the Center for Eye Care in Kansas City, Missouri, and serves as the medical director for Saving Sight Eye Bank, where Vital Tears are produced. He has no financial interest in Vital Tears.
INDICATIONS AND USAGE
XELPROSTM (latanoprost ophthalmic emulsion) 0.005% is indicated for the reduction of elevated intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension.

IMPORTANT SAFETY INFORMATION
CONTRAINDICATIONS
XELPROS is contraindicated in patients with a known hypersensitivity to latanoprost, or any other ingredients in this product.

WARNINGS AND PRECAUTIONS
Pigmentation: XELPROS may cause changes to pigmented tissues. The most frequently reported changes are increased pigmentation of the iris, periorbital tissue (eyelid), and eyelashes. Pigmentation is expected to increase as long as XELPROS is administered. After discontinuation of XELPROS, iris pigmentation is likely to be permanent. Patients who receive treatment should be informed of the possibility of increased pigmentation. The long-term effects of increased pigmentation are not known.

Eyelash Changes: XELPROS may gradually change eyelashes and vellus hair in the treated eye, including increased length, thickness, pigmentation, and number of lashes. The changes are usually reversible upon discontinuation of treatment.

Intraocular Inflammation: XELPROS should be used with caution in patients with a history of intraocular inflammation (iritis/uveitis) and should generally not be used in patients with active intraocular inflammation.

Macular Edema: XELPROS should be used with caution in aphakic patients, in pseudophakic patients with a torn posterior lens capsule, or in patients with known risk factors for macular edema.

Herpetic Keratitis: XELPROS should be used with caution in patients with a history of herpetic keratitis. XELPROS should be avoided in cases of active herpes simplex keratitis because inflammation may be exacerbated.

Bacterial Keratitis: There have been reports of bacterial keratitis associated with the use of multiple-dose containers of topical ophthalmic products.

Use with Contact Lenses: Contact lenses should be removed prior to administration of XELPROS and may be reinserted 15 minutes following administration.

ADVERSE REACTIONS
The most common ocular adverse reactions in clinical trials (incidence ≥5%) for XELPROS were eye pain/stinging, ocular hyperemia, conjunctival hyperemia, eye discharge, growth of eyelashes, and eyelash thickening.

DRUG INTERACTIONS
Precipitation may occur if drugs containing thimerosal are used concomitantly with XELPROS. If such drugs are used, they should be administered at least 5 minutes apart.

Please see brief summary of Full Prescribing Information on the adjacent page.
Brief Summary of Prescribing Information for XELPROSTM (latanoprost ophthalmic emulsion) 0.005%,
for topical ophthalmic use

XELPROSTM (latanoprost ophthalmic emulsion) 0.005%
See package insert for Full Prescribing Information.

INDICATIONS AND USAGE
XELPROS is indicated for the reduction of elevated intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension.

CONTRAINDICATIONS
Known hypersensitivity to latanoprost, or any other ingredients in this product.

WARNINGS AND PRECAUTIONS
Pigmentation
XELPROS may cause changes to pigmented tissues. The most frequently reported changes are increased pigmentation of the iris, periorbital tissue (eyelid), and eyelashes. Pigmentation is expected to increase as long as XELPROS is administered. After discontinuation of XELPROS, iris pigmentation is likely to be permanent. Patients who receive treatment should be informed of the possibility of increased pigmentation. The long-term effects of increased pigmentation are not known.

Eyelash Changes
XELPROS may gradually change eyelashes and vellus hair in the treated eye, including increased length, thickness, pigmentation, and number of lashes. The changes are usually reversible upon discontinuation of treatment.

Intraocular Inflammation
XELPROS should be used with caution in patients with a history of intraocular inflammation (iritis/uveitis) and should generally not be used in patients with active intraocular inflammation.

Macular Edema
XELPROS should be used with caution in aphakic patients, in pseudophakic patients with a torn posterior lens capsule, or in patients with known risk factors for macular edema.

Herpetic Keratitis
XELPROS should be used with caution in patients with a history of herpetic keratitis. XELPROS should be avoided in cases of active herpes simplex keratitis because inflammation may be exacerbated.

Bacterial Keratitis
There have been reports of bacterial keratitis associated with the use of multiple-dose containers of topical ophthalmic products.

Use with Contact Lenses
Contact lenses should be removed prior to administration of XELPROS and may be reinserted 15 minutes following administration.

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

Across multiple clinical trials conducted with XELPROS, the most frequently reported ocular adverse reactions were eye pain/stinging upon instillation and ocular hyperemia, reported in 55% and 41% of patients treated with XELPROS, respectively. Other adverse reactions reported (incidence ≥5%) were conjunctival hyperemia, eye discharge, growth of eyelashes, and eyelash thickening. Less than 1% of patients discontinued therapy because of intolerance to the eye pain/stinging or to the ocular hyperemia.

DRUG INTERACTIONS
Precipitation may occur if drugs containing thimerosal are used concomitantly with XELPROS. If such drugs are used, they should be administered at least 5 minutes apart.

USE IN SPECIFIC POPULATIONS
Pregnancy
Pregnancy Category C
Reproduction studies have been performed in rats and rabbits. In rabbits, an incidence of 4 of 16 dams had no viable fetuses at a dose that was approximately 80 times the maximum human dose, and the highest nonembryocidal dose in rabbits was approximately 15 times the maximum human dose. There are no adequate and well-controlled studies in pregnant women. XELPROS should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Nursing Mothers
It is not known whether latanoprost or its metabolites are excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when XELPROS is administered to a nursing woman.

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

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

PATIENT COUNSELING INFORMATION
Potential for Pigmentation
Advise patients about the potential for increased brown pigmentation of the iris, which may be permanent. Patients should also be informed about the possibility of eyelid skin darkening, which may be reversible after discontinuation of XELPROS.

Potential for Eyelash Changes
Inform patients of the possibility of eyelash and vellus hair changes in the treated eye during treatment with XELPROS. These changes may result in a disparity between eyes in length, thickness, pigmentation, number of eyelashes or vellus hairs, and/or direction of eyelash growth. Eyelash changes are usually reversible upon discontinuation of treatment.

Handling the Container
Instruct patients to avoid allowing the tip of the dispensing container to contact the eye or surrounding structures because this could cause the tip to become contaminated by common bacteria known to cause ocular infections. Serious damage to the eye and subsequent loss of vision may result from using contaminated emulsions.

When to Seek Physician Advice
Advise patients that if they develop an intercurrent ocular condition (eg, trauma or infection) or have ocular surgery, or develop any ocular reactions, particularly conjunctivitis and eyelid reactions, they should immediately seek their physician's advice concerning the continued use of the multiple-dose container.

Use with Contact Lenses
Advise patients that contact lenses should be removed prior to administration of the emulsion. Lenses may be reinserted 15 minutes following administration of XELPROS.

Use with Other Ophthalmic Drugs
Advise patients that if more than one topical ophthalmic drug is being used, the drugs should be administered at least 5 minutes apart.

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Mechanical dry eye (MDE), also known as conjunctivochalasis, is a condition in which loosened, shortened, and wrinkled conjunctiva interferes with the tear meniscus and diminishes the fornix or tear reservoir. This condition occurs when the underlying Tenon’s capsule is degenerated by matrix metalloproteinases.\(^1,2\)

This wrinkled tissue occupies the tear reservoir and prevents the eye from holding tears, which causes pain and irritation (that feels similar to dry eye symptoms) as well as fluctuating vision. Often, some of the wrinkled conjunctival tissue can disrupt the tear meniscus at the edge of the eyelids. When a patient blinks, this wrinkled conjunctiva can rub against the eye, causing further irritation and redness to an already inflamed eye.

Conjunctivochalasis is an often-overlooked cause of recalcitrant dry eye symptoms. Evaporative tear dysfunction and aqueous tear deficiency are common topics of discussion, but many of us are either not familiar with MDE or we are familiar with it, but we do not specifically look for it. And if we do not look for it, we are not going to find it.

The best way to look for—and at—MDE is with fluorescein and a cobalt blue light, preferably with a slit lamp. If that is not available, you can bring a yellow filter into the light path on the other side of the microscope between the patient’s eye and the viewing microscope. The yellow filter highlights the redundant conjunctival folds, the corrugated conjunctiva in the interpalpebral space, and punctate staining of the cornea and the conjunctiva.

Looking for and identifying MDE is critical to an effective treatment plan, as is clear communication with the patient.

There are 4 factors that contribute to ocular surface disease (OSD): exposure to the environment, inflammation, quantity of aqueous tear production, and tear quality, which relates to instability of the tear film.

Patients should also be aware that MDE is often a fifth factor. If we don’t explain this up front, we may find ourselves having to introduce MDE as yet another issue late in the process, which can be a source of frustration to the patient. We find it best to provide information about MDE as a possible contributing factor to OSD no later than the second visit.

**TREATMENT PLAN**

When we diagnose MDE, we treat all other OSD factors nonsurgically first. Treatments to improve meibomian gland flow might include consistent daily, 15-minute applications of hot compresses, lid massage (possibly with NuLids [NuSight Medical], azithromycin or doxycycline topically or systemically, and an omega-3/omega-6 combination, such as HydroEye [ScienceBased Health]).

In some instances, we consider other meibomian gland–directed treatments such as LipiFlow (Johnson & Johnson), iLux (Alcon), MiBo Thermoflow (MiBo Medical Group), or other treatments to directly heat the oil glands and manually express them. If ocular surface inflammation is present, it may be treated with a steroidal eye drop, such as a loteprednol derivative fluorometholone acetate (Flarex, EyeVance Pharmaceuticals).

Furthermore, we educate patients about how important it is to become more aware of their environment and to avoid any unnecessary airflow blowing across their face and eyes. If patients can avoid airflow across their eyes, they will experience less evaporation of an already unstable tear, as well as less dryness, irritation, discomfort, burning, and stinging.

We explain to patients that we only produce a certain amount of tears in a day, and we want to preserve the tear quantity as much as possible by decreasing evaporation and improving tear stability.

When examining a patient who has MDE, we see “the tip of the iceberg,” because the redundant conjunctival folds are just above the lower lid margin where the tear meniscus is supposed.
MDE

(Continued from page 27)

to be. When we look at the interpalpebral conjunctiva, we see a corrugated conjunctival pattern, which may be a sign of persistent exposure to the elements and breakdown of the Tenon’s capsule underneath the conjunctiva.

Matrix metalloproteinases cause an inflammatory cascade that breaks down the tight junctions of the Tenon’s capsule, causing the Tenon’s capsule to lose its tight adherence, and the conjunctiva becomes disinserted from both the underlying episclera as well as down in the inferior cul-de-sac and the inferior fornix.1,2

The excess conjunctival folds that occupy the area of the tear meniscus in MDE prevent the normal position of the meniscus from forming, so when the upper eyelid tries to “grab” on to the meniscus, it is not there. In addition, this redundant, loose conjunctiva and Tenon’s capsule interfere with the tear reservoir behind the lower lid that is supposed to be occupying the inferior cul-de-sac.

We defer surgery when we have exhausted all nonsurgical treatments and the patient still feels their symptoms are not adequately controlled. If symptoms are not adequately controlled after 3 to 6 months, surgical treatments may include cautery, argon laser, incisional/glue approaches, and cryopreserved amniotic membrane surgery. Some of our colleagues prefer using a radiofrequency (RF) device to cauterize and tack down the loose conjunctiva and Tenon’s capsule, but in my opinion, this approach does not address the underlying problem. We have seen many individuals who have had either undergone cauterization or RF of the conjunctiva, and their symptoms have not improved or have even worsened. These patients do not return to the doctor who performed the original treatment; instead, they end up seeking multiple opinions and become very frustrated.

The surgical treatment of MDE includes the Reservoir Restoration (RR) procedure using AmnioGraft® (BioTissue) cryopreserved amniotic membrane. This procedure restores both the tear reservoir and the tear meniscus to their natural states and inhibits MMP activity.3 This procedure becomes much more challenging if it is performed on a patient who has already undergone one of the previously mentioned surgical treatments because the anatomy has been significantly altered by cautery or the RF treatment.

**RR Technique**

When we use the RR procedure, it is important to address the pathology all the way across the inferior cul-de-sac, especially medially, to remove the excess conjunctiva that often overhangs the inferior puncta. If redundant conjunctiva overhanging the inferior puncta remains, oftentimes patients will still have epiphora.

Many individuals have MDE both inferiorly and superiorly. We often refer to the superior aspect as superior limbal keratitis. The majority of patients have significant improvement in their symptoms when we just address the inferior 180°, and we do not need to address the superior. If the initial procedure does not adequately improve the patient’s symptoms, we can go back a few months later and consider performing a similar surgical procedure along the superior 180°.

The RR surgical procedure starts with an incision about 3 mm to 4 mm peripheral to the limbus, dissecting inferiorly and preserving the limbal stem cells. Remove as much of the loose, disinserted Tenon’s capsule as possible, ideally all the way down to the inferior orbital rim.

Cauterize any prolapsed orbital fat so that it regresses back into the orbit. Place 2 layers of AmnioGraft—one smaller piece over the inferior rectus muscle, and a second, much larger layer covering the entire dissected area, from just inferior to the limbus down into the inferior cul-de-sac, all the way across—from medial to lateral. Apply tissue glue to keep the membranes in place and consider adding a few stitches at the corners.

Place the conjunctiva that has been resected, laying it over the larger amniotic membrane layer, and glue it in position, adding a few sutures deep in the inferior fornix or around the periphery if needed, but avoid placing any sutures into the inferior rectus.

The surgical results are very gratifying. Many patients with bilateral MDE have their symptoms measurably improve even in the less severe eye after undergoing RR surgery on the more symptomatic eye. Although there is no clinical explanation for this, the improvement tends to be significant enough to enable us to forgo surgical treatment of the fellow eye.

**REFERENCES**


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Dr. Salinger is an ophthalmologist at V.I.P. Laser Eye Center, in Palm Beach Gardens, Florida. He is a speaker and advisory board member for BioTissue.
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Telemedicine continues to make waves in ophthalmology

Amid the COVID-19 pandemic, innovation is key to providing health care delivery

By Andrew G. Lee, MD; Special to Ophthalmology Times

The COVID-19 pandemic is transforming the way medicine is practiced throughout the country and the world. New alternatives to the modus operandi of traditional health care delivery have been necessary during these uncertain times.

One transformative alternative has been the use of telemedicine and virtual visits. The American Academy of Ophthalmology’s most recent guidelines recommend televisits for all routine and nonurgent ophthalmologic care. Although telemedicine is currently primarily designed for the delivery of health care, we believe that telemedicine can and should be extended to teaching and learning for medical students as an alternative for the traditional apprenticeship model, direct face to face, bedside, and chairside graduate medical education (GME).

On March 17, the Association of American Medical Colleges recommended that medical schools pause all student clinical rotations due to the COVID-19 pandemic. The Association of American Medical Colleges has provided schools with recommendations and guidelines on how to develop online education, including virtual learning resources, web-based modules, and simulations.

However, medical students traditionally also learn from observing and participating in clinical duties in the hospital or clinic alongside physicians, residents, and fellows. At Houston Methodist Hospital, we have transitioned to online teleconferencing for our educational sessions, and we are using HIPAA-compliant platforms for telemedicine patient care. Although multiple platforms (eg, WebEx, Zoom, Skype, FaceTime) have been used, clinical rounds may be more challenging to implement with learners.

We briefly describe our use of telemedicine for our GME activities at the neuro-ophthalmology service at the Blanton Eye Institute at Houston Methodist Hospital. In the first part, I describe our use of the video platforms as a teacher; in the second part, our medical student, Arko Ghosh, describes his individual learner experience; and in the third part, our neuro-ophthalmology fellows describe the balance in the clinic between social distancing and chairside teaching.

VIDEO CONFERENCES

These video-conferencing platforms allow the teacher to see the students, but it takes some dexterity to navigate the slide sharing (with the left hand) and toggling among the video streams for the individual learners to gauge interest, enthusiasm, and understanding of the material.

“I [Andrew Lee, MD] try to rotate in a Socratic method the questions and answers for cases based upon the PowerPoint slideshow that is being shared with the group. Although not as good as face-to-face interactions, I have learned to judge facial expressions and body language among video participants and to determine levels of interest and understanding as well as opportunities to probe the knowledge base and improve interactive learning. At Blanton Eye Institute, Houston Methodist Hospital, we have typical (but small) eye lanes. On some of our neuro-ophthalmology rotations, we might have up to 6 or 8 learners at a time (eg, medical students, eye residents, neuro-ophthalmology fellows, international visitors, and residents from other services).”

“Social distancing requirements will mean disruptive innovation for proximity and teaching at the bedside and at the chairside in the eye clinic even after the COVID-19 restrictions are loosened or removed. We are working on using video technology (with appropriate patient informed consent) for teaching and learning remotely in real-time even in the eye clinic lanes.”

STUDENT EXPERIENCE

“As a student, I have personally experienced ground-breaking medical education on a neuro-ophthalmology rotation during the COVID-19 pandemic,” Arko Ghosh said. “Despite my absence from traditional patient care scenarios, I was still able to have a very stimulating and educational rotation.”

“Through daily Zoom lectures, I participated in the morning report, and I collaborated with the team on multiple research projects. Additionally, although I was unable to participate in direct patient care, I was able to approximate that experience by researching and writing up unique case reports. These opportunities were not only made possible by telemedicine but were actually enhanced by it.”

“As medicine continues to accommodate the evolution of technology, it is important for future clinicians to be well versed in telemedicine. This unique setting offers medical students an unprecedented opportunity to learn and experience telemedicine, carrying with them a valuable and unique skill set into residency training and beyond.”

“The current COVID-19 pandemic is certainly a challenging time for everyone, with constant change in every facet of life, including the delivery of health care. But during a time largely consisting of darkness, there is light to be found in medical education. It is possible for students to gather a challenging and fruitful education, despite being unable to participate in clinical activities.”

“I believe that a virtual, telemedicine-like structure can provide the experience that students need to acquire, and, in some cases, enable students to return to active helpful roles on the health care team. I have personally experienced the power of virtual education, and while it certainly cannot entirely replace the clinical experience, I hope that other students get to experience it, as well.”

CHALLENGES WITH SOCIAL DISTANCING

Shruthi Harish, MD, and Nita Bhat, MD, neuro-ophthalmology fellows said, “Social distancing measures in the wake of the pandemic have had an impact on all specialties of medicine. However, with the eye exam needing to be carried out at close proximity, ophthalmology faces a unique challenge.”

“In our neuro-ophthalmology practice, we have developed a workflow where we triage patient charts to determine which patients need to come into the clinic for an in-person visit (usually reserved for urgent and emergent cases) and which ones can be conducted via telemedicine or managed by telephone.

“For our in-person visits, we limit the number of physicians in the room to 2 at maximum. The patient is seated in the examination chair, and we have 1 physician at the computer (appropriately distanced from the patient), and the fellow or resident is positioned 6 feet away from both the patient and the attending physician, from where they are able to present their findings to the attending.

“Both doctors wear a surgical mask throughout. There is a plastic ‘shield,’ fashioned out of plastic fold-
ers, installed on each slit lamp, which serves as a makeshift face guard. Additionally, we request the patient to hold their questions until after the slit lamp exam is completed to avoid droplet production as much as possible while in close proximity. We dilated all our patients and use the indirect ophthalmoscope, which is more conducive to social distancing than the direct ophthalmoscope. “For our virtual visits, we have 2 physicians in the room, usually 1 attending and 1 resident or fellow. Each eye lane is equipped with 2 computers. One computer is used to set up the patient’s video call and to put in a resident or fellow note. The other is assigned to the attending to be able to access the patient’s chart and to type, dictate, or otherwise edit the note. Having 2 computers in the room helps the 2 physicians to not only be able to maintain adequate distancing but to also avoid having to share keyboards and a mouse, which themselves can be fomites. “The keyboards and mouse are wiped down with alcohol wipes at the end. With patient consent, from both in-person as well as virtual visits, we are able to keep the door of the eye lane open in many cases. This enables a second learner to be positioned at the door, thus being able to observe and learn while still maintaining social distancing. “Change is always hard. When we started this fellowship, we would never have expected to be engaging in tele-neuro-ophthalmology. Now, however, we have not only gotten used to it, but having been able to diagnose superior oblique palsies, thyroid eye disease, myasthenia gravis, and—in 1 case—a downbeat nystagmus that turned out to be secondary to glutamic acid decarboxylase, we feel that telemedicine indeed has a role in ophthalmology.”

CONCLUSION

The COVID-19 pandemic has created chaos and disruption of both clinical care and for teaching and learning. This disruption has created a unique opportunity for innovation and more rapid adoption of tele-neuro-ophthalmology. In addition, telemedicine might also prove to be a suitable or even superior alternative to face-to-face morning report, grand rounds, journal club, and lectures. Further work is necessary to determine the impact of this disruption on the quality of the GME experience for our residents and fellows. We believe that telemedicine will play an increasingly important role in GME long after the COVID-19 pandemic ends.

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In many cases, a fundus examination will provide all the information a clinician needs to arrive at the correct diagnosis. In other cases, the situation is not that straightforward, and technology above and beyond fluorescein angiography or ophthalmoscopy is needed.

“Fundus autofluorescence [FAF] is particularly useful in the white dot syndromes because of the involvement of the outer retina and the retinal pigment epithelium,” according to Phoebe Lin, MD, PhD, associate professor of ophthalmology at Casey Eye Institute, Oregon Health and Science University, in Portland.

Reduced autofluorescence occurs in patients with white dot syndromes, Lin noted, when there is a decrease in the retinal pigment epithelium (RPE) lipofuscin density, loss of the RPE, and increased melanin content, subretinal fluid, fibrosis and scarring, or media opacities that block emission of the autofluorescence.

In contrast, increased autofluorescence in inflammatory conditions such as in white dot syndromes results from excessive RPE lipofuscin accumulation, fluorophores anterior or posterior to the RPE, macrophages containing lipofuscin, and choroidal vessels that contain and collagen and elastin under the RPE, she explained.

Lin described a case of relentless placoid chorioretinitis, which included increased autofluorescence (ie, hyperautofluorescence) and, therefore, active lesions. On the fundus image, the atrophic and well-delineated lesions on the border were hypoaufotluorescent, but the poorly delineated, and poorly intense hyperautofluorescent that may not be reversible with treatment, Lin explained.

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“This indicates that areas that are less intense may do well with treatment, in contrast to those with intense hyperautofluorescence that may not be reversible with treatment,” Lin explained.

**DEFINING DISEASE PROGRESSION**

FAF can also shed light on the degree and direction of disease progression. For example, acute zonal occult outer retinopathy may have 2 modes of spread—from the periphery inward and from the optic nerve outward, that can be seen on imaging. In multifocal choroiditis, more lesions as well as the degree of disease progression over time can be seen on FAF much more easily than can be appreciated using fluorescein angiography or fundus examination.

In a case of classic birdshot chorioretinopathy, the deep choroidal lesions are not visible on FAF, but in these cases, the higher prevalence of outer retinal lesions are visible on FAF.

“We recently published a series of patients in which about 50% had outer retinal lesions that are classic in this pathology, in addition to deep choroidal lesions,” Lin said. “The outer lesions can be followed on FAF.”

The 2 scanning laser ophthalmoscopy imaging devices used most often in clinical practice are the HRA Spectralis (Heidelberg Engineering) with an excitation wavelength of 488 nm and the Ultra-widefield FAF device (Optos) with an excitation wavelength of 532 nm. The former operates in the blue wavelength and the latter in the green wavelength, both of which may provide different information.

The take-home points regarding FAF imaging include that the lesion patterns seen on FAF may provide diagnostic clues.

The technology can demonstrate subclinical lesions that are not seen well on ophthalmoscopy, fundus photography, or fluorescein angiography and is less invasive than angiography. The technology also can demonstrate the course of the disease, guide treatment, and show recurrences or treatment responses.

“Even in our practice, we order FAF in patients with posterior-involving uveitis early and often,” Lin concluded.
TANGO: Helping target genes produce more protein
Overcoming protein deficiency in autosomal dominant optic atrophy

By Lynda Charters; Reviewed by Aditya Venkatesh, PhD

Targeted Augmentation of Nuclear Output (TANGO), a novel therapeutic approach developed by Stoke Therapeutics, has been validated in vitro and in vivo as a way to address autosomal dominant optic atrophy, one of the most commonly occurring optic neuropathies.

This disease is characterized by structural and functional deficits in the mitochondria that result in deterioration of the retinal ganglion cells and, ultimately, visual loss. Most affected patients, estimated to be from 65% to 90%, have protein deficiencies in the OPA1 gene, for which there is no treatment, according to Aditya Venkatesh, PhD, the lead author of a recent study on the subject, and a senior scientist at Stoke Therapeutics.

Using TANGO to Target the OPA1 Gene

The investigators developed a way to address the disease using TANGO, which treats the underlying cause of this genetic disease by reducing the nonproductive messenger RNAs (mRNAs) and restoring (upregulating) the missing proteins from healthy genes, they explained.

One of the major advantages of TANGO is that the approach is mutation-independent and that one antisense oligonucleotide (ASO) can be used to potentially target multiple OPA1 mutations, according to Venkatesh.

Their in vitro experiments showed that administration of ASOs reduced non-productive splicing and increased the OPA1 mRNA and protein expression in a dose-dependent manner. Among the various ASOs tested (ASO1-18), ASO-14 was the most effective in increasing OPA1 mRNA by 30% in vitro.

ASO-14 also increased OPA1 expression in an OPA1 haploinsufficient cell line (OPA1 +/- HEK293) by 50%, which translated to 75% of wild-type levels.

An in vivo study in a wild-type rabbit model showed that the test ASO decreased non-productive splicing and increased OPA1 protein levels in the retinas of the animals and was found to be well tolerated for up to 15 days after the injection.

Based on these results, the investigators concluded that TANGO is a potential new therapeutic technique that may be able to address autosomal dominant optic atrophy that resulted from OPA1 haploinsufficiency.

They also pointed out a few advantages of using this technique for treating ocular diseases in that intravitreal injections of ASOs facilitates diffusion throughout the eye, including the retinal neurons. The effects of one intravitreal injection lasted for 1 year in a murine model. This type of therapy does not require a specialized formulation or encapsulation; and it can target large genes for which adeno-associated virus-based therapy cannot be used.

“These data are the first in-vivo proof of concept for TANGO ASOs in an ocular disease,” Venkatesh pointed out. “The data support our belief that this new RNA-based approach to the up-regulation of proteins may be well-suited to the treatment of diseases like autosomal dominant optic atrophy, which are caused by insufficient protein production.”

Next Steps

Work is underway to develop in vitro assays to assess mitochondrial function with ASO treatment using high-resolution imaging of mitochondrial morphology, and mitochondrial bioenergetic assays to measure function. Investigators also look to developing additional OPA1 +/- in vitro systems using fibroblast lines from patients with autosomal dominant optic atrophy and retinal ganglion cells differentiated from OPA1 +/- induced pluripotent stem cells.
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Email: stewart.king@utsouthwestern.edu

For more than 40 years, the Department of Ophthalmology at UT Southwestern Medical Center has received national and international acclaim for its clinical practice and patient care, research and physician training.

The Department of Ophthalmology offers the most comprehensive ophthalmic care in Texas. Our faculty members’ specialties cover all vision and eye problems and procedures including cornea, external disease, refractive and cataract surgery, glaucoma, macular degeneration, neuro-ophthalmology, ocular pathology, oculoplastic and orbital surgery, oncology, adult strabismus, retinal and vitreous disorders, and pediatric ophthalmology.

Our mission is to provide excellence in clinical care of patients with diseases of the eyes, to advance medical knowledge of the causes and treatments of such diseases, and to instruct and educate physicians in the practice of ophthalmology.

For additional information about all these opportunities, visit our Career Board:
http://jobs.modernmedicine.com/

UT Southwestern Medical Center is committed to an educational and working environment that provides equal opportunity to all members of the University community. In accordance with federal and state law, the University prohibits unlawful discrimination, including harassment, on the basis of: race; color; religion; national origin; gender, including sexual harassment; age; disability; citizenship; and veteran status. In addition, it is UT Southwestern policy to prohibit discrimination on the basis of sexual orientation, gender identity, or gender expression.
SOUTH DAKOTA

Sanford Eye Center is seeking a BC/BE Ophthalmologist to add to its current group of 5 ophthalmologists and 3 optometrists, with one physician focusing on pediatric patients.

- Ideal candidate would be a comprehensive ophthalmologist with fellowship training in glaucoma
- Call is 1:5
- Work 4.5 days per week
- Competitive compensation and comprehensive benefit package
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Sioux Falls is one of the fastest growing areas in the Midwest. As the largest city in the state, it balances an excellent quality of life and strong economy with a safe, clean living environment. The cost of living is competitive and South Dakota has no state income tax. Sioux Falls offers amenities of a community twice its size such as fine dining, shopping, arts, sports and nightlife.

Check us out at practice.sanfordhealth.org

For More Information Contact: Deb Salava, Sanford Physician Recruitment at (605) 328-6993 or (866) 312-3907 or email: debra.salava@sanfordhealth.org

VERMONT

ACADEMIC NEURO-OPHTHALMOLOGIST

The Division of Ophthalmology at the University of Vermont College of Medicine, in alliance with the University of Vermont Medical Center, is seeking an academic neuro-ophthalmologist. This individual must have completed a board approved 3- or 4-year ophthalmology residency or a 3-year neurology residency and a clinical neuro-ophthalmology fellowship, and be board certified or board eligible, and eligible for medical licensure in the State of Vermont. The successful applicant will be appointed at the Assistant/Associate Professor level in the Clinical Scholar Pathway, commensurate with years of experience and accomplishments.

Duties will include providing clinical care to neuro-ophtalmology patients, teaching the principles of ophthalmology to medical students and undergraduate students in Allied Health programs, providing teaching experience for residents in training, developing basic and/or clinical research, and performing additional departmental and/or sectional administrative duties as assigned by the Chair of the Department of Surgery.

This is a full-time, 12 month, salaried, faculty appointment and carries with it attending staff privileges at The University of Vermont Medical Center. Salary is competitive and commensurate with ability and experience.

Located in Burlington, the University of Vermont Medical Center serves as Vermont’s only academic medical center. Burlington is a vibrant community located on the shores of Lake Champlain, between the Adirondack and Green Mountains. With year-round recreational opportunities, safe communities and excellent schools, this progressive community has been frequently cited as one of the most livable cities in the U.S.

The University is especially interested in candidates who can contribute to the diversity and excellence of the academic community through their research, teaching, and/or service. Applicants are requested to include in their cover letter information about how they will further this goal.

The University of Vermont is an Equal Opportunity/Affirmative Action Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, protected veteran status, or any other category legally protected by federal or state law. The University encourages applications from all individuals who will contribute to the diversity and excellence of the institution.

Interested individuals should apply online at https://www.uvmjobs.com/postings/32453 (position number 006035). Inquiries may be directed to Dr. Brian Kim c/o Kristin Allard at Kristin.Allard@uvmhealth.org.
ASSISTANT PROFESSOR/ASSOCIATE PROFESSOR
COMPREHENSIVE OPHTHALMOLOGIST

The Division of Ophthalmology in the Department of Surgery at the Robert Larner, M.D. College of Medicine at the University of Vermont and its affiliated medical center, The University of Vermont Medical Center, is recruiting a full-time academic Comprehensive Ophthalmologist. This individual must have completed a board approved 3- or 4-year ophthalmology residency, be board certified or board eligible, and eligible for medical licensure in the State of Vermont. The candidate must have demonstrated interest and ability in teaching medical students and residents and be willing to participate in the surgical teaching programs. This academic appointment will be in the non-tenure clinical scholar pathway at the Assistant or Associate Professor level commensurate with experience and training.

This is a full-time, 12-month, salaried, faculty appointment and carries with it attending staff privileges at The University of Vermont Medical Center. Salary is competitive and commensurate with ability and experience.

Located in Burlington, the University of Vermont and the University of Vermont Medical Center serve as Vermont’s only academic medical center. It is the only ACS verified Level I trauma center in the state and provides tertiary care to patients from Vermont and Northern NY. Burlington is a vibrant community located on the shores of Lake Champlain, between the Adirondack and Green Mountains. With year-round recreational opportunities, safe communities and excellent schools, this progressive community has been frequently cited as one of the most livable cities in the U.S.

The University is especially interested in candidates who can contribute to the diversity and excellence of the academic community through their research, teaching, and/or service. Applicants are requested to include in their cover letter information about how they will further this goal.

Interested individuals should apply online at https://www.uvmjobs.com/postings/37767 (position number 00022902).

Inquiries may be directed to Dr. Brian Kim via Kristin Allard at Kristin.Allard@uvmhealth.org.
in case you missed it

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“"I’m afraid you’re developing glaucoma in your left eye. Just cut back on the guacamole and it should clear up in a few weeks.”

Artwork by Jon Carter

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Optic relief

"I’m afraid you’re developing glaucoma in your left eye. Just cut back on the guacamole and it should clear up in a few weeks."

Artwork by Jon Carter
THANK YOU TO RETINA SPECIALISTS
and office staff for all you are doing amid the COVID-19 pandemic. We recognize your efforts and stand by you.

For more on Regeneron’s scientific efforts to help address COVID-19, please visit our website: www.regeneron.com/covid19
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