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JUNE 2020

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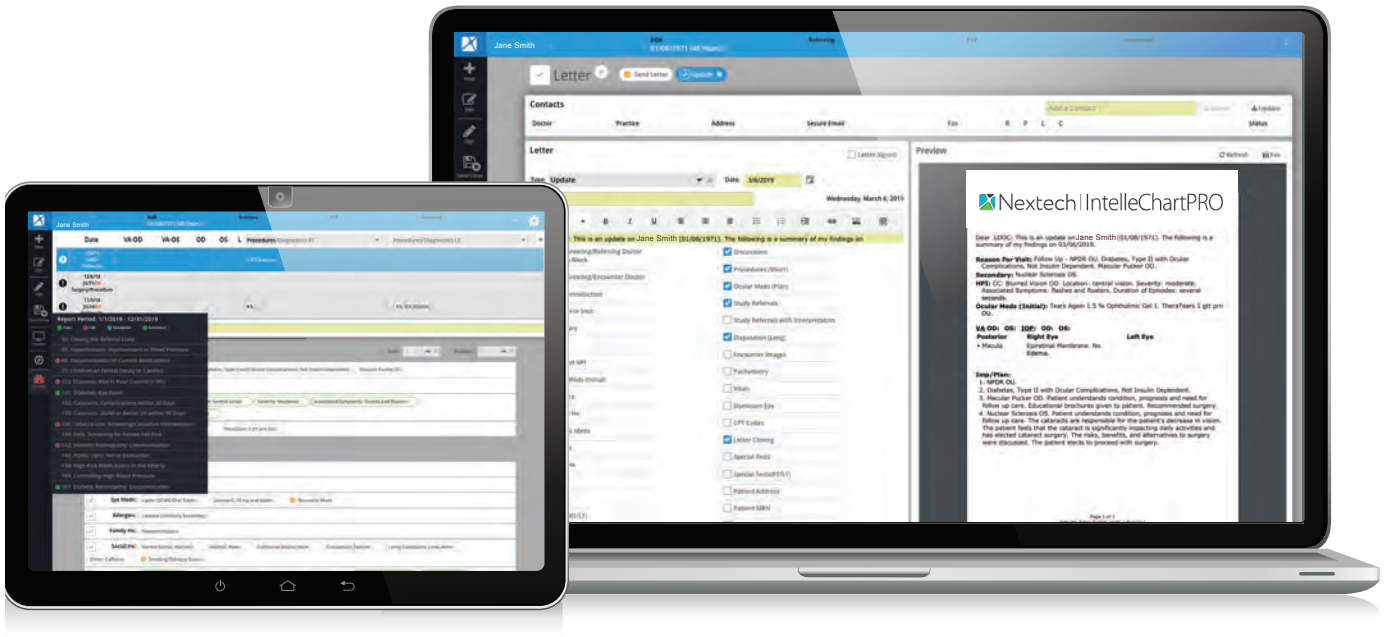

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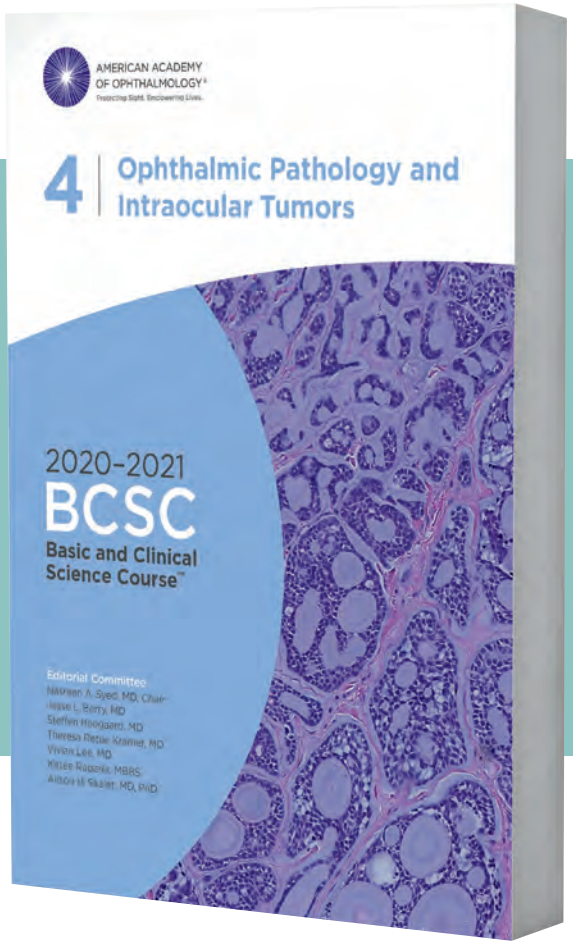

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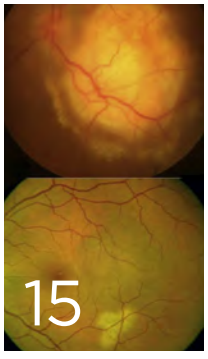

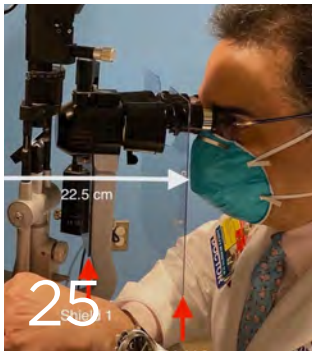

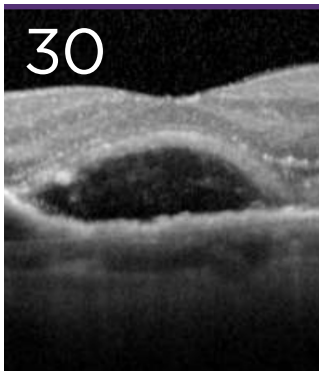

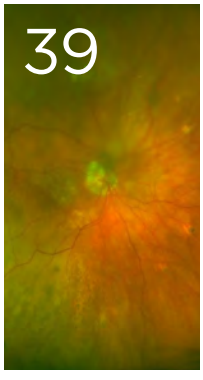

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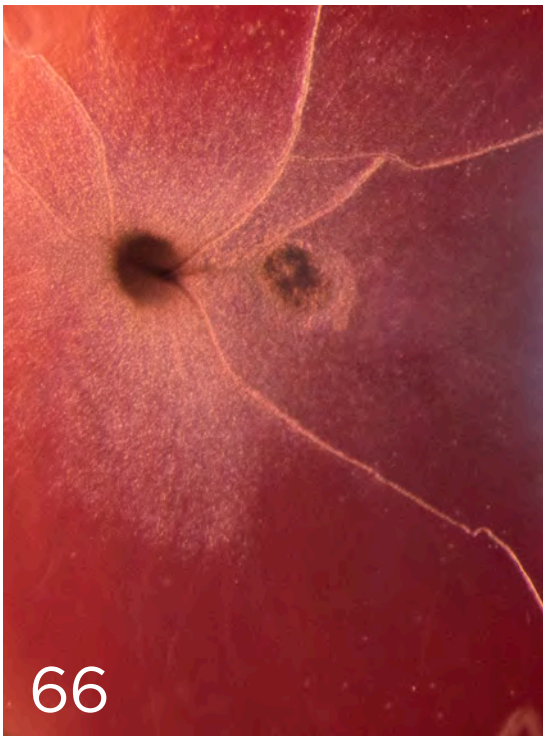

COVER PHOTOGRAPH
The Department of Ophthalmology at NYU Langone Health

ONCE-DAILY
rocklatan®
(netarsudil and latanoprost ophthalmic solution) 0.02%/0.005%

Superior efficacy. Optimal simplicity.[1,2]

Once-daily Rocklatan® significantly lowers IOP in patients with open-angle glaucoma or ocular hypertension—superior to latanoprost and netarsudil at every measured timepoint in phase 3 clinical trials.[1,2]

The first and only once-daily fixed-dose combination of prostaglandin + ROCK inhibitor

IOP

Nearly 60% of Rocklatan® patients achieved a target pressure of 16 mmHg or less[2]

The majority of ocular adverse events were mild and tolerable, with minimal systemic adverse events[1,3]

QD

Once-daily dosing relieves treatment burden and may improve adherence and treatment outcomes[1,4]

IOP: intraocular pressure; ROCK: rho kinase

Visit Rocklatan.com to learn more about this innovative drop for elevated IOP

IMPORTANT SAFETY INFORMATION

Contraindications
None.

Warnings and Precautions
- Pigmentation changes
- Eyelash changes
- Intraocular inflammation
- Macular edema
- Herpetic keratitis
- Bacterial keratitis
- Contact lens wear

Adverse reactions
Rocklatan®: The most common ocular adverse reaction is conjunctival hyperemia (59%). Five percent of patients discontinued therapy due to conjunctival hyperemia. Other common ocular adverse reactions were: instillation site pain (20%), corneal verticillata (15%), and conjunctival hemorrhage (11%). Eye pruritus, visual acuity reduced, increased lacrimation, instillation site discomfort, and blurred vision were reported in 5-8% of patients.

Netarsudil 0.02%: Instillation site erythema, corneal staining, increased lacrimation and erythema of eyelid.

Latanoprost 0.005%: Foreign body sensation, punctate keratitis, burning and stinging, itching, increased pigmentation of the iris, excessive tearing, eyelid discomfort, dry eye, eye pain, eyelid margin crusting, erythema of the eyelid, upper respiratory tract infection/nasopharyngitis/influenza, photophobia, eyelid edema, myalgia/arthralgia/back pain, and rash/allergic reaction.

Please see brief summary on the adjacent page.

For full Prescribing Information, please visit Rocklatan.com.

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch or call 1-800-FDA-1088.

INDICATIONS AND USAGE
Rocklatan® (netarsudil and latanoprost ophthalmic solution) 0.02%/0.005% is approved for the reduction of elevated intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension.

DOSAGE AND ADMINISTRATION
The recommended dosage is one drop in the affected eye(s) once daily in the evening. If one dose is missed, treatment should continue with the next dose in the evening. The dosage of Rocklatan® should not exceed once daily. Rocklatan® may be used concomitantly with other topical ophthalmic drug products to lower IOP. If more than one topical ophthalmic drug is being used, the drugs should be administered at least five (5) minutes apart.

References:
1. Rocklatan® (netarsudil and latanoprost ophthalmic solution) 0.02%/0.005% Prescribing Information, Aerie Pharmaceuticals, Inc., Irvine, Calif. 2019. **2.** Asrani S, McKee H, Scott B, et al. Pooled phase 3 efficacy analysis of a once-daily fixed-dose combination of netarsudil 0.02% and latanoprost 0.005% in ocular hypertension and open-angle glaucoma. Presented at the 13th Biennial Meeting of the European Glaucoma Society, March 2018. **3.** Data on file. Aerie Pharmaceuticals, LLC. **4.** Prum B Jr, Rosenberg L, Gedde S, et al. Primary Open-Angle Glaucoma Preferred Practice Pattern guidelines. *Ophthalmology.* 2016;123(1):P41-P111.

aerie Pharmaceuticals, Inc.

Rocklatan® (netarsudil and latanoprost ophthalmic solution) 0.02%/0.005%
Rx Only

BRIEF SUMMARY
Consult the Full Prescribing Information for complete product information.

INDICATIONS AND USAGE
Rocklatan® (netarsudil and latanoprost ophthalmic solution) 0.02%/0.005% is indicated for the reduction of elevated intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension.

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If one dose is missed, treatment should continue with the next dose in the evening. The dosage of Rocklatan® should not exceed once daily. Rocklatan® may be used concomitantly with other topical ophthalmic drug products to lower IOP. If more than one topical ophthalmic drug is being used, the drugs should be administered at least five (5) minutes apart.

CONTRAINDICATIONS
None.

WARNINGS AND PRECAUTIONS
Pigmentation
Rocklatan® contains latanoprost which has been reported to cause changes to pigmented tissues. The most frequently reported changes have been increased pigmentation of the iris, periorbital tissue (eyelid), and eyelashes. Pigmentation is expected to increase as long as latanoprost is administered.

The pigmentation change is due to increased melanin content in the melanocytes rather than to an increase in the number of melanocytes. After discontinuation, pigmentation of the iris is likely to be permanent, while pigmentation of the periorbital tissue and eyelash changes have been reported to be reversible in some patients. Beyond 5 years the effects of increased pigmentation are not known.

Iris color change may not be noticeable for several months to years. Typically, the brown pigmentation around the pupil spreads concentrically towards the periphery of the iris and the entire iris or parts of the iris become more brownish. Neither nevi nor freckles of the iris appear to be affected by treatment. While treatment with Rocklatan® can be continued in patients who develop noticeably increased iris pigmentation, these patients should be examined regularly.

Eyelash Changes
Rocklatan® contains latanoprost which may gradually change eyelashes and vellus hair in the treated eye; these changes include increased length, thickness, pigmentation, the number of lashes or hairs, and misdirected growth of eyelashes. Eyelash changes are usually reversible upon discontinuation of treatment.

Intraocular Inflammation
Rocklatan® contains latanoprost which 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 because it may exacerbate inflammation...

Macular Edema
Macular edema, including cystoid macular edema, has been reported during treatment with latanoprost. Rocklatan® 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
Reactivation of Herpes Simplex keratitis has been reported during treatment with latanoprost. Rocklatan® should be used with caution in patients with a history of herpetic keratitis. Rocklatan® should be avoided in cases of active herpes simplex keratitis because it may exacerbate inflammation.

Bacterial Keratitis
There have been reports of bacterial keratitis associated with the use of multiple-dose containers of topical ophthalmic products. These containers had been inadvertently contaminated by patients who, in most cases, had a concurrent corneal disease or a disruption of the ocular epithelial surface.

Use with Contact Lenses
Contact lenses should be removed prior to the administration of Rocklatan® and may be reinserted 15 minutes after administration.

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

Rocklatan®
The most common ocular adverse reaction observed in controlled clinical studies with Rocklatan® was conjunctival hyperemia which was reported in 59% of patients. Five percent of patients discontinued therapy due to conjunctival hyperemia. Other common ocular adverse reactions reported were: instillation site pain (20%), corneal verticillata (15%), and conjunctival hemorrhage (11%). Eye pruritus, visual acuity reduced, increased lacrimation, instillation site discomfort, and blurred vision were reported in 5-8% of patients.

Other adverse reactions that have been reported with the individual components and not listed above include:

Netarsudil 0.02%
Instillation site erythema, corneal staining, increased lacrimation and erythema of eyelid.

Latanoprost 0.005%
Foreign body sensation, punctate keratitis, burning and stinging, itching, increased pigmentation of the iris, excessive tearing, eyelid discomfort, dry eye, eye pain, eyelid margin crusting, erythema of the eyelid, upper respiratory tract infection/nasopharyngitis/influenza, photophobia, eyelid edema, myalgia/arthralgia/back pain, and rash/allergic reactions.

DRUG INTERACTIONS
Although specific drug interaction studies have not been conducted with Rocklatan®, in vitro studies have shown that precipitation occurs when eye drops containing thimerosal are mixed with latanoprost ophthalmic solution 0.005%. If such drugs are used, they should be administered at least five (5) minutes apart.

The combined use of two or more prostaglandins or prostaglandin analogs including latanoprost ophthalmic solution 0.005% is not recommended. It has been shown that administration of these prostaglandin drug products more than once daily may decrease the IOP lowering effect or cause paradoxical elevations in IOP.

USE IN SPECIFIC POPULATIONS
Pregnancy
There are no available data on netarsudil ophthalmic solution use in pregnant women to inform any drug associated risk; however, systemic exposure to netarsudil from ocular administration is low. Intravenous administration of netarsudil to pregnant rats and rabbits during organogenesis did not produce adverse embryofetal effects at clinically relevant systemic exposures.

Animal Data
Netarsudil administered daily by intravenous injection to rats during organogenesis caused abortions and embryofetal lethality at doses ≥0.3 mg/kg/day (126-fold the plasma exposure at the RHOD, based on C_{max}). The no-observed-adverse-effect-level (NOAEL) for embryofetal development toxicity was 0.1 mg/kg/day (40-fold the plasma exposure at the RHOD, based on C_{max}).

Netarsudil administered daily by intravenous injection to rabbits during organogenesis caused embryofetal lethality and decreased fetal weight at 5 mg/kg/day (1480-fold the plasma exposure at the RHOD, based on C_{max}). Malformations were observed at ≥3 mg/kg/day (1330-fold the plasma exposure at the RHOD, based on C_{max}), including thoracogastroschisis, umbilical hernia and absent intermediate lung lobe. The NOAEL for embryofetal development toxicity was 0.5 mg/kg/day (214-fold the plasma exposure at the RHOD, based on C_{max}).

For latanoprost, in 4 of 16 pregnant rabbits, no viable fetuses were present at a dose that was approximately 80 times higher than the RHOD. Latanoprost did not produce embryofetal lethality in rabbits at a dose approximately 15 times higher than the RHOD.

Lactation
There are no data on the presence of netarsudil or latanoprost in human milk, the effects on the breastfed infant, or the effects on milk production. However, systemic exposure to netarsudil following topical ocular administration is low, and it is not known whether measurable levels of netarsudil would be present in maternal milk following topical ocular administration. It is also not known whether latanoprost or its metabolites are excreted in milk. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for Rocklatan® and any potential adverse effects on the breastfed child from netarsudil and latanoprost.

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 other adult patients.

NONCLINICAL TOXICOLOGY
Carcinogenesis, Mutagenesis, Impairment of Fertility
Long-term studies in animals have not been performed to evaluate the carcinogenic potential of netarsudil. Netarsudil was not mutagenic in the Ames test, in the mouse lymphoma test, or in the *in vivo* rat micronucleus test. Studies to evaluate the effects of netarsudil on male or female fertility in animals have not been performed.

Latanoprost was not carcinogenic in either mice or rats when administered by oral gavage at doses of up to 170 mcg/kg/day (approximately 2800 times the recommended maximum human dose) for up to 20 and 24 months, respectively. Latanoprost was not mutagenic in bacteria, in mouse lymphoma, or in mouse micronucleus tests. Chromosome aberrations were observed in vitro with human lymphocytes. Additional *in vitro* and *in vivo* studies on unscheduled DNA synthesis in rats were negative. Latanoprost has not been found to have any effect on male or female fertility in animal studies.

For additional information, refer to the full prescribing information at www.Rocklatan.com.

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit MedWatch or call 1-800-FDA-1088.

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Letters

A Simple Hand Magnifier for Teleophthalmology

Teleophthalmology has never been more important than it is now. Although restrictions, such as social distancing, pose challenges, they have provided an opportunity for innovation.

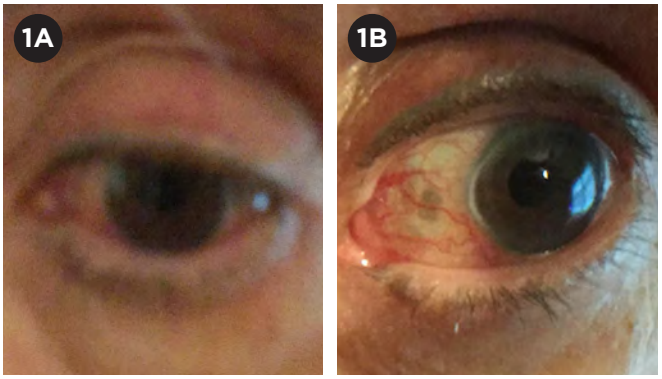
In teleophthalmology, one challenge is obtaining clinically useful photos from homebound patients. With a smartphone or tablet and a hand magnifier (e.g., a reading aid or magnifying glass), patients can take magnified photos with ease.

Most phone cameras have autofocus and high-resolution capture allowing for sharp images. However, low magnification may limit the provider's ability to provide a proper diagnosis. By placing the simple hand magnifier immediately adjacent to the camera and using the autofocus, patients can take clinically useful images.

These instructions detail the simplicity of the technique:

1. Instruct patient to open the camera function of phone or tablet.
2. Place the simple hand magnifier directly against camera.
3. Use autofocus or tap image on screen to focus.
4. Move the phone as close as possible while maintaining focus.
5. Take the photo.

This technique is easiest with assistance but can be accomplished in selfie mode if circumstances require.



COMPARISON. *(1A) Without and (1B) with a hand magnifier.*

The images from the patient pictured above (Figs. 1A, 1B) demonstrate clarity of the ocular structures, which allowed for a successful teleophthalmic encounter. The patient's husband used an iPad Air2. No additional instruction was given other than the above steps. For optimal results:

1. Ask the patient to take many photos from different angles to increase the likelihood of obtaining useful images.
2. Ensure adequate lighting. Instruct patient to face light source (broad, diffuse light is best) and avoid casting shadows from camera.
3. Turn the brightness all the way up on the phone or computer for optimal viewing.

Simple hand magnifiers can provide sharp, magnified images that allow for accurate triage of remote patients.

Maj. Adam H.H. Altman, MD, and Maj. Gary L. Legault, MD
San Antonio Uniformed Services Health Education Consortium, Joint Base San Antonio

NOTE: *The views expressed in this letter are those of the authors and do not necessarily reflect the official policy or position of the U.S. Departments of the Navy, Army, or Air Force; the U.S. Department of Defense; or the U.S. government.*

COVID-19: A Young Ophthalmologist's Perspective

As a young ophthalmologist (YO), I began my career mired in doubts. And just as I had started to build a practice and finally gain confidence in my skills, COVID-19 happened. In talking to my peers, I realize that most of us in the early stages of our careers are going through similar experiences.

Like my colleagues, I worry about the innumerable patients with chronic vision-threatening issues who are falling through the cracks. I think about my patients who cannot come for follow-up due to age, concurrent illnesses, and lack of social support. Many are not adept at technology and cannot participate in telemedicine. For some, I cannot help but worry about their survival prospects. I am also concerned about the safety of my staff, family, and self. Due to fear and anxiety of exposure, we are having to make the difficult decision to isolate away from aging parents, young children, and spouses. All of this is taking an emotional toll.

In addition to this, most YOs are challenged with student loans and with providing financially for young families. Those of us in employed positions are being furloughed or taking reduced pay; those on productivity-based partnership tracks may no longer be eligible to transition from associate to partner; and those who have started their own practices are struggling to stay afloat. For those in training, surgical exposure has been significantly decreased.

However, despite the uncertainty and doubt, my most overwhelming emotion is that of gratitude: gratitude for the selflessness of our colleagues on the frontlines, for health and family, for my mentors, for our Academy, and for our profession. I am privileged to have the needed skills, and I am honored to restore vision and preserve the gift of sight. We will emerge from this more thoughtful and empathetic. And for that I am grateful.

Shruti Aggarwal, MD
Katzen Eye Group
Baltimore

Maj. Adam H.H. Altman, MD

Emergency Care: A Fraying Social Contract

During the COVID-19 outbreak, many ophthalmologists have been delivering emergency eye care in their offices or by telemedicine. This has helped ease the strain on emergency departments (EDs).

This focus on emergency ophthalmic care brings to the fore the economic realities of rendering emergency care out of our offices and clinics. (For past discussion of this issue, see "Who's On Call? Emergency Care Crisis Looms," Clinical Update, December, and "Rethinking Call Duty," Letters, March at aao.org/eyenet/archive).

In the past, we accepted these emergencies at our offices as part of a social contract: We understood that patients would get better care seeing us directly at a reduced cost to society versus care in an ED. However, even prior to the COVID-19 pandemic, this social contract was being frayed by reductions in reimbursement, increased difficulty collecting on claims, and an ever-heavier regulatory burden. An emergency visit is a "known unknown." For a nonmultispecialty ophthalmology office, a time-intensive secondary referral is sometimes required. Furthermore, because the more routine eye emergencies are seen at urgent care centers, ophthalmologists tend to get the cases that are more complex and time-consuming.

The specter of COVID-19 will slow our workflows given the need for social distancing, wearing of protective gear, and cleaning of surfaces. This exacerbates the economic strain of adding an emergency encounter to the schedule.

From an economic point of view, an emergency encounter can take twice as long as a conventional visit (even with telemedicine) and involves more risk and complexity. Therefore, reimbursement for it should be at least twice as much as for a comprehensive new patient exam. After all, eye care services rendered by ED physicians wind up costing many times more than the care rendered in an ophthalmology office for the same presenting complaint—when supply and facility costs, expensive testing such as CT scans, and out-of-network billing are taken into account. (There have been some efforts to reduce surprise out-of-network charges.)

WRITE TO US. Send your letters of 150 words or fewer to us at *EyeNet Magazine,* American Academy of Ophthalmology, 655 Beach Street, San Francisco, CA 94109; e-mail eyenet@aao.org; or fax 415-561-8575. (*EyeNet Magazine* reserves the right to edit letters.)

We need to find ways to allow our specialty to accept patients with emergencies in a way that makes economic sense. These visits could be differentiated from nonemergency care with special coding and reimbursement. We should work with CMS and insurance companies to achieve these changes.

Lawrence Stone, MD
Chicago

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Opinion

RUTH D. WILLIAMS, MD

COVID-19: Of the Global and the Personal

Crisis leadership is a popular topic right now. We're told that a crisis illuminates the difference between true leaders and the pretenders, that great leaders communicate constantly as they take necessary action using evolving data, and that they show optimism and spread hope even while describing the dire present reality. So, in the midst of the COVID-19 pandemic, I decided to read about Winston Churchill.

Erik Larson's latest book, *The Splendid and the Vile,*[1] isn't just about World War II, nor is it a standard biography. Instead, it is a detailed and intimate documentation of Churchill's first year as prime minister—that is, the year of the Blitz. Much of the material Larson used is drawn from personal journals, including those of everyday Britons. And reading about the relentless bombing of London has been a poignant reminder that even though I'm still sheltered in place, anxious about the glaucoma patients I'm not seeing and working on protocols for returning to practice, my home is lovely and warm, the food is good and too plentiful, and no bombs are dropping on the neighborhood.

In February, I was reading daily COVID-19 reports on a private physicians' group on Facebook. The descriptions of the EDs and ICUs were disturbing—and far away. Now, our local hospital sends daily updates with the number of COVID-19 patients admitted, the number in the ICU, the number on ventilators, and the number that have died. I wait for that email every day because it's not about what's happening in China or Italy or Detroit; it's what's happening to the people in my community. The patients in my own hospital—even if I don't know them—elicit a more personal connection than the statistics from the Johns Hopkins COVID-19 daily update do.

This pandemic is also offering a blunt personal reminder to each of us that our commitment as physicians requires that we weigh competing values. We're all balancing the challenge of keeping our patients and staff safe even as we resume ophthalmic care—and coping with the tension between sheltering-in-place guidelines and their impact on the economy. At every turn, we must weigh a public good against an individual need.

To achieve a balance between safety and doing our work, we seek evidence for our protocols. Unfortunately, such evidence-based guidance may not exist. For example, how can visual field testing be performed safely? Questions abound: Is masking the patient and the technician an adequate safety measure? Should it be an N95 mask? Do fomites adhere to the testing bowl? Should HEPA filters be installed in the room? In response to these questions, on May 1, Zeiss issued updated cleaning guidelines for their perimeters.[2] As protocols evolve, we weigh potential risks with the need to obtain visual fields. Now more than ever, our principles as physicians must guide us.

Ruth D. Williams, MD
Chief Medical Editor, EyeNet

The Academy and subspecialty organizations are collaborating to provide guidance on similar thorny issues as we resume practice. Protocols will evolve. In the months ahead, each ophthalmologist will make decisions based on local conditions and the specific circumstances of the practice. Ophthalmologists will balance the common good with the individual need, just as we always have.

And as we continue to ponder the ramifications of this global pandemic and its impact upon our own lives, here's another vignette from our local hospital: One COVID-19 patient on a ventilator was a staff nurse. When she was finally released, the hospital shared a video of her leaving the front entrance in a wheelchair with dozens of cheering physicians, nurses, staff, and administrators—and a parade of ambulances, fire trucks, and even the helicopter. It was a such a joyful moment. We give our best for every patient, but it's deeply personal when one of our own gets sick—and when she recovers and heads home.

1 Larson E. *The Splendid and the Vile: A Saga of Churchill, Family, and Defiance During the Blitz.* Penguin Random House; 2020.
2 HFA COVID Guidance_EN_31_025_04081_HFA_12415_FINAL.pdf.

Current Perspective

DAVID W. PARKE II, MD

Dick Mills—Playing Through Stoppage Time

COVID-19 took another ophthalmologist—and a great one. Richard P. Mills, MD, MPH, passed away on May 9 in Seattle. Dick's curriculum vitae shone with the whole spectrum of professional accomplishments—talented clinician, dedicated teacher, well-published clinician-investigator, and professional leader. At the Academy he held numerous committee positions, chaired EyeCare America, and, following election by his peers, served as Academy President in 1995.

But Dick described his term as Chief Medical Editor for *EyeNet* as "my favorite thing I've done professionally." As the son of an argumentation and debate professor at Northwestern University, Dick loved words. His 14 years of *EyeNet* Opinion columns were legendary. His last one in February 2016 was entitled "14 Years: Was It as Good for You as It Was for Me?" In it, he wrote: "There are men and women of letters, of numbers, of papers, and of books. I'm a word guy. I've always adored the sounds of words, and the way pairs of words fit together, alliteratively or oxymoronically. And spelling. I turned off spell check as soon as I discovered I could spell better than it could."

In "Are You Anancastic? Just a Little Bit Helps" he confessed, "Sometimes I go searching, like a pig rooting for a truffle, for exactly the right word to use in an Opinion." (He then marched forth to explain why all ophthalmologists are, or should be, anancastic.)

His writing was pithy, and his tone vacillated between bemused, wry, and annoyed. At times he could be downright curmudgeonly. He was anything but solipsistic—reveling in the eccentricities of the world and people around him.

At this time, when all seems dour and COVID-centric, I'd like to take this moment to share with you some of the random ruminations (a little alliteration, Dick) of one of ophthalmology's true statesmen:

February 2004. While pondering procrastination as one of the deadly sins, he opined upon vultures that "don't pounce upon carrion. They circle high above, effortlessly gliding on rising desert thermals, eyeballing their next meal . . . I don't know if they enjoy circling, but I am certain that they don't beat themselves up about the delay." He then observed that procrastinating was simply "circling time."

June 2006. He divided ophthalmologists into hitchhikers (who don't contribute to the public good but are beneficiaries of it) and the drivers (those who do). He concluded, "And for those behind the wheel, in the spirit of collegiality, I hope you don't try to run the hitchhikers off the road."

August 2014. A personal favorite revealed the true meaning behind health insurance euphemisms, including: "*Accountable care organization (ACO):* An entity by which money flows through the hospital, where it is laundered and shrunk before distribution to physicians" and "*Bending the cost curve:* The equivalent of orthodontia for health care. Guess who's tightening the wires?"

December 2014. Dick was not a fan of EHRs—in part because they reduced language to mouse clicks. He noted, ". . . experiencing today's EHR marketplace is a lot like living with teenagers. Having grown too fast over the last few years, they are awkward, surly, uncoordinated, picky, spendthrift, and immature. And they have plenty of zits. Despite their many different personalities, they all strive to emulate each other. They have great potential, yet most of it is unrealized."

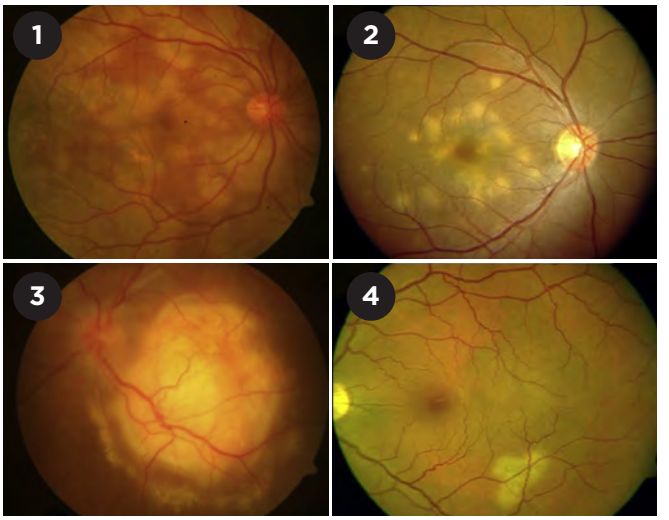
July 2013. Four months after he experienced a hyperkalemic cardiac arrest with 10 minutes of hospital CPR, intubation, and defibrillation, Dick related the story in detail for his readers with typical humor and irony. In that Opinion, he wrote about the concept of "stoppage time" in soccer and shared these words: "When the game is supposed to be over, it is allowed to continue for the duration of stoppage time—but only the referee knows for sure how long that is going to be . . . So I'm on my personal stoppage time now. Like the soccer team, I am planning to go full speed ahead. I've always enjoyed living my life, and I'll especially savor this second time around."

We are all delighted that the referee gave Dick seven more years and that he used the time to inform and enthrall us all.

Enjoy all of Dr. Mills' *EyeNet* editorials at aao.org/eyenet/archive-dr-mills-opinions.

UVEITIS

Consensus on Managing Tubercular Uveitis



TUBERCULAR CHOROIDITIS. *The spectrum of choroidal involvement ranges from (1) tubercular serpiginous-like choroiditis to (2) tubercular multifocal choroiditis, (3) tuberculoma, and (4) tubercular unifocal choroiditis.*

ANTITUBERCULAR THERAPY (ATT) has been shown to be effective in reducing recurrences of tubercular uveitis in nearly 86% of patients.[1] Yet some physicians remain reluctant to initiate treatment.

"Ocular tuberculosis remains a challenge all over the world, as the diagnosis is largely presumptive due to lack of positive histopathologic confirmation," said Vishali Gupta, MD, at the Advanced Eye Centre in Chandigarh, India. "In several countries, ophthalmologists have to refer these patients to infectious disease experts or physicians who refuse to start ATT for lack of confirmed diagnosis. This can lead to multiple recurrences [of disease], resulting in increased ocular morbidity and visual loss," said Dr. Gupta.

Enter consensus guidelines on initiating ATT. To limit confusion, a team of international experts from the Collaborative Ocular Tuberculosis Study (COTS) has issued consensus guidelines on initiating ATT in several clinical scenarios.[2] The guidelines suggest that clinicians take the following steps:

- First, ascertain whether the clinical presentation in the eye is suggestive of TB.
- Second, consider whether the patient lives in a TB-endemic region (defined as having an incidence of more than 100 cases per 100,000 persons). Consensus was more robust for endemic regions.

"It is also important to rule out other possible etiologies in the differential diagnosis, as TB can mimic several other varieties of uveitis," both infectious and noninfectious, Dr. Gupta said.

- Once ocular TB is suspected, order an immunologic test—a tuberculin skin test and/or an interferon-gamma release assay.
- In the three subtypes of tubercular choroiditis—tubercular serpiginous-like choroiditis, tuberculoma, and tubercular focal or multifocal choroiditis—any positive immunologic test plus radiologic signs of active or healed pulmonary tuberculosis justifies initiation of ATT.
- In endemic regions, a positive result from a single immunologic test is sufficient to initiate treatment of tubercular serpiginous-like choroiditis or tuberculoma, even without radiologic features suggestive of tuberculosis.

When to use adjunctive therapy for inflammation. There is strong agreement to start oral corticosteroids with, or soon after, initiation of ATT in patients who have tubercular serpiginous-like choroiditis or tuberculoma (with no associated systemic infectious disease). But opinion is mixed regarding the timing of initiating oral corticosteroids in patients with tubercular multifocal or unifocal choroiditis.

And a caveat. Beware of potential drug interactions when combining ATT with various immunosuppressive drugs. When in doubt, consult the patient's internist.

Impact on practice. Dr. Gupta now has more confidence in making decisions about initiating ATT, particularly in borderline situations. "Earlier, I was not sure whether or not I should start ATT. But after this consensus, I have started treating these patients, even though only one test is positive," she said. "The guidelines have made a difference in my practice patterns."

—Miriam Karmel

1 Agrawal R et al. *JAMA Ophthalmol.* 2017;135 (12):1318-1327.
2 Agrawal R et al. *Ophthalmology.* Published online Jan. 10, 2020.

Relevant financial disclosures—Dr. Gupta: None.

COMPREHENSIVE

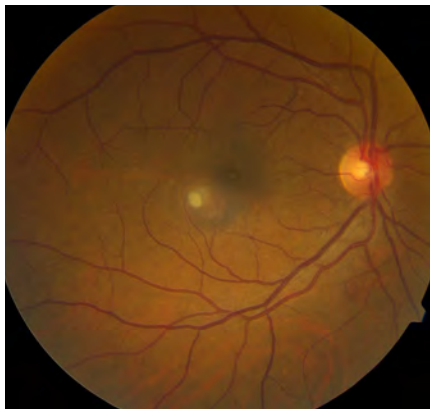
Endophthalmitis: Which Sampling Method Is Best?

FOR PRESUMED INFECTIOUS ENdophthalmitis, needle vitreous tap and mechanical vitreous biopsy with pars plana vitrectomy (PPV) were more likely to yield culture growth than was an aqueous tap, according to a study from Duke University Eye Center in Durham, North Carolina.[1]

Positive microbial cultures were found in 29% (17/59) of aqueous samples—versus 47% (26/55) of needle vitreous tap samples and 59% (19/32) of samples obtained from mechanical vitreous biopsy with PPV.

Following in the steps of the EVS. This retrospective study of chart data from nine years of endophthalmitis cases at Duke was intended to augment the results of the Endophthalmitis Vitrectomy Study (EVS), said coauthors Henry L. Feng, MD, and Cason B. Robbins, BS. Twenty-five years ago, the EVS gave ophthalmologists an evidence-based road map for identifying and treating endophthalmitis after cataract surgery.[2] However, the landmark trial did not provide guidance for cases with other etiologies, the Duke researchers pointed out.

Need for clarity. "We're seeing endophthalmitis after [intravitreal] injections, glaucoma procedures, corneal procedures, and trauma—and the list goes on," said Dr. Feng. "And we just don't have a lot of evidence-based guidance on what to do for endophthalmitis in those cases because the EVS included



ETIOLOGIES. *Only 26% of the cases of endophthalmitis occurred following cataract surgery.*

CATARACT

Why Screen Multifocal IOL Patients With OCT?

TO OPTIMIZE VISUAL OUTCOMES WITH MULTIFOCAL IOLs, it is wise to rule out macular pathologies before cataract surgery. However, previous research has shown that the standard preoperative dilated fundus exam can miss retinal disease in many cases.[1]

A new analysis suggests that ophthalmologists could fill this information gap by imaging the retinas of multifocal IOL candidates with optical coherence tomography (OCT) preoperatively—and that it could be cost-effective to do so.[1]

"OCTs are able to detect subtle macular pathologies in 9% to 30% of normal-appearing retinas. Preoperative detection of macular pathologies can help guide IOL selection and improve patient outcomes," said coauthor Ella H. Leung, MD, at Baylor College of Medicine in Houston.

Study specifics. For this analysis, the researchers used a theoretical case of a 67-year-old man who was screened with OCT before undergoing cataract surgery and receiving a multifocal lens. His vision improved from 20/60 preoperatively to 20/20 postoperatively. His out-of-pocket cost for the IOL was $2,500.

Although the OCT increased the costs of the preop evaluation, it theoretically detected 11% more of macular pathologies before surgery than did a dilated fundus exam alone, the authors said. This resulted in "decreased overall costs, slightly improved visual gains, and slightly improved" quality-adjusted life years (QALYs) over time.[1]

Putting it into practice. Coauthor Allister Gibbons, MD, at Bascom Palmer Eye Institute in Miami, said he orders OCTs for all his patients who are considering paying the extra cost of a premium IOL implant. "Personally, I have been requesting a macular OCT for all my presbyopia-correcting IOL candidates, as I have a low threshold to exclude patients from this category of lenses."

Dr. Gibbons added, "I recall hearing from Dr. David Brown that a premium IOL requires a premium macula. For those surgeons who currently do not perform screening OCTs in their multifocal IOL candidates, this study may add to their decision-making process."

Dr. Leung noted that Medicare currently does not routinely pay for screening OCTs performed before cataract surgery without a qualifying diagnosis. "If the screening OCT is not reimbursed, then the physician's practice covers the expense. However, the actual cost of an OCT depends on several factors, including whether the practice already owns the OCT machine," she said.

Coauthor Douglas D. Koch, MD, at Baylor, said the study confirmed the value of OCTs, even without reimbursement for the imaging. "This has not changed but rather reinforced my practice of preoperatively screening multifocal IOL candidates with a macular OCT," Dr. Koch said. "I feel that it is in the patient's best interest to do so, and I willingly absorb this cost." *—Linda Roach*

1 Leung EH et al. *Ophthalmology*. Published online Jan. 31, 2020.

Relevant financial disclosures—Drs. Gibbons and Leung: None. Dr. Koch: Alcon: C; Carl Zeiss Meditec: C; Johnson & Johnson Surgical Vision: C.

only postcataract surgery and postsecondary IOL patients who developed endophthalmitis."

Additional findings. In addition to evaluating microbiological yield, the researchers assessed etiologies and clinical practice patterns for endophthalmitis treated at Duke from Jan. 1, 2009, to Jan. 1, 2018.

Of 130 consecutive cases (133 eyes), 26% were related to cataract surgery. The three other most common etiologies were endogenous (20%), intravitreal injection (17%), and post-trabeculectomy (15%). All of the isolated bacteria were sensitive to combination therapy with vancomycin and ceftazidime.

In several cases, Duke physicians also performed vitrectomy in patients whose vision at initial presentation was better than those who underwent vitrectomy in the EVS, Dr. Feng said. "At least among the experts at Duke over the last nine years, we can see that vitrectomy is being considered for noncataract cases when the presenting vision is about hand motion at 1 foot. In contrast, the EVS data suggested that vitrectomy was beneficial only for patients with presenting vision of light perception or worse," Dr. Feng added. "This finding may reflect today's safer surgeries with the advent of smaller-gauge instrumentation and other technological advances." —*Linda Roach*

1 Feng HL et al. *Ophthalmol Retina.* Published online March 18, 2020.

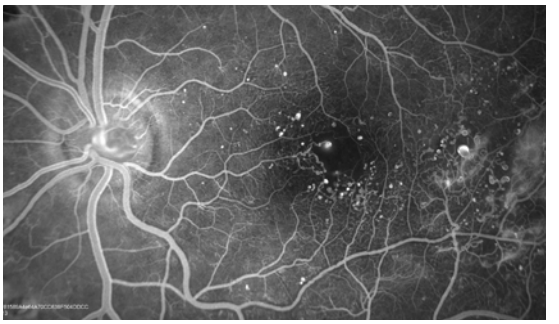
2 Endophthalmitis Vitrectomy Study Group. *Arch Ophthalmol.* 1995;113(12):1479-1496.

Relevant financial disclosures—Dr. Feng and Mr. Robbins: None.

RETINA

DRCR.net Five-Year Outcomes for Protocol T

HOW CAN VISUAL GAINS ACHIEVED in a clinical trial be sustained once patients enter the real world of standard clinical care? In an extension of the two-year DRCR.net's Protocol T study, anti-VEGF treatment improved vision over five years in eyes with visual acuity (VA) impairment from diabetic macular edema (DME). But some of the gain at the two-year mark was lost when patients left the trial setting.[1]



DME. *Fluorescein angiogram shows DME, microaneurysms, and neovascularization in a 39-year-old patient with long-standing diabetes.*

A previous DRCR.net study, Protocol I, found that VA was maintained through five years when a structured protocol was followed.[2] "We were hoping that the visual acuity results in Protocol T would parallel the prior study and show stability in vision between two and five years," said Adam R. Glassman, MS, at the Jaeb Center for Health Research in Tampa, Florida.

Does that mean that something happens when patients are no longer followed in a rigorously controlled setting? "That's speculation," said Mr. Glassman. "But it's not an unreasonable speculation."

The initial study. For Protocol T, 660 diabetic adults at 88 sites were randomized to receive aflibercept, bevacizumab, or ranibizumab as first-line treatment for visual impairment from center-involved DME. Visits were scheduled every four weeks in year 1 and every four to 16 weeks in year 2, depending on treatment response.

The extension. For the next three years, 317 (68%) of 463 eligible patients received standard care and were evaluated at the five-year mark.

During the three-year extension, 95% had at least one office visit with a retina specialist. The median number of visits for years 3, 4, and 5 were four, three, and four, respectively. (In contrast, the median number of visits was nine in year 2.)

In addition, 68% of patients in the extension study received at least one anti-VEGF treatment, with a median of four injections. The choice of anti-VEGF agent during the first two years did not lead to any statistically significant treatment group differences in VA at five years.

At the five-year mark, 30% gained 7.4 letters from baseline, but mean VA worsened by 4.7 letters from the two-year assessment. All told, nearly half of eyes (47%) were 20/25 or better and 5% were 20/200 or worse at five years.

A surprise finding. Mean central subfield thickness decreased from baseline by 154 µm and remained stable throughout five years despite the fact that average VA worsened during the extension study. "The reasons for this are unclear, but this finding highlights the importance of evaluating both anatomic and functional results in eyes with DME," Mr. Glassman said.

Ongoing challenge. Once a trial has ended, how can visual gains be sustained? "This is a challenging issue, since there are so many variable factors in clinical practice that are controlled in clinical trials," Mr. Glassman said. Future studies might explore barriers to clinical care, he added. In the meantime, he advised teaching patients the importance of regularly scheduled retinal exams, even if they are not experiencing visual symptoms.

—*Miriam Karmel*

1 Glassman AR et al. *Ophthalmology.* Published online March 28, 2020.

2 Elman MJ et al. *Ophthalmology.* 2015;122(2):375-381.

Relevant financial disclosures—Mr. Glassman: None.

MORE ONLINE. For a news brief on automated strabismus screening, see this article online at aao.org/eyenet.

See the financial disclosure key, page 9. **For full disclosures,** including category descriptions, view this News in Review at aao.org/eyenet.

We are Here for you

To our colleagues...

We understand the COVID-19 pandemic has severely impacted you both emotionally and financially.

Like you, OMIC's Board of practicing ophthalmologists has been forced to cease or severely limit practice during the COVID-19 pandemic.

We are recovering but the effects on all of us will be felt for some time. Ultimately, we know that the resiliency of the ophthalmic community will help us pull through these challenging times.

Here is how we are helping.

COVID-19 PAGE

- COVID-19 Sample Patient Consent Documents
- Risk Management Resources and Recommendations
- OMIC News and Coverage Information

OMIC.com/COVID-19-PAGE

COVID-19 PREMIUM RELIEF

OMIC was one of the first carriers to announce financial assistance for policyholders. On April 10, 2020, our Board approved a COVID-19 premium credit, which was effective for all insureds active on May 1, 2020 and has been applied to policies. Insureds do not need to do anything to qualify; premiums will be automatically adjusted.

COVID-19 RISK MANAGEMENT

OMIC created a COVID-19 page in March 2020; visit OMIC.com to learn more. Policyholders requiring assistance should call OMIC's confidential Risk Management Hotline for COVID-19 questions and assistance at (800) 562-6642 and Press 4 or email riskmanagement@omic.com.

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Journal Highlights

NEW FINDINGS FROM THE PEER-REVIEWED LITERATURE

Ophthalmology

Selected by Stephen D. McLeod, MD

Natural History of Geographic Atrophy Secondary to AMD

June 2020

Despite termination of the phase 3 lampalizumab clinical studies in 2017 due to insufficient efficacy, the Proxima A and B portions of the trials have yielded important data on the relationship between visual function and worsening geographic atrophy (GA) from age-related macular degeneration (AMD). In a comparative analysis, **Holekamp et al.** found that the natural history studies spotlight the major functional loss and rapid progression that are common with GA, even in early stages of the disease.

Between May 2015 and February 2017, three cohorts were involved in these prospective studies:

- patients with bilateral GA and no choroidal neovascularization (CNV) in either eye (Proxima A cohort; 295 participants)
- patients with GA but no CNV in the study eye plus CNV in the other eye with or without GA (Proxima B/fellow-eye cohort; 168 participants)
- patients with GA only in the study eye and no CNV in either eye (Proxima B/fellow-eye intermediate AMD cohort; 32 participants)

Follow-up duration varied because of early termination of studies. The primary outcome was the mean change in GA lesion area in the study eyes.

At 24 months, the adjusted mean (standard error) change in lesion area was 3.87 (0.15) mm^2 in the Proxima A cohort, 3.55 (0.16) mm^2 in the fellow-eye CNV cohort of Proxima B, and 2.96 (0.25) mm^2 in the fellow-eye intermediate AMD cohort of Proxima B. In all three groups, visual function decreased from baseline to month 24. Adjusted mean changes in corrected visual acuity (VA) were –13.88 (1.40) in Proxima A, –9.49 (1.29) in the fellow-eye CNV cohort of Proxima B, and –11.48 (3.39) in the fellow-eye intermediate AMD cohort. Mean changes in low-luminance VA were –7.65 (1.20), –7.57 (1.26), and –8.37 (3.02), respectively. In the intermediate AMD cohort, 30% of patients had conversion to GA in the fellow eye, and 6.7% had conversion to CNV by 12 months.

The authors cautioned that the difference in progression rates between Proxima A and B at 24 months may relate to the variability in GA area at baseline. The high rate of conversion from unilateral to bilateral GA within 12 months underscores the stealth of the disease and suggests it may be more rapid—and have greater effects on quality of life—than previously thought.

LASIK Versus SMILE for Myopic Conditions

June 2020

LASIK remains the most popular refractive treatment for myopia and myopic astigmatism, but small-incision lenticule extraction (SMILE) is increasing in popularity. **Ang et al.** performed a paired-eye noninferiority trial to compare the two procedures objectively. They found that both had good refractive predictability and similar safety indices at three and 12 months.

This prospective masked study was conducted at the Singapore National Eye Centre. Consecutive patients (recruited from May 2014 to November 2016) were assigned randomly to receive SMILE in one eye and LASIK in the other, with both procedures provided on the same day by a single surgeon. The prespecified primary outcome was refractive predictability three months after surgery; secondary outcomes included efficacy and safety results.

Ultimately, 70 eligible patients were assessed (mean age, 28 years; all Asian; 64% female). Preoperatively, there was little difference in spherical equivalence (SE) between eyes (–05.3 ± 1.8 D vs. –5.2 ± 1.7 D; p = .87). Both procedures had high three-month predictability: 99% of SMILE eyes and 97% of LASIK eyes achieved SE within ±1 D of attempted correction. However, the high performance of both procedures suggested that a noninferiority margin

of ±1 D was too great to offer a meaningful distinction. Additional analysis looking at a margin of ±0.5 D indicated that at three months, 87% of SMILE eyes and 92% of LASIK eyes achieved SE within ±0.5 D of attempted correction.

Uncorrected distance visual acuity (UDVA) of 20/40 or better was achieved in 100% of both groups, and UDVA of 20/20 or better was attained in 84% of SMILE eyes, versus 87% of LASIK eyes. Through 12 months, similarity was sustained in predictability (SE within ±1 D of attempted correction: 99% for both SMILE and LASIK), efficacy (UDVA of 20/20 or better: 85% vs. 83%), and safety (index: 1.15 ± 0.20 for both).

The authors noted that neither procedure resulted in major complications. Nevertheless, they emphasize that SMILE is a challenging procedure that necessitates additional surgical training. *(Also see related editorial by Thomas M. Lietman, MD, in the same issue.)*

Selective Laser Trabeculoplasty Outcomes in the United Kingdom

June 2020

Selective laser trabeculoplasty (SLT) successfully reduces intraocular pressure (IOP) in patients with open-angle glaucoma and ocular hypertension, especially those who are treatment-naive. To determine whether these results translate to clinical practice, **Khawaja et al.** analyzed electronic health records gathered from five U.K. ophthalmology teaching centers. They found that although most eyes with elevated IOP responded to SLT in the short term, treatment failed in three-quarters of eyes within two years, and many patients eventually needed more glaucoma medication or another procedure.

For this study, the researchers de-identified medical records and reviewed them for demographics, procedures, outcomes, and factors linked to treatment success. The main outcomes were changes from baseline in IOP and number of glaucoma medications. A Kaplan-Meier probability analysis was used to determine treatment success. Failure was defined as any of the following: need for another procedure (including repeat SLT), two consecutive visits with IOP >21 mm Hg or IOP reduction <20%, or two consecutive visits with a higher number of glaucoma medications than at baseline.

Altogether, 831 patients met the eligibility criteria. The mean follow-up time was 19.4 months (range, 3-67 months). In the 12- to 18-month window (439 eyes), the mean change in IOP was –4.2 mm Hg; in the subsequent 12 months (243 eyes), it was –3.4 mm Hg (both $p < .0001$). The mean increases in glaucoma medications per eye were 0.13 ($p = .007$) and 0.20 ($p = .005$), respectively. The probability of treatment success was 70% at six months but declined to 45%, 34%, 27%, and 18% by months 12, 18, 24, and 36, respectively. IOP >21 mm Hg at baseline was associated with a 33% reduction in the risk of failure (hazard ratio, 0.67; $p < .001$). Age, sex, baseline visual field mean deviation, and use of IOP-lowering drugs had no association with successful outcomes.

Although the success rate for SLT was 70% at six months, it dropped to 27% by 24 months. The decline in visual field mean deviation in the later timeframes supports common wisdom that the effects of treatment typically slow and may lead to disease progression. The authors ascribed the link between baseline IOP and treatment success to a likely floor effect with SLT, indicating that the procedure may be better suited for ocular hypertension or high-tension primary open-angle glaucoma than for normal-tension glaucoma.

—Summaries by Lynda Seminara

Ophthalmology Glaucoma

Selected by Henry D. Jampel, MD, MHS

Evaluation of Micropulse Cyclophotocoagulation

May/June 2020

Kaba et al. set out to evaluate whether micropulse cyclophotocoagulation (MP-CPC) is a safe and effective treatment for treating ocular hypertension (OHT) and glaucoma. They found that it is, with patients experiencing a mean reduction in intraocular pressure (IOP) of 20% or more over baseline at the one-year mark. However, they also found that patients in certain subgroups—notably those with normal-tension glaucoma or a baseline IOP of ≤21 mm Hg—had a more limited response.

The researchers assessed the results of 399 MP-CPC surgeries (399 eyes of 214 patients) performed between May 2016 and May 2018 in Canada. The main outcome measure was IOP; secondary outcomes included use of glaucoma medications and ocular adverse effects.

Patients were evaluated at four points postoperatively. At baseline, mean IOP was 19.8 ± 7.4 mm Hg; reductions in IOP were 22.7%, 20.2%, 20.7%, and 23.7% at the one-, three-, six-, and 12-month evaluations, respectively ($p < .0001$ for all timepoints). All told, 68% of the study eyes achieved a ≥20% mean reduction in IOP from baseline. However, the mean IOP reduction in eyes with normal-tension glaucoma was 7.6% from baseline. In addition, a subanalysis based on IOP stratification found that mean IOP reduction was 32% at post-op month 1 for those eyes with a baseline IOP of >21 mm Hg, versus 17.1% for those with a baseline IOP ≤21 mm Hg.

With regard to secondary outcomes, more than two-thirds of the eyes were being treated with topical glaucoma medications preoperatively. This stayed roughly the same throughout the study. However, of the 25 patients initially on oral glaucoma medications, 18 (72%) were able to discontinue their use by the 12-month mark. The most common adverse events were vision loss, IOP spike, and cataract. Eight patients needed a minimally invasive glaucoma surgery procedure during the study.

—Summary by Jean Shaw

Ophthalmology Retina

Selected by Andrew P. Schachat, MD

Safety of FA in Children

June 2020

Chee et al. evaluated the safety of fluorescein angiography (FA) in pediatric patients. They found that FA was not associated directly with systemic or

ocular adverse events. In addition, they found that younger children were more likely to undergo inpatient FA examinations, while those older than age 4 were more likely to be evaluated in an outpatient setting.

For this retrospective study, the researchers reviewed the charts of 115 patients who were treated between January 2010 and December 2015. Patients with fewer than 24 hours of documented follow-up were excluded.

A total of 214 FA exams were performed. Of these, 129 took place in 60 outpatients, and 85 occurred in 65 inpatients. (Ten patients underwent both in- and outpatient exams.) The researchers reviewed a number of intra- and perioperative physiological parameters, including heart rate, blood pressure, and oxygen saturation. Peri-injection effects of FA were evaluated by a two-tailed paired t-test comparison of mean five-minute pre- and postinjection physiological data.

The results showed a significant difference in patient age for inpatient exams (mean, 2.5 years; range, 4 weeks to 16.2 years) and outpatient evaluations (mean, 10.7 years; range, 3.8 to 18.4 years). No significant systemic or ocular adverse events were noted within 24 hours of FA, whether it was given on an in- or outpatient basis.

—Summary by Jean Shaw

American Journal of Ophthalmology

Selected by Richard K. Parrish II, MD

Ocular Outcomes of Alcohol Exposure in Utero

June 2020

Alcohol exposure in utero has been linked to growth and learning deficits, facial abnormalities, and organ damage. It also can cause eye problems such as optic nerve hypoplasia (ONH) and abnormal retinal configuration, although few studies of fetal alcohol spectrum disorder (FASD) have fully described the ocular aspects of the disorder. **Gyllencreutz et al.** examined individuals with FASD; they found that refractive errors, strabismus, and fundus abnormalities persisted from childhood through to early adulthood.

The authors enrolled 30 children who were adopted from Eastern European countries by families in Sweden. The children were diagnosed with FASD at a mean age of 7.9 years and examined by a multidisciplinary team between 2000 and 2002. Thirteen to 18 years later, the same team performed follow-up exams; at this point, the patients' mean age was 22 years.

Visual acuity (VA) and refractive results were as follows:

- During childhood, median VA was 20/32 in the right eye and 20/32 in the left (0.2 logMAR for both). Median refraction was +0.88 D in the right eye (range, –8.75 to +4.75) and +1.25 D (range, –9.38 to +5.25) in the left.
- During adulthood, median VA was 20/22 in the right eye and 20/20 in the left (0.05 logMAR in the right and 0.0 in the left). Median refraction was –0.25 D in both eyes (right eye range, –12 to +2.75; left eye range, –13.25 to +2.63).
- Thirteen children (40%) and 14 adults (47%) had astigmatism ≥1 D.

In other results, defective stereoacuity (>60 arc second) was apparent in 20 children (67%) and 22 adults (73%); and 12 children (40%) and 13 adults (43%) had heterotropia. Also noted was ONH persistence over time (three children, four adults) and increased tortuosity of retinal vessels (eight children, 11 adults). Nine of the 11 adults with increased tortuosity were born preterm and/or were small for their gestational age. (Data were unavailable for the other two.) The findings reinforce the need for ongoing follow-up of patients with FASD.

Assessing Photoreceptors After Repair of Macula-Off RD

June 2020

Macula-off retinal detachment (RD) can be repaired by pars plana vitrectomy with gas tamponade, but visual outcomes often are disappointing. Clinical factors such as macula-off duration and detachment height are known to affect prognosis after RD. Using a multimodal approach, **Reumueller et al.** explored the role of another factor—retinal regeneration—in RD outcomes. They found that even though cone morphology and function improved by 56 weeks postoperatively, structural and functional impairment remained.

This prospective fellow-eye comparison case series took place in an outpatient clinic at the Medical University of Vienna. Using a combination of spectral-domain optical coherence tomography (SD-OCT), adaptive-optics OCT (AO-OCT), and microperimetry (MP), the authors examined five eyes of five patients at six weeks (baseline) and 56 weeks (follow-up) after vitrectomy with gas tamponade for macula-off RD. They also evaluated the patients' five healthy fellow eyes. The same eight corresponding regions at foveal eccentricities of 2.5 and 6.5 degrees were analyzed in each eye. Main outcome measures were cone density, cone pattern regularity, signal attenuation, and retinal sensitivity.

The patients' mean age was 59.8 years, and their macula-off duration ranged from 0.5 to 5.5 days. Morphologic assessment with AO-OCT at baseline showed severe pattern irregularity, and SD-OCT showed attenuated outer retinal bands with severely reduced signal intensity in RD eyes compared with healthy fellow eyes.

Although cone pattern regularity improved from baseline to follow-up in the RD eyes ($p < .001$), irregularity persisted in 63% of AO-OCT images at follow-up, and severe signal reduction was observed in 45.5% of SD-OCT B-scans. Mean cone density at the inner-outer segment junction and cone outer segment tips was approximately 20,000/mm^2 (2.5 degrees) and 16,000/mm^2 (6.5 degrees), respectively, for healthy fellow eyes at baseline and follow-up. In contrast, cone density was much lower for RD eyes at baseline (range, 200-15,600/mm^2; $p < .001$)—and although improvement was observed at follow-up ($p < .001$), mean density was lower in RD eyes at the inner-outer segment junction and cone outer segment tips (range, 7,790-9,555/mm^2; $p < .001$).

Functional assessment with MP in healthy fellow eyes showed mean retinal sensitivity of 18 dB at baseline and

follow-up; it was much lower in RD eyes (14.30 dB and 14.64 dB, respectively) and did not improve substantially. Overall, SD-OCT grading and MP sensitivity correlated strongly with AO-OCT grading and cone density (rho values > .750).

The combination of AO-OCT, SD-OCT, and MP provides helpful insight into cone regeneration after vitreoretinal procedures. Despite evidence that cone morphology improves, there can be ample functional and morphologic distortion of cones, along with reduced retinal sensitivity, a year after successful reattachment. Hence, successful repair "does not equal restoration of the outer photoreceptor segment," said the authors. —*Summaries by Lynda Seminara*

JAMA Ophthalmology

Selected and reviewed by Neil M. Bressler, MD, and Deputy Editors

Use of Eye Care by Adults at High Risk of Vision Loss

May 2020

Saydah et al. compared the number of U.S. adults at high risk for vision loss and the use of eye care services in 2002 and 2017. They found that more adults were at high risk for vision loss in 2017 than in 2002. However, while more adults received eye care in 2017, the percentage who could not afford eyeglasses was higher in 2017.

For this study, the authors gathered data from two National Health Interview Surveys. Covariates included demographics, health insurance status, vision or eye problems (age-related macular degeneration, cataract, diabetic retinopathy, glaucoma, or an eye injury), and the presence of diabetes. Main outcome measures were self-reports of having done the following in the preceding 12 months: 1) visiting an eye care professional, 2) undergoing a dilated eye exam, and 3) needing eyeglasses but being unable to afford them. Respondents who were unable to see or were younger than 18 years of age were excluded from the analysis.

Participants who were deemed at high risk for vision loss were those ≥65 years of age and those with a diabetes diagnosis or eye/vision problem. Assessment methods included multivariable logistic regression and temporal comparisons (2002 vs. 2017) derived from estimates standardized to the 2010 census population.

In 2017, more than 93 million U.S. adults were at high risk for vision loss, up from almost 65 million in 2002. For this study, of the 30,920 eligible respondents in 2002, 16% were at least 65 years old, compared with 20% of the 32,886 respondents in 2017. Fifty-two percent of both samples were female.

Although use of eye care services was greater in 2017 than in 2002 (visit: 56.9% vs. 51.1%; dilated exam: 59.8% vs. 52.4%), so was the percentage of individuals who could not afford eyeglasses (8.7% vs. 8.3%). This finding was more pronounced for low-income participants.

Gender Disparities in Leadership Positions and Publication Rates

May 2020

Women make up 25.3% of ophthalmologists in the United States and comprise 28% of academic ophthalmology faculty members. To better understand gender inequality in ophthalmology, **Camacci et al.** looked at sex composition of the boards of ophthalmic journals and societies; they also compared publication productivity. Their analysis showed that the sex composition of the boards mirrors that of the ophthalmology profession, but high-level positions such as society president and editor-in-chief are heavily dominated by men.

For this cross-sectional study, the authors used the SCImago Journal Rank indicator to determine the 20 highest-ranked ophthalmology journals. Highly influential ophthalmology societies were identified via a faculty survey. The 2018 board members of each journal and society were identified from the relevant official websites, and the sex of each individual was noted. The Scopus database was used to obtain each member's h-index and m-quotient. (The h-index is designed to take both authors' productivity and the impact of their papers into account. The m-quotient accounts for different durations of academic careers and is calculated by dividing the h-index by the number of years since an author's first publication.)

Among the 1,077 members of ophthalmic journal and society boards, 797 (74%) were men. Of the 24 journal editors-in-chief, 23 (95.8%) were male. Thirteen (86.7%) of the 15 presidents of professional societies were men. The median h-index was significantly higher for men (journals: 34 vs. 28, $p < .001$; societies: 27 vs. 17, $p = .006$). The median number of publications was 157 for men and 109 for women ($p < .001$). Likewise, more society board members were male (109 vs. 58, $p = .001$), and median citations favored men (4,027 vs. 2,871, $p < .001$). The m-quotients for board members were comparable (journal boards: 1.2 [male] vs. 1.1 [female], $p = .54$; society boards: 1.0 [male] vs. 0.9 [female], $p = .32$).

In summary, the sex distribution of society and journal boards is consistent with that of U.S. ophthalmologists. Career length seems to have no bearing on publication productivity. If journals and societies want their leadership to fully reflect the demographics of ophthalmologists, it may help to consider early-career personnel for new openings, which may give women greater opportunity to fill these positions, the authors said. *(Also see related commentary by Kathryn Colby, MD, PhD, in the same issue.)*

AI May Help Identify Candidates for Refractive Surgery

May 2020

Xie et al. evaluated the utility of deep learning as an adjunct to tomographic imaging for identifying high-risk corneas. Their artificial intelligence (AI) system appeared useful for classifying images, providing important details about the cornea, and identifying potentially at-risk corneas.

This cross-sectional analysis was performed at the Zhongshan Ophthalmic Center in Guangzhou, China. The researchers included patients throughout China who wanted refractive surgery, had a primary diagnosis of

keratoconus, and had a stable post-op refractive state. Data were collected using a Pentacam HR system, and four-map composite refractive images were used to determine the overall profile of the cornea. Altogether, data for 6,465 de-identified corneal tomographic images (1,385 patients) were used to generate the AI model, which was based on the Pentacam InceptionResNetV2 Screening System (PIRSS). Images were analyzed independently by 20 individuals (including 10 senior ophthalmologists) and by the AI model.

The overall accuracy rate of the PIRSS model was 94.7% (95% confidence interval [CI], 93.3%-95.8%) on the validation dataset. Most areas under the receiver operator characteristic curves were above 0.99. For an independent test dataset, the model achieved similar accuracy (95% [95% CI, 88.8%-97.8%]), comparable to that of five senior ophthalmologists who perform refractive surgery (92.8% [95% CI, 91.2%-94.4%]; p = .72). The PIRSS model was superior to human classifiers for identifying corneas that would be unsuitable for refractive surgery (95% vs. 81%; p < .001).

Larger samples and other refinements are needed to improve the performance of PIRSS, said the authors, who emphasized that technology cannot replace human clinical expertise. They suggested that biochemical assessment may improve screening for keratoconus and that combining it with AI could help guide clinical decisions. *(Also see related commentary by Travis K. Redd, MD, MPH, J. Peter Campbell, MD, MPH, and Michael F. Chiang, MD, MA, in the same issue.)*

—Summaries by Lynda Seminara

OTHER JOURNALS

Selected by Prem S. Subramanian, MD, PhD

Assessing Fear of Falling in Patients With POAG

Investigative Ophthalmology & Visual Science
2020;61(3):52

Previous research has correlated visual field loss with reduced activity levels in patients with primary open-angle glaucoma (POAG), and there is a need to explore the role of falls and fear of falls in patient behaviors. **Yuki et al.** set out to determine which factors drive the fear of falling among patients with POAG and to explore the relationship between this fear and visual field (VF) loss. They found that fear of falling was more pronounced for older adults, women, and those patients who have damage to the inferior peripheral VF.

For this cross-sectional observational study, the authors evaluated 273 patients with POAG (average age, 64.2 years), using the Fall Efficacy Scale–International (FES-I) questionnaire during face-to-face interviews. Multivariable linear regression was used to explore relationships between the total FES-I score and age, sex, and level of best-corrected visual acuity as well as other factors, such as time spent walking each day, total deviation (TD) in four VF areas, and number of previous falls.

Results showed that fear of falling increased with age and was higher for women. Reduced inferior peripheral VF sensitivity and increased inferior central VF sensitivity correlated with greater fear of falling. No meaningful associations were observed for other variables, including the number of previous falls. Only four of the 13 study variables were included in the optimal model for total FES-I score: age (coefficient, 0.23; standard error [SE], 0.04; p < .001), sex (coefficient, 1.79 for women; SE, 0.84; p = .034), and mean TD in the inferior central area (coefficient, 0.92; SE, 0.22; p < .001) and the inferior peripheral area (coefficient, –0.86; SE, 0.21; p < 0.001).

The authors believe that this study is the first to use the FES-I questionnaire to assess fear of falling in patients with glaucoma. In addition to being aware of the demographic factors linked to greater fear, they said, additional attention should be paid to patients with damage in the inferior peripheral VF.

—Summary by Lynda Seminara

MORE ONLINE. For a study on undiagnosed HIV in ocular syphilis patients, see this section at aao.org/eyenet.

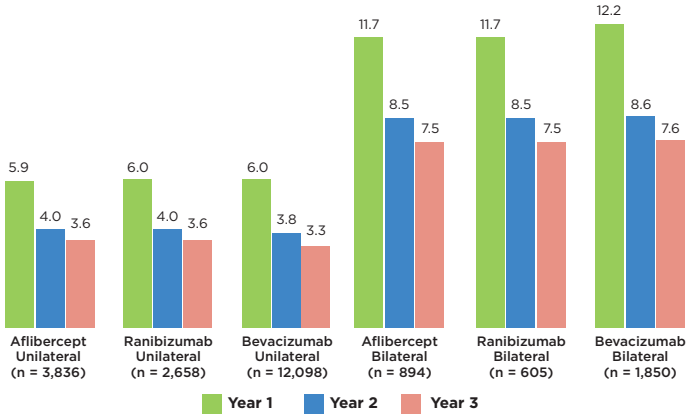
IRIS Registry Snapshot: Intravitreal Injections for AMD

Real-world treatment often differs from standard-of-care practices. In a study sponsored by Janssen Global Services, Verana Health analyzed data from the Academy's IRIS Registry (Intelligent Research in Sight) to assess changes in anti-VEGF treatment frequency in patients with neovascular age-related macular degeneration (AMD).

The three-year study involved 18,596 patients; of these, 3,034 had bilateral wet AMD. The findings (right) suggest that a large proportion of individuals discontinue treatment within the first year, regardless of treatment type, and they underscore some of the known challenges in treatment of patients with wet AMD.

Note: The Academy has partnered with Verana Health to curate and analyze IRIS Registry data.

Mean Anti-VEGF Injections Per Year, By Treatment Type



SOURCE: Verana Health

AMERICAN ACADEMY
OF OPHTHALMOLOGY®

We're Advocating in New Ways to Address New Risks

As our nation addresses the coronavirus pandemic, ophthalmologists and their patients face unprecedented risks.

No one understands those risks better than you and your Academy. We're making sure lawmakers understand the financial and regulatory threats to quality eye care for patients with potentially blinding eye disease. Those threats affect access to care they need now and in the future.

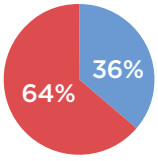
Ophthalmologists, particularly those in private practice, have been deeply affected by COVID-19. We're making sure Congress knows what's at stake and how they can provide the assistance your practices need.

For valuable resources visit aao.org/coronavirus

Based on what members have told us about the financial effects of COVID-19, we're telling Congress:

63% of practices have furloughed or laid off staff

Almost two-thirds of practices would be financially unhealthy if federal aid falls short



Four of every five practices would be smaller upon reopening

MD Roundtable: COVID-19 and Clinical Precautions

As the COVID-19 pandemic sweeps across the globe, ophthalmologists have been grappling with questions about ocular manifestations of the disease, protective measures to reduce transmission, and keeping patients informed. Kathryn A. Colby, MD, PhD, of the University of Chicago, hosted an MD Roundtable with Ashley Behrens, MD, of the Wilmer Eye Institute, Jodhbir S. Mehta, MD, PhD, of the Singapore National Eye Centre, and Sonal S. Tuli, MD, of the University of Florida. These cornea experts discuss their firsthand experience with the disease and what they have learned thus far. (For the discussion of ocular manifestations, see "Clinical Experience and Scientific Insights," with this article at aao.org/eyenet.) These conversations took place on April 22, 2020.

NEW CONFIGURATION. *At the Wilmer Eye Institute, waiting area of the Comprehensive Eye Care Clinic (1A) before and (1B) after the pandemic started.*

Screening and Eye Care

Dr. Colby: *Let's begin with outpatient treatment since that's the majority of what we do as ophthalmologists. Which measures are you using to screen patients for SARS-CoV-2 infection in the clinic, and how are you caring for patients who require outpatient procedures, such as laser treatments or injections, during the COVID-19 pandemic?*

Dr. Behrens: Patients who come to the clinic must first complete a questionnaire to help us determine the potential risk of infection (see Table 1). Patients with confirmed COVID-19 and persons under investigation (PUIs) are not seen in our clinic. They are examined in the emergency department, where we have a slit lamp in a negative-pressure room. For those seen in the clinic, exam rooms are cleaned thoroughly between patients.

Dr. Mehta: We also have patients complete a questionnaire, and they undergo a thermal scan at the entrance of the hospital before arriving at the clinic. If a patient is from a COVID-19 hot-spot region, he or she is seen in an isolated area, separate from our main clinic. We also take the temperature of staff members twice a day.

Patients deemed to be at low risk for SARS-CoV-2 infection are seen in the clinic for routine procedures such as retinal injections. We review electronic medical records to determine whether we really need to see the patient at that time, and we ask patients to come to the clinic alone, if possible. We encourage social distancing in the waiting room; we've removed half the chairs, and there are markings on the chairs to make sure patients are well separated.

We keep hand sanitizer by every slit lamp and apply it every time a patient is seen. The slit-lamp breath shields are cleaned between patients because even though patients are masked, any droplet or respiratory action against the shield could transmit infection.

Dr. Tuli: We screen every patient—as well as all faculty and staff—before they come into the clinic. We have someone at the door who gives a questionnaire to patients, and we do a temperature scan. We check for sense of smell with scratch-and-sniff cards because loss of this sense is a sign of COVID-19. We're also considering implementing pulse oximetry because hypoxia is another sign of infection. In general, nonemergency patients are asked to return at a future date.

In the clinic, we have always advised patients and staff to avoid talking at the slit lamp and during injection procedures, and we're continuing to do that. We're performing posterior laser

ROUNDTABLE HOSTED BY **KATHRYN A. COLBY, MD, PHD,** WITH **ASHLEY BEHRENS, MD, JODHBIR S. MEHTA, MD, PHD,** AND **SONAL S. TULI, MD.**

treatments as usual. However, we're not doing any excimer laser treatments because of the plume generated, so we're avoiding any surface ablation, including phototherapeutic keratectomy (PTK).

Dr. Behrens: As a refractive surgeon, I haven't yet had a case requiring PTK during the pandemic, and of course there are no emergency hyperopic or myopic excimer laser treatments.

For patients with glaucoma who require a Humphrey visual field test, we're trying to determine the best way to disinfect the machine between patients. The manufacturer recommends a brief cleansing procedure, but even with masking, the bowl can be contaminated by droplets during the test. I'm concerned that infectious virus could still pose a risk to patients.

Dr. Colby: We've been considering regular nasal swabbing of our staff, possibly every two weeks or 10 days, as a means of surveillance. We also discourage talking during the exam—when the ophthalmologist and patient are in close proximity—and we're allotting at least five minutes for cleaning the exam room between patients.

Dr. Colby: *How are you providing ophthalmic care to patients who are hospitalized with COVID-19?*

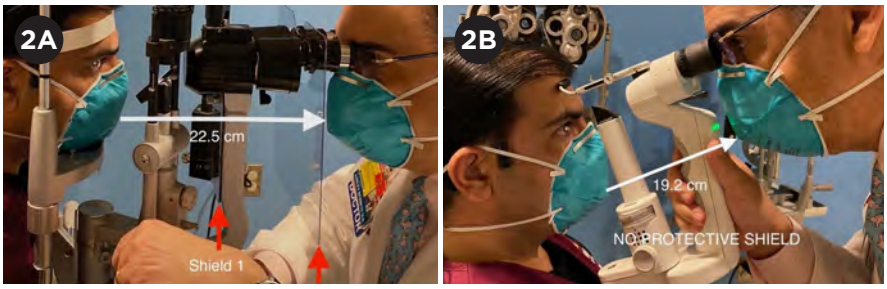
Dr. Tuli: For patients given ventilatory assistance who are not conscious, we protect the eyes with lubrication and ensure there's no lagophthalmos. These are standard measures, not specific to COVID-19.

Dr. Mehta: In the intensive care unit, we also use standard procedures to protect the ocular surface.

Personal Protective Equipment

Dr. Colby: *Describe the personal protective equipment (PPE) that you're using. Are you triaging PPE according to symptoms?*

Dr. Mehta: Patients with COVID-19 are being isolated in the hospital wards. When we see these patients, we wear full PPE, including fit-tested N95 masks. After the experience of severe acute respiratory syndrome (SARS) in Singapore, these measures have become routine for hospital employees. Staff members who cannot physically wear N95 masks must avoid the isolation units.



AVOID PORTABLE SLIT LAMPS. *A standard slit lamp with double breath shield (2A) is preferable to a portable slit lamp (2B) for reasons of social distancing.*

Dr. Colby: At our institution, we do annual fit testing for N95 masks to be in compliance, and it has felt like a major undertaking, but now we're glad to have had the fit test.

Dr. Mehta: For our clinic patients determined to be at low risk of infection, we are not in full PPE. We don't wear gloves, but we do wear surgical masks while in the exam rooms. The protective gear, including, for example, breath shields on the slit lamp, can be cumbersome for certain procedures, including Goldmann applanation tonometry.

Dr. Behrens: Evidence suggests that asymptomatic patients account for nearly 50% of those infected[1] and that almost 50% of transmission can be attributed to asymptomatic or presymptomatic index cases.[2] Therefore, our technicians, examiners, and ophthalmologists have been wearing full PPE to see any patient; this means fit-tested N95 masks, gloves, eye protection, and a plastic visor to shield the face. The slit lamp also is equipped with two breath protectors. I tried wearing goggles, but they interfered with exams at the slit lamp. Instead, I wear my regular glasses. Portable slit lamps should be avoided because they require you to be even closer to the patient (see Fig. 2). When we have any difficulty examining a patient with a standard slit lamp, we use a penlight instead.

Dr. Tuli: When we see COVID-19 patients in the hospital for consultations, we wear full PPE, including fit-tested N95 masks, gloves, and gowns. Similarly, we have designated an area of the clinic for PUIs, and we also wear full PPE to examine those individuals.

For patients who do not have symptoms and are at low risk of SARS-CoV-2 infection, we wear eye protection and surgical masks in the exam rooms. We found low-elevation goggles that work well at the slit lamp, but wearing them for indirect ophthalmoscopy remains a challenge.

Gloves can create a false sense of security. The glove-wearing provider touches the patient and then may touch pens and other items in the room while still wearing the gloves, potentially contaminating those things. For a patient at low risk of infection, it is better to use a cotton-tip applicator or your fingers and then wash your hands.

Some of our providers wear N95 masks for every patient because they're more concerned, but we generally save the N95s for seeing high-risk patients. Until recently, we didn't have a sufficient supply of N95 masks to be worn for outpatient care.

Dr. Colby: We set up a room with ultraviolet (UV) light to sterilize our N95 masks, mostly the ones used in the operating room. With UV sterilization, we're able to use the same mask four times; after sterilization, each mask is returned to the original user.

Dr. Behrens: Our current supply of N95 masks is sufficient to not require sterilizing them. We use them until they are soiled and then change them. Our staff members are universally masked, with N95s for physicians and techs and at least cloth masks for front office staff. If a patient is not already wearing a mask when he or she reaches the entrance of the Wilmer Eye Institute, we provide one.

Telemedicine

Dr. Colby: *Are you using telemedicine in any way during the pandemic?*

Dr. Tuli: We're trying to do as much telehealth as possible to limit exposure.

Table 1. Wilmer Eye Institute—COVID-19 Entrance Screening

(Updated 5/1/20. At this date, only emergent and urgent patients were seen.)

PERSON (PATIENT, VISITOR, ESCORT) PRESENTS TO SCREENER

☐ Provide mask to any unmasked individual.

☐ Ask: "Do you have an appointment today?"

If YES and if escorted: "We are asking that your escort does not accompany you to clinic, if you are able to proceed unescorted." (No escort, unless patient needs physical assistance.)
INFORM: "We will be asking you a series of questions and checking your temperature before you proceed."
If NO: Request reason for requested visit. If urgent/emergent, contact the clinic for permission to add. All other requests should be scheduled through the call center.

☐ **CATEGORY 1**

- Have you experienced any new unexplained loss of taste or smell? **If YES,** proceed to Section A. **If NO,** go to Category 2.
- Have you had a positive COVID-19 test within the past 14 days? **If YES,** proceed to Section A. **If NO,** go to Category 2.
- Have you been advised to obtain COVID-19 testing and/or are you awaiting results? **If NO,** go to Category 2.

If YES, "Was the test ordered because of a planned surgery or procedure?"

- **If YES and otherwise asymptomatic,** proceed to Category 2.
- **If NO** (not due to upcoming surgery), proceed to Section A.

☐ **CATEGORY 2**

Ask each symptom question individually: Have you experienced, in the last three days any new:

- Fever
- Cough
- Sore throat
- Shortness of breath
- Muscle aches
- Diarrhea
- Headache

If YES to TWO or more of these symptoms, proceed to Section A.
If YES to only ONE of these symptoms, proceed to Category 3.
If NO to ALL symptoms, proceed to Category 3.

☐ **CATEGORY 3**

- Have you had exposure to a person confirmed to have COVID-19?
- Have you traveled to New York City or New Jersey in the past 14 days?
- Do you live in a long-term care facility (e.g., nursing home, skilled nursing facility, assisted living, rehab unit)?

If YES to at least ONE of the Category 3 situations and any ONE symptom from Category 2, proceed to Section A.
If YES to ONE or more of the Category 3 questions, proceed to Section B.
If NO, proceed to Section C.

FOR ALL PATIENTS

☐ Proceed to use of scanning thermometer.
If patient's temperature is 100.4 or higher:

If NO symptoms or any Category 3 criteria are present, proceed to Section B.
Otherwise, proceed to Section A.

SECTION A. RETURN TO VEHICLE PROCESS

☐ Obtain contact information using Contact Form, and advise patient to return to their vehicle.

☐ Explain to patient that they will be contacted in a few minutes to manage their office visit as their screening has provided some concern for a visit in our typical clinic setting.

☐ Provide appropriate clinic with the Contact Form so they can contact the individual immediately with plan for office visit.

SECTION B. PROCEED TO ISOLATION ROOM, AND CALL CLINIC

☐ Provide a surgical mask to any individual who is wearing homemade mask or face covering.

☐ Escort patient to isolation room and call clinic to inform of status and obtain plan for visit.

SECTION C. PROCEED TO CLINIC

☐ **INFORM:** "Please proceed to the clinic. We ask that you continue to wear your mask while in our building."

SOURCE: *Adapted from the Wilmer Eye Institute screening form dated May 1, 2020. Special thanks to Donna Vierheller, COT, and Michelle J. Campbell, MBA.*

This includes phone consultations or video chats, with the patient at home. Some physicians have adopted this more readily than others. We are offering drive-through testing of intraocular pressure (IOP), whereby a technician uses a disposable tip to check IOP. We're also doing hybrid visits—so, for instance, a patient may undergo optical coherence tomography (OCT) in the clinic and return home. The physician would then call the patient later that day and conduct a telehealth visit. Such hybrid visits help us determine whether a patient needs to come back for an injection and assess the stability of a macular degeneration case. We're finding that there is a fair bit that we can do by telehealth.

Dr. Behrens: Our glaucoma specialists initially offered drive-through IOP testing, but they stopped because patient response was low. I have done a few telemedicine visits as an anterior-segment ophthalmologist. We use Polycom video conferencing (Poly), which integrates with the Epic system, and it has been difficult to achieve high-quality video for a good examination.

Dr. Mehta: The COVID-19 pandemic has caused us to reevaluate the amount of time patients spend in the hospital clinic. Retina and glaucoma specialists in Singapore have transitioned to hybrid virtual clinics, like those Dr. Tuli described. For example, patients have a visual field test or imaging in the office, and the results are viewed by a consultant. Patients are contacted by text message to inform them of the results, upcoming appointments, and prescription information. We may also follow up by video conference to explain the findings and schedule the next appointment. We're finding that these hybrid visits work for about 25% to 30% of our patients; most of them have stable conditions and are presenting for follow-up. An option we're considering is doing the imaging at a satellite diagnostic center.

We've encountered some obstacles with telemedicine. Many of our patients are older and less tech savvy, and we need to make sure they have access to the video conferencing platform. Providing telehealth can be time-intensive, and it requires more imaging than we'd normally do. Another issue has been ensuring that these extra services will be billable.

Dr. Behrens: I've been asking some patients to take photos of the eye with their cell phones, and I have a few telehealth imaging tips. I advise patients to use the back camera with flash enabled (not the selfie camera) to produce higher-resolution images. With this, we've been able to readily detect conditions such as corneal ulcer and even more subtle presentations, like peripheral keratitis. However, with photos, you can miss a lot.

Precautions With Patients

Dr. Colby: *We care for a population that is predominantly older and at risk, and we want to reassure patients that it's safe to come to the clinic for necessary injections or glaucoma care. How are you letting patients know that it's safe to come in for exams, and what are you telling them about using contact lenses and eyedrops during the pandemic?*

Dr. Tuli: It's more important than ever to advise patients on good contact lens hygiene, including washing hands before inserting and removing lenses, as well as avoiding touching the eyes while the contacts are in. Disposable lenses should be considered to decrease the risk of contamination associated with reusable lenses. We tell patients to keep using eyedrops and to wash their hands before and after instilling them. This is the advice we've given all along, but we're now emphasizing it more.

We've been informing patients by phone on how we're screening for infection and that we're deep cleaning the entire clinic twice daily, as well as cleaning exam rooms after each patient's visit. It's important to reassure them that the clinic is a safe place to receive ophthalmic care. We're also planning to provide this information in a letter that is mailed to patients.

Dr. Behrens: I recommend daily-wear contact lenses over reusable ones, and I emphasize that patients should avoid touching the tips of eyedrop bottles. When possible, I use preservative-free medications.

Basically, our clinics are closed; we're not seeing patients for routine follow-up. We are treating only emergency cases and those that require special care, such as patients who need injections or present with uveitis.

Dr. Mehta: I've been recommending that patients avoid wearing contact lenses altogether; I advise wearing glasses for now. My concern is that even with hand washing, patients are likely to contaminate the eye from use of contact lenses. I'm reminding patients to apply eyedrops with clean hands, and we're strongly recommending that they have eyedrops delivered rather than travel to the pharmacy for them.

To help patients feel confident about their safety in the clinic, we show them the strict protective measures we're taking. In the lobby of the hospital, there's a large screen that depicts how we are keeping people from coming to the hospital unnecessarily. Patients see that we are using thermal scanning to check everyone's temperature. We're also sharing this information through text messaging.

When we decide that a nonessential appointment should be delayed to mitigate risk, we explain this reasoning, and we emphasize that the doctor has determined that it's safe to delay the visit. This way, the patient understands that it wasn't simply an administrative decision to delay an appointment.

Closing Pearls

Dr. Colby: *What overarching statements would you like readers to take away from this discussion?*

Dr. Mehta: Be aware that conjunctivitis might be an early presenting sign of SARS-CoV-2 infection, even in an otherwise asymptomatic patient (see "Clinical Experience and Scientific Insights," which is posted with this article at aao.org/eyenet). Take extra precautions and obtain a thorough and relevant patient history, including whether the sense of smell or taste has been compromised.

I think the practice of ophthalmology, and of medicine in general, will be changed even after we get through this pandemic; it will be a driver for us to implement more video conferencing

and teleophthalmology.

Dr. Behrens: Be exceedingly precautious. Wash your hands thoroughly for 20 seconds before and after seeing a patient and use PPE. Until we have evidence from robust controlled studies showing how SARS-CoV-2 affects the eye, we must practice extreme safety measures to prevent spread to physicians, other health care workers, technicians, and other staff members.

Dr. Tuli: We don't have definitive evidence about conjunctivitis as a COVID-19 sign or on the likelihood of viral transmission through tears, but practicing strict hand and eye hygiene is always a good idea.

Understandably, our families, staff, and patients are scared and stressed. It's important for us to explain to them that with appropriate precautions, they can reduce their risk of getting this infection, and that the vast majority of people who become infected will recover. We need to reassure our staff and those under our care that even though the COVID-19 world may be different, we're resilient and will get through it.

1 Moriarty LF et al. *MMWR*. 2020;69(12):347-352.

2 He X et al. *Nat Med*. 2020. doi: 10.1038/s41591-020-0869-5.

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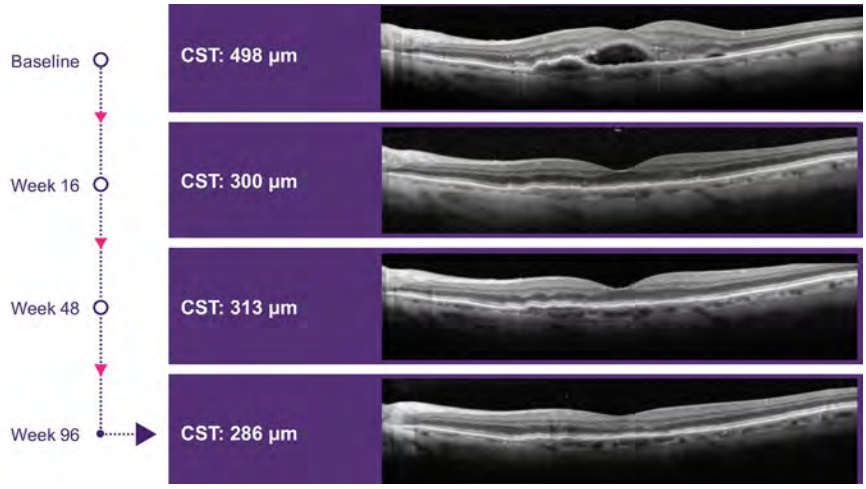
Brolucizumab Hits Snag

At the beginning of this year, brolucizumab (Beovu) looked like it was set to follow a familiar pattern: A new anti-VEGF drug successfully navigates the long path to FDA approval, and ophthalmologists begin considering whether it can solve lingering clinical issues of treating age-related macular degeneration (AMD).

But on Feb. 23, that scenario changed. In an alert to its members, the American Society of Retina Specialists said that it had received reports of 14 cases of vasculitis following the drug's approval on Oct. 7, 2019. Of these, 11 were designated by the reporting provider as occlusive retinal vasculitis.[1,2]

Based on current information, brolucizumab is contraindicated in the presence of active inflammation.[2] In addition, if inflammation is noted following injection, close follow-up and imaging are warranted, as some cases of occlusive vasculitis may initially be subtle and others may have a delayed presentation.[2]

In response to these concerns, Novartis, the drug's manufacturer, launched an extensive safety review. In early April, the company concluded that "there is a confirmed safety signal of rare adverse events of 'retinal vasculitis and/or retinal vascular occlusion with or without presence of intraocular inflammation that may result in severe vision loss.'"[3] As a result, prescribing information would be updated, the company said.



POTENTIAL BENEFIT. *Two-year reduction in central subfield thickness in patients who received brolucizumab during the HAWK trial.*

Why It Was Approved

The drug's performance in clinical trials suggested that it might help retina specialists address two continuing issues of anti-VEGF therapy—persistent retinal fluid despite treatment and the burden on patients of monthly anti-VEGF injections.

Overview of trials. Two randomized controlled multinational trials of brolucizumab—known as HAWK and HARRIER—were conducted in 1,817 patients with neovascular AMD. In HAWK, patients' eyes were randomized 1:1:1 to receive brolucizumab 3 mg, brolucizumab 6 mg, or aflibercept 2 mg. In HARRIER, eyes were randomized 1:1 to brolucizumab 6 mg or aflibercept 2 mg.

Visual outcomes. The researchers found that improvements in best-corrected visual acuity (BCVA) obtained with the 6-mg dose of brolucizumab were noninferior to acuity gains with 2 mg of aflibercept, at both 48 and 96 weeks.[4] Approximately a third of eyes in both studies gained at least 15 letters of BCVA at 48 weeks. These gains were maintained in the second year, with a mean increase in BCVA of 5.9 letters for brolucizumab 6 mg versus 5.3 letters for aflibercept in HAWK, and 6.1 letters versus 6.6 letters, respectively, in HARRIER.

Sustained drying of fluid. Along with achieving their primary endpoint of noninferiority in BCVA, the trials demonstrated that the 6-mg dose of

BY LINDA ROACH, CONTRIBUTING WRITER, INTERVIEWING **PRAVIN U. DUGEL, MD, K. BAILEY FREUND, MD, ANDREAS K. LAUER, MD,** AND **NICOLAS A. YANNUZZI, MD.**

brolucizumab was better than aflibercept at drying fluid in the retina and at reducing central subfield thickness (CST).

In HARRIER, 24% of the brolucizumab group had intra- and/or subretinal fluid at 96 weeks, compared to 39% of the aflibercept group ($p < 0.0001$). In HAWK, the comparable figures were 24% and 37%, respectively ($p < 0.0001$). In addition, fewer eyes receiving brolucizumab 6 mg had fluid beneath the retinal pigment epithelium at 96 weeks: 17% versus 22% for aflibercept in HARRIER, and 11% versus 15%, respectively, in HAWK.

CST reduction. In HARRIER, optical coherence tomography (OCT) scans showed that the mean absolute decrease in CST from baseline at 96 weeks was –198 µm in the brolucizumab subjects and –155 µm in aflibercept eyes ($p < 0.0001$). In HAWK, the reductions were –175 µm for brolucizumab and –149 µm for aflibercept ($p = 0.0057$).

Less frequent dosing. Given the treatment burden posed by frequent anti-VEGF injections, many clinicians have hoped that brolucizumab would provide patients with some relief on this front.

Investigators in HAWK and HARRIER tested the efficacy of transitioning patients to a quarterly injection schedule immediately after three initial monthly loading doses, without the gradual treat-and-extend (T&E) process that is being used off-label to lengthen treatment intervals with other anti-VEGF agents.

At one year, half of the brolucizumab patients were successfully on a quarterly injection schedule. Of those patients, 82% in HAWK and 75% in HARRIER were maintained on 12-week intervals for the second year.[4] (Brolucizumab recipients who failed the quarterly regimen were treated every eight weeks for the remainder of the trials, without the possibility of extension to every 12 weeks; aflibercept was given at eight-week intervals in both studies.)

Predicting response to therapy. One of the conundrums of anti-VEGF therapy has been in trying to predict which retinas require monthly therapy and which will do well with less frequent injections. The brolucizumab trials showed that, if the drug proved efficacious for a patient early in the trial, their disease likely would remain controlled with 12-week intervals, without a T&E protocol.

Additional thoughts on T&E. As approved, brolucizumab is labeled for three monthly loading doses, followed by an immediate jump to intervals of eight to 12 weeks. This does not allow for the more cautious, gradual T&E protocols that many retina specialists have adopted with other anti-VEGF drugs, said K. Bailey Freund, MD, with Vitreous Retina Macula Consultants of New York in New York City.

"I would be hesitant to use brolucizumab for eyes in which I think it will not be possible to extend to eight-week intervals," Dr. Freund said. "Also, I prefer to extend gradually; so, after two monthly doses, I might next try a six- or seven-week interval before attempting to extend further."

Adverse Outcomes

Trial results. Brolucizumab was generally well tolerated in HAWK and HARRIER. However, the results raised some concerns regarding inflammation, as a small number of patients who received brolucizumab experienced uveitis, iritis, and endophthalmitis.[2]

"In the phase 3 trials, there was a greater proportion of study patients who developed intraocular inflammation—more so than we saw with ranibizumab, aflibercept, or bevacizumab," said Andreas K. Lauer, MD, at the Casey Eye Institute in Portland, Oregon. Most of the cases of inflammation observed in the trials resolved with no sequelae;[1] nonetheless, their occurrence prompted the push to have clinicians track and report their experiences with patient outcomes.[2]

What's next? In addition to updating prescribing information, Novartis has informed investigators who are participating in ongoing clinical trials and is amending protocols to include the new safety information.[3]

Clinicians are encouraged to report any problems to Novartis at www.report.novartis.com or to the FDA at www.accessdata.fda.gov/scripts/medwatch/index.cfm. Retina specialists may also contact www.asrs.org/clinical/adverse-events-reporting/report-an-adverse-event.

What role does COVID-19 play? With the advent of COVID-19, retina specialists are focusing on their most vulnerable patients, including those at greatest risk of vision loss from AMD. As Dr. Freund put it, "Neovascular AMD doesn't care about the virus, and patients can lose vision if they do not continue treatment."

Even before COVID-19 became a concern, Dr. Freund said that his large group practice was moving cautiously on adoption of the drug. Initially, he planned to use brolucizumab in two groups of patients: 1) those in whom he was "unable to adequately control exudation with the other anti-VEGFs"

Method of Action

Brolucizumab is a recombinant, humanized single-chain antibody fragment—the smallest functional portion of an antibody molecule—that inhibits all isoforms of VEGF-A. It has a molecular weight of 26 kDa, compared to 97-115 kDa for aflibercept (Eylea) and 48 kDa for ranibizumab (Lucentis).[1]

Because of its small size, the molecule can be delivered into the vitreous at molar doses much higher than previous anti-VEGF drugs, allowing greater penetration into retinal tissue and possibly explaining its extended duration in the eye. For instance, the equivalent molecules per injection is 0.5 for ranibizumab 0.5 mg, 1 for aflibercept 2.0 mg, and 11 for brolucizumab 6.0 mg.[1]

Evidence from animal studies also suggests that its smaller size may foster quicker systemic clearance.[2]

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and 2) those "currently on a T&E regimen where I would like to extend the injection interval a bit further," Dr. Freund said. Now, however, he has suspended his use of brolucizumab while he awaits additional findings on the drug's safety.

Further Clarification Needed

Presuming that brolucizumab regains its footing, a number of issues warrant additional investigation.

Stable disease? Some evidence suggests that brolucizumab might smooth out fluctuations in retinal thickness over time, said Pravin U. Dugel, MD, with Iveric bio, Inc. and based in Phoenix. In post hoc analyses of the brolucizumab data, OCTs taken of brolucizumab eyes did not have the seesaw pattern observed in those taken of aflibercept eyes, he said—and in other trials of anti-VEGF agents, fewer OCT fluctuations correlated with better BCVA, he noted.

If fewer OCT fluctuations are indeed substantiated with brolucizumab, this would be one of the most appealing aspects of the drug for clinicians, Dr. Lauer said. "We know that a consistently sustained level of medication reduces reactivation of the disease, and the clinical picture tends to be more stable," he said. Support for this comes "from the inflammatory eye disease world, using sustained release corticosteroids, and also from the LADDER study,[5] with a port delivery system using ranibizumab," Dr. Lauer said.

Impact as drying agent. "The data suggest that at the fixed interval dosing regimens evaluated in the clinical trial, brolucizumab appears to be a better drying agent than aflibercept," said Nicolas A. Yannuzzi, MD, at Bascom Palmer Eye Institute in Miami. "But how much does that matter? Visual outcomes were shown to be noninferior."

In addition, Dr. Yannuzzi noted, some retina specialists are wary of the idea of completely drying the neovascularization for fear of hastening progression to geographic atrophy.

At any rate, evidence of any benefit of extended dosing and lower treatment burden will have to wait until the drug enters routine clinical practice, said Dr. Yannuzzi.

Good results with PCV. Dr. Freund noted that a potential target population for use of the drug as initial monotherapy would be patients who have polypoidal choroidal vasculopathy (PCV), a subtype of neovascular AMD in which typical soft drusen are often absent but eyes have pachychoroid disease features. This AMD variant is most common in Asian populations. Incidence of this subtype among Asians with neovascular AMD has been estimated to be as high as 50%,[6] and there is early evidence that brolucizumab might dry up their lesions quickly, he said.

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Dr. Dugel served as principal investigator of HAWK and is executive vice president and chief strategy and business officer of Iveric bio. He is based in Phoenix. *Relevant financial disclosures: Iveric bio: E; Novartis/Alcon Pharmaceuticals: C; Roche/Genentech: C.*

Dr. Freund practices at Vitreous Retina Macular Consultants of New York and is clinical professor of ophthalmology at the New York University School of Medicine, both in New York City. *Relevant financial disclosures: Novartis/Alcon Pharmaceuticals: C; Optovue: C; Roche/Genentech: S.*

Dr. Lauer is chair of ophthalmology and chief of the Retina-Vitreous Division of the Casey Eye Institute at Oregon Health & Science University in Portland. *Relevant financial disclosures: Allergan: S; Biogen: C; Genentech: S; NEI: S; Nightstar/Biogen: C; Oxford BioMedica: S; Regenxbio: C; Sanofi: C.*

Dr. Yannuzzi is a fellow in retina and vitreous diseases, an instructor, and chief ophthalmology resident at Bascom Palmer Eye Institute in Miami. *Relevant financial disclosures: None.*

See the disclosure key, page 9. For full disclosures, view this article at aao.org/eyenet.

Retinitis Pigmentosa, Part 1: Understanding the Basics

Retinitis pigmentosa (RP) is a progressive degeneration that typically starts with involvement of the rod photoreceptors, followed by cone photoreceptors,[1,2] and thus is classified as a rod-cone dystrophy.

The condition is estimated to affect 1 in 4,000 people worldwide, with variable prevalence in different populations. For example, the rate of nonsyndromic RP around Jerusalem is roughly 1 in 2,086, while 1 in 1,000 older individuals in northern China have classic RP fundus findings and functional visual loss.[1]

Although RP usually affects only the eyes, it can occur as part of a syndrome or as a result of systemic conditions in 20% to 30% of cases.[2,3] The most common syndromic RP conditions include Usher syndrome, in which RP is accompanied by hearing difficulties and possible vestibular ataxia, and Bardet-Biedl syndrome, in which patients may have RP with concomitant intellectual disability, obesity, polydactyly, hypogonadism, and renal abnormalities.[3]

Abetalipoproteinemia, phytanic acid oxidase deficiency, and familial isolated vitamin E deficiency are rare syndromic RP conditions in which early initiation of treatment may prevent deterioration.[3]

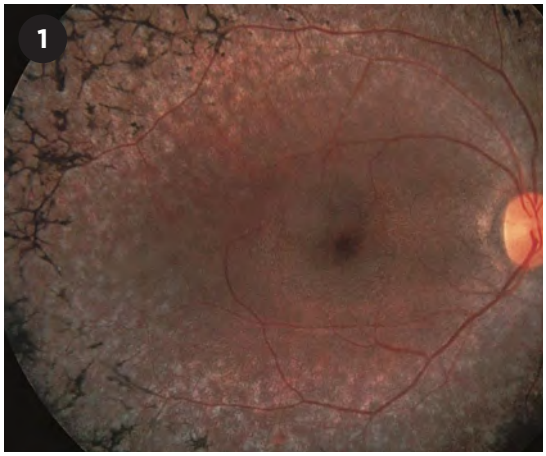
Currently, however, there is no proven treatment to prevent or reverse deterioration of vision in other forms of RP.

Genetics

Approximately 50% to 60% of RP cases are inherited in an autosomal recessive pattern, 30% to 40% are autosomal dominant, and 5% to 15% are X-linked. Digenic, maternal mitochondrial, and other non-Mendelian inheritance accounts for the remainder.[3]

Heterogeneity. The genetic heterogeneity of RP is remarkable. Nonsyndromic RP is associated with 56 genes and more than 3,100 mutations.[2] In syndromic RP, Usher syndrome is linked with 12 genes and Bardet-Biedl syndrome with 17 genes, with a combined total of 1,200 mutations.[2] Each identified gene can be affected by different mutations, resulting in different phenotypes, while similar mutations in the same gene can cause different clinical manifestations; this complexity can present a significant barrier to diagnosis as well as to the mapping of genes to disease.[2]

Counseling. Genetic counseling is important in equipping patients with the knowledge of inheritance patterns and the likelihood of family members having the disease. Genetic testing is valuable, as genotypes can translate into variable phenotypes. Taking a thorough family history can help home in on the type of genetic testing needed, translating into significant cost savings for patients.[4]



KEY FINDING. *Fundus photo in RP patient shows the pathognomonic sign of bone-spicule hyperpigmentation.*

Natural History

In 80% to 90% of patients, the loss of rod photoreceptors precedes and exceeds the loss of cone photoreceptors.[5] The effect is seen in the most commonly reported onset of RP in which poor night vision occurs before impairment of color contrast and daylight visual acuity (VA).[3] However, in some patients the loss of both types of photoreceptors may be comparable. A minority may have cone-rod degeneration, in which cone function declines more than rod function, with corresponding symptoms.[3]

Disease course. There is much interpersonal variation in the age of onset, subjective severity of symptoms, and rate of visual decline in RP.[2,3] The

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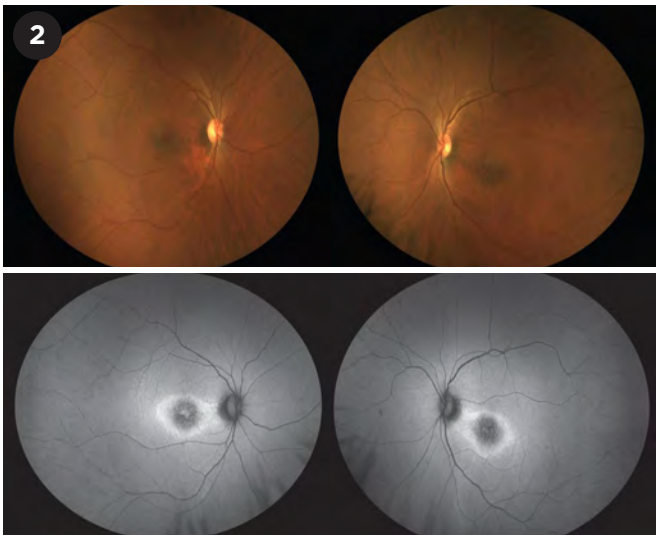
symptoms may appear at any time between childhood and middle age, although patients frequently experience nyctalopia in their youth and lose their midperipheral vision in the early adult years.[3] Subsequently, far peripheral vision is gradually lost, after which central vision constricts to become tunnel vision. Patients are often legally blind by 40 years of age owing to severely restricted visual fields and have deterioration of central vision by 60 years of age.[3]

Delay in presentation. Because many nighttime settings are well lit, allowing for sight with cone rather than rod photoreceptors, patients may not notice the impairment of their night vision until late in the disease.[3] In addition, patients are usually able to perform everyday tasks without noticing visual field restriction until the field is reduced from the normal mean of approximately 180 degrees horizontally to 50 degrees.[3] Moreover, VA can also be maintained despite a reduction of up to 90% of foveal cone photoreceptors.[3] Because of these factors, patients may have a delayed presentation with RP.



PHOTOS VS. FAF. *Fundus photographs (top) and autofluorescence images (bottom) of a patient with RP caused by a heterozygous* SNRNP200 *mutation. The relatively subtle macular findings in the photos are more apparent on FAF: hypoautofluorescence centrally with a surrounding hyperautofluorescent ring. The FAF findings are less marked in the right eye, which corresponds to better acuity in that eye.*

Symptoms and Signs

Classic features of RP include nyctalopia, visual field loss, and reduced VA.[1] Color vision and contrast sensitivity may also be impaired.[3]

On examination, the retina often displays pathognomonic bone-spicule hyperpigmentation in the mid- to far periphery (Fig. 1) as a result of the migration of pigment from the retinal pigment epithelium (RPE) to the neurosensory retina secondary to progressive photoreceptor loss.[3] Posterior subcapsular cataracts are seen in approximately half of patients with RP.[3] The optic nerve head may have a pale, waxy appearance, retinal arteries tend to be attenuated, and vitreous cells or cystoid macular edema (CME) may be observed.[1-3] Macular degeneration usually occurs in advanced disease.[1]

Visual Function Testing

Photoreceptor function. Electroretinograms (ERGs) are used to assess rod and cone function by measuring the timing and magnitude of electrical impulses emitted by the retina in response to light stimulation of different colors, intensities, and frequencies.[3] A single dim blue flash elicits rod photoreceptor response, repeated white light flashes elicit cone photoreceptor response, and a single bright white light elicits both rod and cone photoreceptor responses.[3,5] In RP, the electrical responses take longer to occur and demonstrate diminished amplitudes compared to those in eyes with normal visual function.[3]

Other types of ERG can also be used for evaluating patients with RP. Full-field ERG assesses the general photoreceptor function and picks up abnormalities when at least 20% of the photoreceptors in the retina are dysfunctional.[5] Multifocal ERG is more specific in highlighting the distribution of impaired photoreceptor function and can reveal the characteristic pattern of photoreceptor deterioration and loss in RP.[5] ERG results are thus important for diagnosing, evaluating severity, monitoring progression, and assessing treatment outcomes in RP.[3]

Dark adaptation threshold. Dark adaptation threshold testing assesses rod photoreceptor function by determining the minimum intensity of light that can be seen after the patient has been kept in a dark environment for 30 minutes. Thus, it reflects the severity of a patient's night blindness.[3]

Visual fields. Visual field defects can be detected using a Goldmann perimeter or Humphrey field analyzer. Defects are usually first observed in the midperiphery, with a gradual spread peripherally. Eventually, the far peripheral fields are lost, and central fields constrict progressively in advanced RP.[3]

Color and contrast vision. Color vision can be tested with Ishihara plates or other equivalents and may show tritanopia in advanced RP.[3] A Pelli-Robson chart may be used to evaluate for a decrease in contrast sensitivity.[2]

Imaging

OCT. On optical coherence tomography (OCT), the integrity of the foveal inner/outer segment (IS/OS) junction has been reported to be positively associated with VA and has been suggested to be useful in monitoring disease progression.[6] In addition, the length of the IS/OS line is related to functional visual field area and mean retinal sensitivity as measured with microperimetry. Another use of OCT in RP is evaluating for CME, which can affect central vision.[5]

FAF. Fundus autofluorescence (FAF) is useful in assessing photoreceptor function and RPE health.[6] In RP, the predominant pattern observed on FAF is a ring of hyperautofluorescence encircling the fovea. This finding has been attributed to increased lipofuscin in the RPE from accelerated degeneration of photoreceptor cells in the outer segment layer,[3,6] surrounded by an area of hypoautofluorescence in the peripheral retina due to RPE atrophy from the increased metabolic stress of

RP and Autoimmune Retinopathy: A Connection?

Antiretinal antibodies are associated with autoimmune retinopathy (AIR).[1,2] Ten percent of patients with RP were found to have antiretinal antibodies in one study, while another case series found that 90% of patients with RP and CME had antiretinal antibodies.[1]

AIR is a rare and poorly understood group of inflammatory autoimmune diseases that comprise cancer-associated retinopathy, melanoma-associated retinopathy, and nonparaneoplastic retinopathy (npAIR).[1,2] These conditions share features including antiretinal antibodies, progressive visual field defects and vision loss, and photoreceptor dysfunction.[1,2] Symptoms depend on the type of photoreceptors involved and can include rapid deterioration of vision and color vision, photosensitivity, peripheral or central field defects, photopsias, and nyctalopia.[2] Fundus examination tends to be normal despite reported symptoms, although iritis and vitritis have been observed, and waxy disc pallor and attenuation of retinal arterioles may develop.[2]

While the pathophysiology of npAIR remains undetermined, it has been suggested that a proportion of cases may arise secondary to retinal diseases such as RP with CME.[2] No definitive criteria for diagnosis and management have been established. However, a recent consensus agreement suggests that essential diagnostic criteria for npAIR should include aberrant ERG results, serum antiretinal antibodies, visual loss that is not accounted for by fundus abnormalities or retinal degeneration or dystrophy, and minimal intraocular inflammation.[1]

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photoreceptor destruction.[5] The border between the hyperautofluorescence and hypoautofluorescence is thought to delineate the border between functional and dysfunctional retina; correspondingly, the visual field defect commences peripherally at the border of the hyperautofluorescent ring, and this ring is generally observed to decrease in diameter as RP progresses.[6]

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NEXT MONTH. See next month's Ophthalmic Pearls for Part 2 of Retinitis Pigmentosa, covering research on current management and promising new therapies.

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Q4

Q8
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Q12

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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: 1. EYLEA® (aflibercept) Injection full U.S. Prescribing Information. Regeneron Pharmaceuticals, Inc. August 2019. **2.** Schmidt-Erfurth U, Kaiser PK, Korobelnik JF, et al. Intravitreal aflibercept injection for neovascular age-related macular degeneration: ninety-six-week results of the VIEW studies. *Ophthalmology*. 2014;121(1):193-201. **3.** Khurana RN, Rahimy E, Joseph WA, et al. Extended (every 12 weeks or longer) dosing interval with intravitreal aflibercept and ranibizumab in neovascular age-related macular degeneration: post hoc analysis of VIEW trials. *Am J Ophthalmol*. 2019;200:161-168.

Please see Brief Summary of Prescribing Information on the following page.

Q12 DOSING REGIMEN IN WET AMD[1-3]

As Demonstrated in Phase 3 Clinical Trials[1-3]

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.

Visit HCP.EYLEA.US to see the data.

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).

REGENERON

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EYLEA®
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For Intravitreal Injection

BRIEF SUMMARY—Please see the EYLEA full Prescribing Information available on HCP.EYLEA.US for additional product information.

1 INDICATIONS AND USAGE
EYLEA is a vascular endothelial growth factor (VEGF) inhibitor indicated for the treatment of:

Neovascular (Wet) Age-Related Macular Degeneration (AMD); Macular Edema Following Retinal Vein Occlusion (RVO); Diabetic Macular Edema (DME); Diabetic Retinopathy (DR).

4 CONTRAINDICATIONS

4.1 Ocular or Periocular Infections
EYLEA is contraindicated in patients with ocular or periocular infections.

4.2 Active Intraocular Inflammation
EYLEA is contraindicated in patients with active intraocular inflammation.

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

5 WARNINGS AND PRECAUTIONS

5.1 Endophthalmitis and Retinal Detachments.
Intravitreal injections, including those with EYLEA, have been associated with endophthalmitis and retinal detachments [*see Adverse Reactions (6.1)*]. 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 [*see Patient Counseling Information (17)*].

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

5.3 Thromboembolic Events.
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.

6 ADVERSE REACTIONS
The following potentially serious adverse reactions are described elsewhere in the labeling:
- Hypersensitivity [*see Contraindications (4.3)*]
- Endophthalmitis and retinal detachments [*see Warnings and Precautions (5.1)*]
- Increase in intraocular pressure [*see Warnings and Precautions (5.2)*]
- Thromboembolic events [*see Warnings and Precautions (5.3)*]

6.1 Clinical Trials Experience.
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 in other clinical trials of the same or another drug and may not reflect the rates observed in practice.
A total of 2980 patients treated with EYLEA constituted the safety population in eight phase 3 studies. Among those, 2379 patients were treated with the recommended dose of 2 mg. 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.

Neovascular (Wet) Age-Related Macular Degeneration (AMD). The data described below reflect exposure to EYLEA in 1824 patients with wet AMD, including 1223 patients treated with the 2-mg dose, in 2 double-masked, controlled clinical studies (VIEW1 and VIEW2) for 24 months (with active control in year 1).
Safety data observed in the EYLEA group in a 52-week, double-masked, Phase 2 study were consistent with these results.

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

	Baseline to Week 52		Baseline to Week 96	
Adverse Reactions	EYLEA (N=1824)	Active Control (ranibizumab) (N=595)	EYLEA (N=1824)	Control (ranibizumab) (N=595)
Conjunctival hemorrhage	25%	28%	27%	30%
Eye pain	9%	9%	10%	10%
Cataract	7%	7%	13%	10%
Vitreous detachment	6%	6%	8%	8%
Vitreous floaters	6%	7%	8%	10%
Intraocular pressure increased	5%	7%	7%	11%
Ocular hyperemia	4%	8%	5%	10%
Corneal epithelium defect	4%	5%	5%	6%
Detachment of the retinal pigment epithelium	3%	3%	5%	5%
Injection site pain	3%	3%	3%	4%
Foreign body sensation in eyes	3%	4%	4%	4%
Lacrimation increased	3%	1%	4%	2%
Vision blurred	2%	2%	4%	3%
Intraocular inflammation	2%	3%	3%	4%
Retinal pigment epithelium tear	2%	1%	2%	2%
Injection site hemorrhage	1%	2%	2%	2%
Eyelid edema	1%	2%	2%	3%
Corneal edema	1%	1%	1%	1%
Retinal detachment	<1%	<1%	1%	1%

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

Macular Edema Following Retinal Vein Occlusion (RVO). The data described below reflect 6 months exposure to EYLEA with a monthly 2 mg dose in 218 patients following CRVO in 2 clinical studies (COPERNICUS and GALILEO) and 91 patients following BRVO in one clinical study (VIBRANT).

Table 2: Most Common Adverse Reactions (≥1%) in RVO Studies

	CRVO		BRVO	
Adverse Reactions	EYLEA (N=218)	Control (N=142)	EYLEA (N=91)	Control (N=92)
Eye pain	13%	5%	4%	5%
Conjunctival hemorrhage	12%	11%	20%	4%
Intraocular pressure increased	8%	6%	2%	0%
Corneal epithelium defect	5%	4%	2%	0%
Vitreous floaters	5%	1%	1%	0%
Ocular hyperemia	5%	3%	2%	2%
Foreign body sensation in eyes	3%	5%	3%	0%
Vitreous detachment	3%	4%	2%	0%
Lacrimation increased	3%	4%	3%	0%
Injection site pain	3%	1%	1%	0%
Vision blurred	1%	<1%	1%	1%
Intraocular inflammation	1%	1%	0%	0%
Cataract	<1%	1%	5%	0%
Eyelid edema	<1%	1%	1%	0%

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

Diabetic Macular Edema (DME) and Diabetic Retinopathy (DR). The data described below reflect exposure to EYLEA in 578 patients with DME treated with the 2-mg dose in 2 double-masked, controlled clinical studies (VIVID and VISTA) from baseline to week 52 and from baseline to week 100.

Table 3: Most Common Adverse Reactions (≥1%) in DME Studies

	Baseline to Week 52		Baseline to Week 100	
Adverse Reactions	EYLEA (N=578)	Control (N=287)	EYLEA (N=578)	Control (N=287)
Conjunctival hemorrhage	28%	17%	31%	21%
Eye pain	9%	6%	11%	9%
Cataract	8%	9%	19%	17%
Vitreous floaters	6%	3%	8%	6%
Corneal epithelium defect	5%	3%	7%	5%
Intraocular pressure increased	5%	3%	9%	5%
Ocular hyperemia	5%	6%	5%	6%
Vitreous detachment	3%	3%	8%	6%
Foreign body sensation in eyes	3%	3%	3%	3%
Lacrimation increased	3%	2%	4%	2%
Vision blurred	2%	2%	3%	4%
Intraocular inflammation	2%	<1%	3%	1%
Injection site pain	2%	<1%	2%	<1%
Eyelid edema	<1%	1%	2%	1%

Less common adverse reactions reported in <1% of the patients treated with EYLEA were hypersensitivity, retinal detachment, retinal tear, corneal edema, and injection site hemorrhage.
Safety data observed in 269 patients with nonproliferative diabetic retinopathy (NPDR) through week 52 in the PANORAMA trial were consistent with those seen in the phase 3 VIVID and VISTA trials (see Table 3 above).

6.2 Immunogenicity.
As with all therapeutic proteins, there is a potential for an immune response in patients treated with EYLEA. The immunogenicity of EYLEA was evaluated in serum samples. The immunogenicity data reflect the percentage of patients whose test results were considered positive for antibodies to EYLEA in immunoassays. The detection of an immune response is highly dependent on the sensitivity and specificity of the assays used, sample handling, timing of sample collection, concomitant medications, and underlying disease. For these reasons, comparison of the incidence of antibodies to EYLEA with the incidence of antibodies to other products may be misleading.
In the wet AMD, RVO, and DME studies, the pre-treatment incidence of immunoreactivity to EYLEA was approximately 1% to 3% across treatment groups. After dosing with EYLEA for 24-100 weeks, antibodies to EYLEA were detected in a similar percentage range of patients. There were no differences in efficacy or safety between patients with or without immunoreactivity.

8 USE IN SPECIFIC POPULATIONS.

8.1 Pregnancy
Risk Summary
Adequate and well-controlled studies with EYLEA have not been conducted in pregnant women. Aflibercept produced adverse embryofetal effects in rabbits, including external, visceral, and skeletal malformations. A fetal No Observed Adverse Effect Level (NOAEL) was not identified. At the lowest dose shown to produce adverse embryofetal effects, systemic exposures (based on AUC for free aflibercept) were approximately 6 times higher than AUC values observed in humans after a single intravitreal treatment at the recommended clinical dose [*see Animal Data*].
Animal reproduction studies are not always predictive of human response, and it is not known whether EYLEA can cause fetal harm when administered to a pregnant woman. Based on the anti-VEGF mechanism of action for aflibercept, treatment with EYLEA may pose a risk to human embryofetal development. EYLEA should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.
All pregnancies have a background risk of birth defect, loss, or other adverse outcomes. The background risk of major birth defects and miscarriage for the indicated population is unknown. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2-4% and 15-20%, respectively.

Data
Animal Data
In two embryofetal development studies, aflibercept produced adverse embryofetal effects when administered every three days during organogenesis to pregnant rabbits at intravenous doses ≥3 mg per kg, or every six days during organogenesis at subcutaneous doses ≥0.1 mg per kg.
Adverse embryofetal effects included increased incidences of postimplantation loss and fetal malformations, including anasarca, umbilical hernia, diaphragmatic hernia, gastroschisis, cleft palate, ectrodactyly, intestinal atresia, spina bifida, encephalomeningocele, heart and major vessel defects, and skeletal malformations (fused vertebrae, sternebrae, and ribs; supernumerary vertebral arches and ribs; and incomplete ossification). The maternal No Observed Adverse Effect Level (NOAEL) in these studies was 3 mg per kg. Aflibercept produced fetal malformations at all doses assessed in rabbits and the fetal NOAEL was not identified. At the lowest dose shown to produce adverse embryofetal effects in rabbits (0.1 mg per kg), systemic exposure (AUC) of free aflibercept was approximately 6 times higher than systemic exposure (AUC) observed in humans after a single intravitreal dose of 2 mg.

8.2 Lactation
Risk Summary
There is no information regarding the presence of aflibercept in human milk, the effects of the drug on the breastfed infant, or the effects of the drug on milk production/excretion. Because many drugs are excreted in human milk, and because the potential for absorption and harm to infant growth and development exists, EYLEA is not recommended during breastfeeding.
The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for EYLEA and any potential adverse effects on the breastfed child from EYLEA.

8.3 Females and Males of Reproductive Potential
Contraception
Females of reproductive potential are advised to use effective contraception prior to the initial dose, during treatment, and for at least 3 months after the last intravitreal injection of EYLEA.

Infertility
There are no data regarding the effects of EYLEA on human fertility. Aflibercept adversely affected female and male reproductive systems in cynomolgus monkeys when administered by intravenous injection at a dose approximately 1500 times higher than the systemic level observed humans with an intravitreal dose of 2 mg. A No Observed Adverse Effect Level (NOAEL) was not identified. These findings were reversible within 20 weeks after cessation of treatment.

8.4 Pediatric Use.
The safety and effectiveness of EYLEA in pediatric patients have not been established.

8.5 Geriatric Use.
In the clinical studies, approximately 76% (2049/2701) of patients randomized to treatment with EYLEA were ≥65 years of age and approximately 46% (1250/2701) were ≥75 years of age. No significant differences in efficacy or safety were seen with increasing age in these studies.

17 PATIENT COUNSELING INFORMATION
In the days following EYLEA administration, patients are at risk of developing endophthalmitis or retinal detachment. If the eye becomes red, sensitive to light, painful, or develops a change in vision, advise patients to seek immediate care from an ophthalmologist [*see Warnings and Precautions (5.1)*].
Patients may experience temporary visual disturbances after an intravitreal injection with EYLEA and the associated eye examinations [*see Adverse Reactions (6)*]. Advise patients not to drive or use machinery until visual function has recovered sufficiently.

REGENERON

Manufactured by:
Regeneron Pharmaceuticals, Inc.
777 Old Saw Mill River Road
Tarrytown, NY 10591

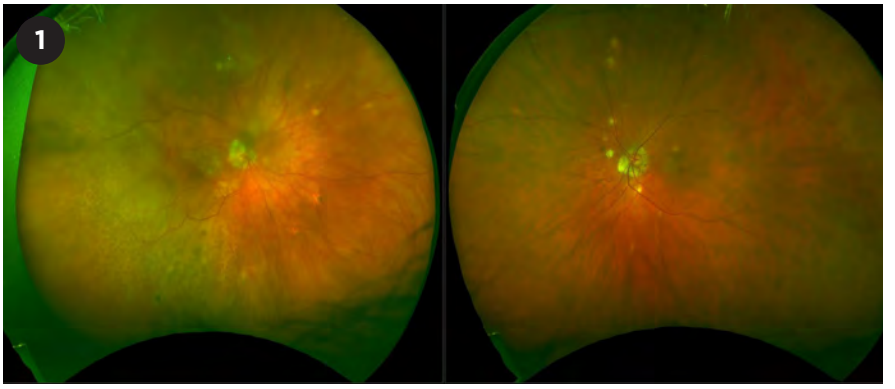
Issue Date: 08/2019
Initial U.S. Approval: 2011

Based on the August 2019
EYLEA® (aflibercept) Injection full
Prescribing Information.

EYL.19.07.0306

The Case of Retinal Spots With Blurred Vision

Robin West* is a 75-year-old man with a smoking history of 40 pack years. Because he had an episode of bilateral presumed ocular histoplasmosis syndrome (POHS) 20 years ago, he began to worry about recurrence when he noticed blurred vision in his right eye at both near and distance. With worsening vision over the last three months in his right eye, he visited an eye specialist, who diagnosed him with POHS. He was referred to our eye clinic for further evaluation.



THE RIGHT EYE. *During the fundus exam, we noticed yellowish choroidal lesions in the posterior pole of the right eye, with RPE mottling and choroidal thickening.*

We Get a Look

We confirmed Mr. West's history of POHS as well as findings of a right lung mass that had increased in size over the previous year.

Vision exam. On examination, Mr. West's best-corrected visual acuity was 20/70 in the right eye and 20/20 in the left. His intraocular pressure was 12 mm Hg in the right eye and 14 mm Hg in the left. There was no afferent pupillary defect, and his ocular motility was intact.

At the slit lamp. The slit-lamp exam showed no flare or cells in either anterior chamber. Nuclear sclerosis (3+) was apparent in the lens of each eye. There were trace anterior vitreous cells in the right eye and none in the left eye.

Dilated fundus exam. The dilated fundus exam of the right eye showed yellowish creamy multifocal choroidal lesions in the posterior pole with retinal pigment epithelium (RPE) mottling and choroidal thickening involving the macula (Fig. 1). There was also diffuse temporal choroidal thickening with associated exudative retinal detachment (RD) in the right eye. The fundus exam of both eyes also showed small punched-out chorioretinal scars in the midperiphery.

Imaging. Ocular coherence tomography (OCT) of the macula showed choroidal thickening and subretinal fluid in the right eye and normal exam in the left eye. B-scan showed temporal thickened, hypoechoic choroid in the right eye. Fluorescein angiogram showed mottled punctate hypofluorescence over the choroidal lesions in the right eye, and late staining of midperipheral scars in both eyes.

Differential Diagnosis

Clinically, our patient presented with creamy-yellow multifocal choroidal lesions, exudative retinal detachment, and minimal vitritis in his right eye. These signs were very concerning for intraocular lymphoma. However, given Mr. West's prior history of a right lung mass that had increased in size based on prior chest computed tomography (CT), we were also concerned about metastatic lung cancer. At this point, white dot syndromes and malignant melanoma were low on our differential.

What the Tests Revealed

MRI. Initially, magnetic resonance imaging (MRI) of the brain and orbits, with and without contrast, confirmed a right choroidal mass with extraocular extension in the posterior temporal aspect of the globe (Fig. 2). No intracranial spread was noted.

PET-CT. Next, Mr. West underwent a positron emission tomography–computed tomography (PET-CT) scan,

BY **MANUJ KAPUR, MD, JUAN POSADA, MD, SHELLEY DAY GHAFOORI, MD, DAN S. GOMBOS, MD, FACS,** AND **PATRICIA CHÉVEZ-BARRIOS, MD.** EDITED BY INGRID U. SCOTT, MD, MPH.

Stephen Henry, COA

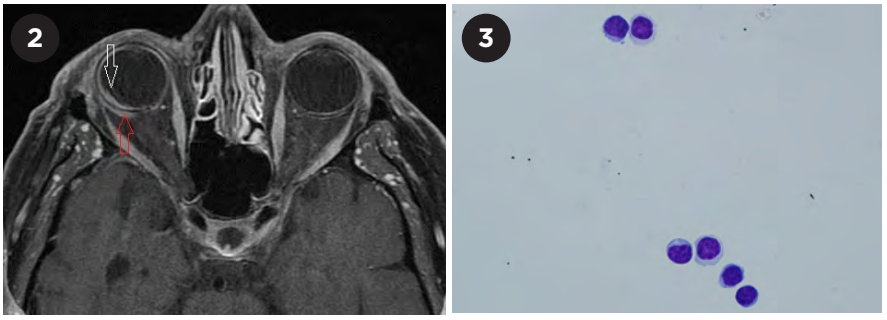
which showed no evidence of uptake elsewhere.

Biopsy. Mr. West also had CT-guided biopsy of the right lung nodule due to concern for metastasis. This showed hyalinized fibrous tissue and was negative for lung cancer.

With only ocular involvement, we proceeded with a diagnostic vitrectomy and choroidal biopsy; this showed kappa-positive CD5-positive low-grade monoclonal B cells in the choroid. Immunocytochemistry and flow cytometry showed CD5-positive monoclonal B cells. The vitreous biopsy also showed rare small lymphocytes, predominantly T cells, reactive with rare B cells (Fig. 3). These results were pointing toward a diagnosis of intraocular lymphoma.

Next, we needed to determine whether it was a primary or secondary lymphoma. So, we referred our patient to a hematologist/oncologist in order to rule out concurrent systemic lymphoma. A complete blood count (CBC) was done; this showed normal morphology and no evidence of increased lymphocytes. Mr. West also had a bone marrow biopsy, which did not show evidence of systemic disease.

Our diagnosis. With the combination of minimal vitreous cells, creamy-yellow multifocal choroidal infiltrates, small low-grade lymphoid B-cells detected during biopsy of a thickened choroid, extraocular spread, and absence of clinical evidence of systemic disease, we reached a diagnosis of primary choroidal lymphoma, extranodal marginal zone B-cell subtype.



FURTHER TESTING. *(2) MRI of the orbits shows extraocular spread. (3) Vitreous cytology shows small lymphocytes (Giemsa stain; 100X original magnification).*

About the Disease

Intraocular lymphomas are broadly categorized as primary or secondary. Secondary intraocular lymphoma is due to disseminated systemic lymphoma, usually diffuse large B-cell subtype, and commonly involves the choroid.

PIOL. Primary intraocular lymphoma (PIOL) only involves the eye and is mostly non-Hodgkin B-cell subtype. The mean age at presentation is the fifth or sixth decade of life.[1]

Etiology. PIOL's etiology is unknown, but several hypotheses have been suggested. Burkitt lymphoma, Epstein-Barr virus (EBV), human immunodeficiency virus (HIV), human T-cell lymphotropic virus (HTLV), and *Helicobacter pylori,* along with genetic mutations, have been implicated in the lymphoma genesis of various histologies.[2]

Two subtypes. PIOL can be subdivided into two subtypes: primary uveal lymphoma and primary vitreoretinal lymphoma (PVRL).

Primary uveal lymphoma. Primary uveal lymphoma is usually low grade with a good prognosis and is subdivided into three types: choroidal, iridal, and ciliary body lymphoma.

Primary choroidal lymphoma, which we diagnosed in Mr. West, accounts for the majority of uveal lymphoma cases. Primary choroidal lymphoma is typically unilateral, with diffuse choroidal thickening and yellowish creamy choroidal infiltrates without vitritis. With progression, there is diffuse thickening of the uveal tract as seen on B-scan as well as associated exudative RD. Fluorescein angiogram shows early hypofluorescence corresponding to choroidal infiltrates and late staining of RPE changes. Extraocular involvement, including episcleral extension, is common. The episcleral extension appears as a nonmobile orange to yellowish color lesion or "salmon" patch. This overlapping involvement with ocular adnexal structures is an important component of primary choroidal lymphoma and alerts the clinician to look for coexisting uveal disease if one detects adnexal lymphoma during the exam.[3] Biopsy of these sites and choroid can also help in making the diagnosis.

Primary vitreoretinal lymphoma. PVRL is typically bilateral, but frequently asymmetric. It is a high-grade variant of primary central nervous system lymphoma (PCNSL) and has a poor prognosis. Patients with PVRL typically present with vitritis and creamy lesions with orange-yellow infiltrates between RPE and Bruch's membrane. This gives rise to the characteristic "leopard skin" pigmentation overlying the mass.

Approximately 42%-92% of individuals with PVRL ultimately develop central nervous system (CNS) involvement with a mean interval of eight to 29 months.[1] In contrast, 25% of patients with PCNSL will have concomitant PVRL.[4] MRI is more sensitive than CT for detecting lymphomatous lesions in the CNS. PET-CT can also help in identifying CNS lesions and ocular activity.

Due to high correlation between PVRL and PCNSL, all patients diagnosed with the ophthalmic disease should undergo a systemic evaluation by an oncologist. This should include MRI of the brain and orbits, cerebrospinal fluid (CSF) studies, CBC, and PET-CT of the chest, abdomen, and pelvis. If PCNSL is also present along with classic ophthalmic findings, a biopsy of the ophthalmic site may not be required. However, in the absence of CNS disease, tissue biopsy of the vitreous and sub-RPE space is the gold standard. Once tissue is obtained, histologic and immunocytochemistry/flow cytometry are performed.

Diagnosing PIOL. Histologically, most lymphomas arise from B cells that exhibit minimal basophilic cytoplasm and elevated nucleus:cytoplasm ratio with hypersegmented nuclei and prominent or multiple nucleoli. Immunocytochemistry and flow cytometry also aid in differentiating various lymphomas. A systemic workup is essential

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before reaching a diagnosis of PIOL. It is useful not only for staging but also for ruling out secondary or systemic lymphoma with intraocular spread.

Treating PIOL. Currently, ocular radiation or intravitreal methotrexate or rituximab is used to treat isolated unilateral PIOL. When the CNS is involved, high-dose systemic methotrexate as a single agent or as part of a combination regimen is used most commonly.[3] The primary choroidal low-grade extranodal marginal B-cell lymphomas have an indolent course and may be treated with local radiation or chemotherapy.

The reported mortality rates from PIOL in the literature are variable. However, one series found a survival advantage if PIOL was diagnosed before CNS involvement—60 months survival versus 35 months.[5]

Our Patient's Progress

After detailed discussion, Mr. West elected to undergo local radiation (30 Gy) to the right orbit. At 21 months, the extraocular extension is undetectable on imaging. He continues to come in for periodic systemic surveillance.

*Patient name is fictitious.

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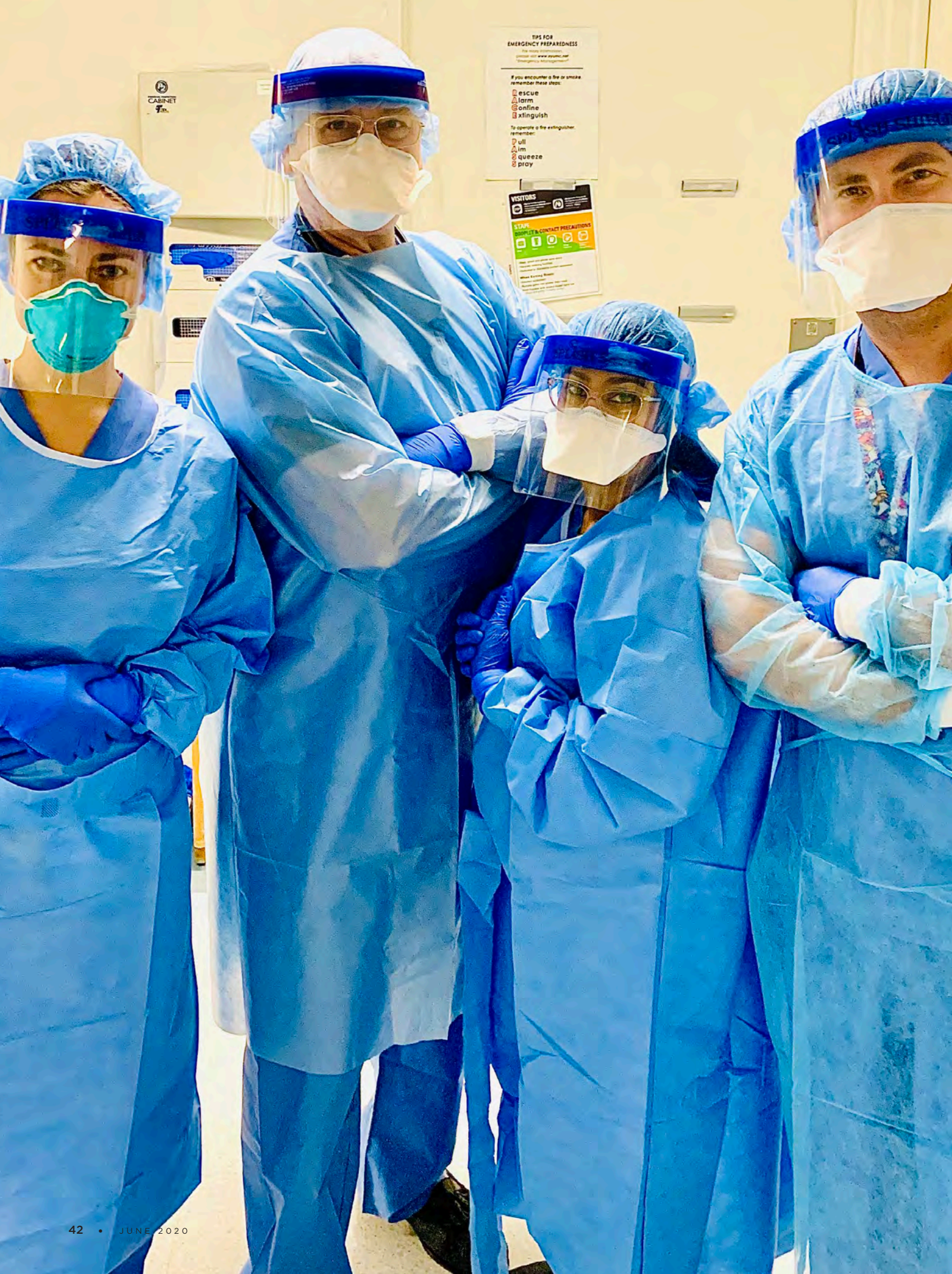
4 Hochberg FH et al. *J Neurosurg.* 1988; 68(6): 835-853.

5 Hormigo A et al. *Br J Haematol.* 2004; 26(1): 202-208.

Dr. Kapur is staff ophthalmologist and **Dr. Posada** is chief of hematology-oncology at the Central Texas Veterans Health Care System in Temple, Texas. **Dr. Day Ghafoori** is clinical assistant professor at the University of Texas (UT) at Austin Dell Medical School. **Dr. Gombos** is professor and section chief of ophthalmology at the UT MD Anderson Cancer Center in Houston. **Dr. Chévez-Barrios** is professor of pathology and genomic medicine at the Houston Methodist Hospital.

MORE ONLINE. For the initial OCT, see this article at aao.org/eyenet.


TIPS FOR
EMERGENCY PREPAREDNESS
If you encounter a fire or smoke,
remember these steps:
Rescue
Alarm
Confine
Extinguish
To operate a fire extinguisher,
remember:
Pull
Aim
Squeeze
Spray
CABINET
VISITORS
STOP
DROPLET & CONTACT PRECAUTIONS

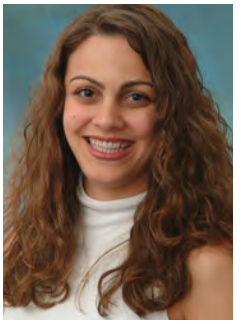
The Department of Ophthalmology at NYU Langone Health

Profiles From the Pandemic

The COVID-19 crisis has closed practices and forced ophthalmologists to rethink how to focus their energy. During the week of April 13, when parts of the world were on lockdown, *EyeNet* asked seven ophthalmologists for their observations on the crisis. It's a snapshot from a specific time in global and medical history that changed everything from physicians' day-to-day routines to their perspectives on life and the meaning of being an ophthalmologist.

TELEMEDICINE

Lisa M. Nijm, MD, JD
Medical Director, Warrenville Eyecare & LASIK, Warrenville, Illinois



Dr. Nijm

Q. How has the pandemic changed your short-term priorities?
As is true for other ophthalmologists, my priorities are to protect my patients, staff, and family. When I learned that the coronavirus was deemed a pandemic, I began rescheduling routine visits in an effort to protect my patients and staff. Initially, I thought this would be for just a few weeks. However, after the Academy made its official recommendations, I quickly implemented telemedicine as a way to continue to provide care.

Q. What are you doing now that you would not have done otherwise?
We did not have telemedicine available prior to the pandemic, primarily due to the restrictions from CMS. Lifting those restrictions allowed us to provide this innovative care to patients.

Presently, we touch base with each patient on the schedule and determine whether it's a routine visit that can be postponed, a visit that is suitable for telemedicine, or a visit requiring urgent follow-up. The dynamics of a telemedicine visit may require creativity from both physician and patient to acquire as much information as possible. For instance, I have had patients check each eye individually by focusing on their TV or another object in the room if an eye chart could not be printed. When necessary, I have requested that a patient send a close-up of his or her eye for a more detailed external exam.

Understandably, not all cases are ideal for telemedicine; however, I can provide care for many of my established patients with common external conditions such as dry eye, chalazion, or recurrent erosion. I have also found it useful as a more sophisticated screening tool to determine whether a patient needs to be seen emergently. Finally, I value telemedicine visits as an opportunity to have a more in-depth discussion for conditions such as dry eye treatment or lens choices in cataract surgery. This approach allows patients greater time to digest the information so that we will be ready to proceed with appropriate treatment once elective visits are resumed.

Q. What are the biggest rewards?
I've found telemedicine to be incredibly valuable, and I think my patients have found a lot of value in it as well. A silver lining during this crisis has been the ability to provide greater access to care

ON THE FLOOR. *From left to right, Irina Belinsky, MD, Joel S. Schuman, MD, Vaidehi Dedania, MD, and Zachary Elkin, MD, in PPE and ready to see COVID-19 patients.*

for patients with the potential to move this technology forward.

My favorite telemedicine app currently is Doximity as it has a HIPAA-compliant video capability that is relatively straightforward to use. Once you enter the patient's phone number, it sends a text with a link to the patient's smartphone. Within a few clicks—voilà—I receive a text message that the patient is ready to be seen. I have also been working with colleagues on a step-by-step guide to help patients take and submit high-resolution smartphone photos for telemedicine visits.

Q. What are your greatest concerns?

Telemedicine is not the same as having the patient in the office. Further, some patients don't have video capabilities; therefore, they are limited to phone consults. But I do feel it is the best way we can continue to care for patients remotely while keeping everyone safe during this crisis.

Relaxing the guidelines and providing adequate reimbursement are key to encouraging greater utilization of this technology. My hope is that CMS maintains the availability of telemedicine past this crisis. I can see it as an option for enhancing access to care, especially for patients who cannot make a visit due to unforeseen circumstances such as a winter snowstorm.

Q. What are your biggest challenges day to day?

Being an MD and JD, I should mention that it is prudent to be aware of the medicolegal risks and the liability associated with telemedicine. You must include appropriate documentation in the chart, including informed consent and all elements of the visit as you would for any in-person patient encounter. The Academy has provided guidelines to assist with documentation,[1] and OMIC has recently released a telemedicine consent form.[2] These guidelines will ensure that you have proper documentation not only for reimbursement purposes but also to minimize potential risk exposure.

VIDEO VISIT. *A patient's perspective of a video visit with Dr. Nijm.*

Q. What do you see as the impact of what you are doing?

Telemedicine is a great way to help patients while ensuring safety. Importantly, it can help assess urgent situations. In fact, for two of my patients—one with a corneal ulcer and the other with corneal edema—the telemedicine visit was the deciding factor in recommending an urgent in-office visit and likely saved both patients' vision.

Q. What's your perspective on the pandemic?

This is certainly a challenging time for everyone, but it's a time-limited phenomenon—we will overcome this disease. I am consistently inspired by the resiliency of the human spirit and the great things we accomplish by working together.

Time is precious. This is an opportune moment—likely the only one we will ever have in our careers—to sincerely step back and reevaluate our personal and professional lives. I would encourage my colleagues to be cognizant of that—to pause and look for ways to nourish the mind, body, and soul.

From a practice perspective, this is an excellent opportunity to evaluate what we do well and what we can do better. Are there new technologies or techniques that we might implement now to continually improve delivery of care? It's a chance to turn this into a time of growth and truly see how we can do better for our patients, our practices, and the people around us who matter most.

Q. What are your thoughts on being an ophthalmologist during the COVID crisis?

I can't tell you how many ophthalmologists I have

Telemedicine and Other Practice Management Resources

For a wealth of information about telemedicine from the American Academy of Ophthalmic Executives, head to aao.org/practice-management/resources/coronavirus-resources. Here, you will find advice ranging from how to get started and how to defend against hackers to tip sheets and videos. For example, in one of several telemedicine videos, David Glasser, MD, narrates the basics of coding for telemedicine.

For FAQs on coding for telemedicine, see page 56.

Lisa M. Nijm, MD, JD

spoken to who tell me they miss their practice. We miss our patients, our staff, and the amazing work we are blessed to do. It is a privilege to be an ophthalmologist. I fully believe that after this brief pause, we will return to our clinics with an even greater passion for the patients we care for and the work we love to do.

1 aao.org/practice-management/news-detail/coding-phone-calls-internet-telehealth-consult and search for "documentation." Accessed April 24, 2020.
2 www.omic.com/telemedicine-consent-form/ Accessed April 24, 2020.

ONLINE EDUCATION

Roberto Gallego, MD, PhD
Unit of Macula, Clínica Oftalvist, Valencia, Spain

Q. How has the pandemic changed your short-term priorities?

Dr. Gallego

With the lockdown in Spain since March 15, I have had the opportunity to spend much more time than usual with my wife and son. This is the first time in years that this has been possible without busy clinics and traveling to meetings. I feel that we were living on a hamster wheel while barely looking into our personal priorities. This may change significantly from now on.

Q. What are you doing now that you would not have done otherwise?

As clinicians, we are devoted to patient care but also to education. Since the lockdown started, I have had the opportunity to arrange several webinars, with the aim of being helpful to colleagues in Spain and Latin America. I have used Facebook Live for a half-dozen seminars, with a live attendance of 150-200 people, then shared via YouTube the recorded presentation. During two question-and-answer sessions on Instagram Live, I consulted with colleagues about specific clinical cases. I also had the opportunity to record an informational retina video for patients, which now has over 100,000 views.

In addition, several associations have arranged online webinars. My colleague, and charming wife, Dr. Rosa Dolz-Marco and myself joined the Sociedad Peruana de Oftalmologia and the Sociedad Argentina de Retina y Vitreo for these events. We are both medical retina specialists, so we have tried to expand the knowledge on optical coherence tomography and multimodal imaging interpretation of retinal diseases, mainly age-related macular degeneration.

In addition, I have been invited to several online seminars or discussions about retina management during the coronavirus outbreak. This time has been busy, but I am glad to keep pushing for medical education in the absence of in-person meetings.

Q. What are the biggest rewards?

Via the webinars, I have taken these challenging days as opportunities to grow the network (virtually) among Spanish-speaking retina specialists. It is gratifying when people whom you have never met thank you because they can better understand one of their clinical cases. I am sure that these webinars will have an impact on patient care when we are ready to go back to work.

Q. What are your biggest challenges day to day?

The challenges are significant. As a medical retina physician, I care for patients with neurodegenerative macular diseases. These are typically patients aged 65 and older, meaning that they are at higher risk for complications due to COVID-19 infection. But interrupting their intravitreal injection therapy for a number of weeks may preclude further functional improvement. We call each patient to provide clear information about their situation and help them understand the balance between COVID infection risks and severe irreversible vision loss. The decision about whether to come to the office for treatment should always be made by the patient.

Q. What do you see as the impact of what you are doing?

I think that nowadays the relevance of providing accurate information for patients is essential. Using phone calls for each case seems like the best

WEBINAR. *Dr. Gallego takes part in an online symposium.*

Roberto Gallego, MD, PhD

approach. Doctors are the best option to make those phone calls, and patients are thankful for them.

Q. What's your perspective on the pandemic?
Our professional and personal lives will change completely. We won't be able to have crowded waiting areas in our facilities anymore. At least for several months, we may not have opportunity to attend meetings. It seems rational to assume that this may also apply to leisure activities with friends and family. We are facing a new era, like our ancestors did so many other times during the history of mankind. And life goes on. Our attitude and adaptability will be determinant.

EMERGENCY DEPARTMENT VOLUNTEER

Kyle J. Godfrey, MD
Assistant Professor of Ophthalmology, Weill Cornell Medicine and NewYork-Presbyterian, New York, N.Y.

Q. How has the pandemic changed your short-term priorities?
The pandemic quickly forced me to think in units of hours and days instead of months and years. As a new faculty member, my priorities had been building my clinical practice, research team, and educational efforts. My eyes were focused down the road on things like our new multidisciplinary, endoscopic orbital surgery course. Suddenly, as COVID-19 swept through New York, we lost our sense of horizon. My priorities simplified and my focus sharpened on each day. I prioritized maintaining my health and finding creative ways to engage, support, and educate our community. Substituting long-term vision for short-term focus has helped me put one foot in front of the other and keep moving forward. I have also tried to practice daily gratitude for my health, for the health of my family, and for having a job that allows me to help others.


Dr. Godfrey

Q. What are you doing now that you would not have done otherwise?
In addition to telemedicine, virtual lectures, and limited emergency orbit and oculofacial surgeries, I am volunteering as an attending physician in the emergency department (ED). In this new role, I am caring for COVID-19 and appropriate general emergency patients to help decompress clinical volume. This effort is supporting and bolstering the ranks of emergency clinicians who have been tirelessly and courageously caring for the influx of sick patients at multiple hospitals.

Q. How did you get involved?
As the clinical volume surged in New York, our chairman asked for volunteers to support the hospital mission, and I agreed to help. At that time, the need was in the ED. Although I was initially intimidated by the thought of returning to an emergency medicine role, the support I received made for an effective transition.

Q. What are the biggest rewards?
Without question, the gratitude of my new emergency medicine patients and colleagues means a lot. The reception I receive each day in the ED and in our hospital—applause, food donations, chalk messages on the sidewalk, notes from patients—provides a tangible sense of purpose and solidarity. The coordinated hospital response has also been a reminder for me that medicine is a team sport. In ophthalmology, we often function in small, highly specialized units at some distance from the rest of medicine. However, being a part of the hospital's massive, coordinated response at the front lines of this crisis reminded me how much more powerful and effective we can be when collaborating, communicating, and working together for a common purpose. To see our hospital system not just survive but also take care of our community at the highest level has been a huge reward, and I know it has set example for other departments around the city and country.

Q. What are your greatest concerns?
My greatest concern had been that at the peak of the local curve we would not have sufficient resources or space to care for everyone who came through our doors. Thankfully, due to the exceptional efforts and leadership at our hospital, this did not happen. We have been well protected and well organized, and we have been able to care for everyone with a remarkably high level of success. Secondarily, I also empathize with any concerns our residents and fellows are feeling about their own training experiences (although none have expressed anything other than a desire to help). However, our residents and fellows are fortunate to have a dynamic and high-volume learning environment, and I am confident that they will graduate as competent and well-trained clinicians and surgeons.

IN THE ED. *Of his experience in the emergency department at New York Presbyterian Hospital, Dr. Godfrey notes that caring for the community at the highest level has been a huge reward.*

Q. What are your biggest challenges day to day?
Although I miss operating and the daily interactions with my colleagues in our department, I have enjoyed the new challenge of clinical work in the ED. Quickly transitioning to a new field pushed me cognitively, physically, and emotionally, but it has been tremendously rewarding. From a clinical perspective, the COVID-19 treatment algorithms have been effective in guiding our coordinated, resource-efficient response, and they have contributed to our success. Additionally, the support of the staff, including technicians, nurses, nurse practitioners, physician assistants, residents, and attending physicians in the ED has been crucial to my ability to care for these sick patients.

Q. What do you see as the impact of what you are doing?
I am only playing a small role in a large and complex group effort, but I think standing shoulder to shoulder with my new ED colleagues helped reinforce for them that no department, clinician, or patient will be left behind, and that we are all pushing back against the tide of this disease together.

Q. What's your perspective on the pandemic?
I think the perennial importance of positivity, gratitude, and service have emerged for me. Although the losses are overwhelming, I think we can all find reasons to be positive. This perspective empowers us for the important work ahead. From a place of gratitude, I think we are all capable of contributing something. I have been inspired by the creative ways people have found to serve others and contribute. I am also continually inspired by the work of all essential employees who have kept our hospital, city, and country going. From transit workers to grocers to police officers, I have tried to say thank you at every opportunity.

Q. What are your thoughts on being an ophthalmologist during the COVID crisis?
From a medical perspective, a crisis of this magnitude requires us to contribute our full effort, at the top of our training, to the areas of greatest need. Our first impulse must be to help in every way possible. Although we are fortunate to have highly specialized microsurgical skills that allow us to prevent and cure blindness, we were first physicians trained in the diagnosis and treatment of systemic illness. We have more to offer our patients than we may initially believe.

VOLUNTEER ON THE FLOOR

Joel S. Schuman, MD
Professor and Chairman of Ophthalmology and Director, NYU Langone Eye Center, NYU Grossman School of Medicine, New York, N.Y.

Q. How has the pandemic changed your short-term priorities?
The pandemic certainly shifted focus for many people in a variety of specialties as well as for those outside of medicine. But in medicine, it really put the emphasis on saving lives.


Dr. Schuman

Another change is within the financial arena. Financial well-being is a core focus on the business side of ophthalmology, and the aphorism in academic medical centers is, "No money, no mission." But the pandemic really shifts the priority to maintaining health. That's why all of us are ratcheting down our clinical practices in ophthalmology—to reduce risks to ourselves, loved ones, patients, and staff.

We're now seeing about 20% of our normal volumes in our clinical practice. As department chair, I made a decision early on to only see patients in the office who had urgent or emergent problems, as recommended by the Academy. These patients receive whatever care they need. But by coming into an office or a hospital where there is a higher concentration of people with COVID-19, they're also exposing themselves to a greater chance of developing COVID-19, and that

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READYING FOR THE FLOOR. *From left to right, Eleanore Kim, MD, Zachary Elkin, MD, Joel Schuman, MD, Irina Belinsky, MD, and Vaidehi Dedania, MD, meet before they see COVID-19 patients.*

has added to the kinds of discussions we need to have with our patients.

Q. What are you doing now that you would not have done otherwise?

Several of my faculty and I are working on the inpatient medical floors at NYU Langone Health Tisch Hospital. Nearly 100% of the patients we're caring for have COVID-19 pneumonia, and a certain percentage of them end up on a ventilator in the ICU. This is serious business. We see people who one day seem to be relatively stable or even seem to be getting better, but the next day, they rapidly deteriorate and are struggling to breathe.

The work we're doing on the floors as general medical doctors is similar to what I did as an intern in New York 35 years ago. When I was taking care of patients in 1984 and 1985, AIDS was growing in New York City. It was another disease we didn't really understand, and people were very afraid. But I didn't know one person in the hospital who shirked his or her responsibility. Everyone stepped up and took care of patients.

Now with COVID-19, we have a virus that is airborne and very contagious, but fortunately has a much lower mortality rate—more like ~1%, depending on the country and risk factors. Many ophthalmologists in my department, as well as many of our trainees, have volunteered to take care of these patients. Rather than saying, "I didn't sign up for this," everybody is basically saying, "Put me in, coach. I'm ready."

Q. How did you get involved?

I'm married, and I have three adult kids. My wife, who is an attorney, was nervous about the prospect of my taking care of patients on a medical floor where everyone has COVID-19. But when our institution asked for volunteers, I could not in good conscience ask other people to do something that I wouldn't do myself. I felt a sense of responsibility not only to the patients directly, but also to my faculty. When the time came, I had my family's full support in volunteering to work the floors.

Q. What are the biggest rewards?

There is the intrinsic reward of helping people, of lending a hand. The other reward is something that I remember from my internship, which is a sense of camaraderie. All of us who work together as teams on the floors have a sense of closeness because we have the opportunity to face and do something extraordinary together. This shared intensity is special.

Q. What are your greatest concerns?

I really don't want to make my family sick. My middle son moved in with us during the first week of the quarantine. When I come home at the end of the day, he, my wife, and my dog all barricade behind closed doors. Although my wife would like to hose me off in the street, I live in Manhattan, so that would be weird! Instead, I go straight to the shower; there's no contact until that's done and I'm in fresh clothes. I take every precaution at work and at home so I don't bring SARS-CoV-2 to them.

Q. What are your biggest challenges day to day?

These are 12-hour shifts and at the end of the day, I pick up and do my day job as an ophthalmologist and department chair. That certainly is a challenge.

There is also the stress of taking care of people who might die, which is not something we usually deal with as ophthalmologists. It is challenging, but the patients are the ones who are really suffering.

Each day, we do everything we can to support people with COVID-related problems, predominantly pneumonia. I've had patients with all kinds of virus-related issues such as cytokine storms, hypotension, hypoperfusion, microvascular hypercoagulability, stroke, and multiorgan failure.

We spend most of our time following labs on patients and assessing how they are doing clinically with the disease. For example, how much inflammation do they have, and do they need more medication to address it? Are they stable or going downhill? Are they doing okay with everything we can do for them on the floor, or do they need to be in intensive care or on life support? Are they ready to go home or to rehab? That's pretty much our day-to-day routine.

Joel S. Schuman, MD

Q. What do you see as the impact of what you are doing?
Working as general medical physicians, I feel the whole team is helping to save people. We're another pair of hands and another set of eyes to watch these patients, and if they're getting into trouble, we can move them into more intensive care.

Although we're using a muscle that we don't use every day—one many of us haven't used in a long time—we do have a special set of skills. We went to medical school and we know how to deliver medical care.

Q. What's your perspective on the pandemic?
This disease is highly transmissible and deadly for some, and it has shut down the global economy. It makes you realize what a fragile thing life is, especially when you're taking care of patients with this disease.

I recently rewatched "Outbreak," and there's a scene in the movie where Dustin Hoffman's character says, "Something 1 billionth our size is beating us." And that's what we're dealing with. It's very humbling.

Q. What are your thoughts on being an ophthalmologist during the COVID crisis?
Being on the general medical floor has reinforced that my subspecialty choice was right for me. With COVID-19, we're very often providing supportive care, helping keep people alive while they try to beat the disease. But we don't know how to cure it. In ophthalmology, we can make people better, and we do it regularly. We can help restore patients' sense of sight and help to improve their quality of life. We have a pretty great profession. When the pandemic ends, I will be happy to get back to it full time.

EDUCATING TRAINEES

Paisan Ruamviboonsuk, MD
Chairman, Department of Ophthalmology, Assistant Director, Rajavithi Hospital, Bangkok, Thailand

Q. How has the pandemic changed your short-term priorities?
In early February, my hospital in Bangkok had just opened a new 25-story building and new eye clinic. Moving an eye clinic with more than 50 units of full-function eye instruments was not easy, but it went quite smoothly. For about four weeks, we were able to see the same number of patients as in the old clinic, around 500-600 patients a day.

Then, the number of COVID-19 cases began to accelerate, forcing the government to impose a state of national emergency. Our department decided to adjust services and training. Our short-term goal was to find a balance between the risk of viral contamination in our facilities, the risk of infection among eye care personnel, and the eye care needed for our patients, including ophthalmic education for our residents and fellows.

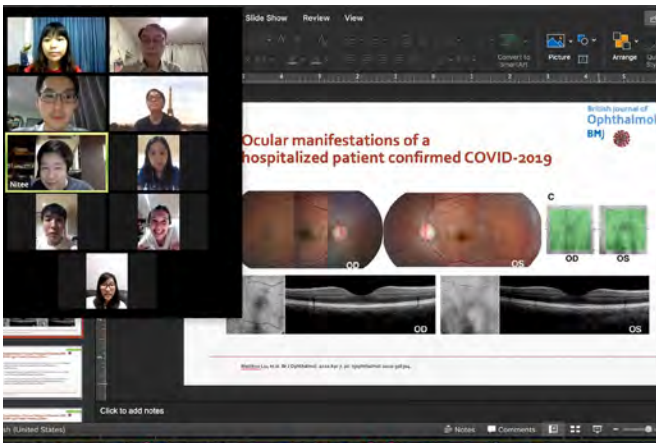
We postponed almost all elective cases in the outpatient department (OPD) and OR. The number of patients dropped to around 30-40 a day in the OPD, and we operated on only two or three cases a day, compared with around 20 cases a day before the pandemic.

Q. What are you doing now that you would not have done otherwise?
Our country has been fortunate to not have too many cases of COVID-19. However, we needed to adjust our ophthalmic training program because we now have fewer eye patients and scarcer resources. It is challenging to use limited resources for training in ophthalmology, especially since we don't know when this pandemic is going to end. As currently organized, I think this unusual training program using limited resources should work for at least three or four months.

Q. What are the biggest rewards?
This is a difficult time for our residents and fellows. The longer the lockdown, the less they are able to learn from real clinical experience in eye clinics or the OR. The biggest reward would be maintaining high-quality training despite the limited resources. Becoming a confident ophthalmologist would be a reward for each of the trainees, especially those who graduate this year.

Q. What are your greatest concerns?
For ophthalmology trainees, it's important to gain both medical and surgical skills. During the pandemic, trainees can study interesting cases in our collection of departmental presentations. However, gaining surgical skills is more difficult. Imagine how many cases a resident or fellow could normally operate on during the course of several months. On lockdown, this cannot happen. Learning with simulators may be better than nothing. But learning about cases from slides or simulators is not comparable to learning in real clinical situations.


Dr. Ruamviboonsuk



ONLINE TRAINING. *Dr. Ruamviboonsuk hosts an online training session.*

Q. What are your biggest challenges day to day?
We have not yet faced the biggest challenges related to COVID-19. Timely termination of the lockdown might be what everybody dreams of, but in ophthalmology, the biggest challenge may come after this pandemic is over. Ophthalmic services around the world may face a flood of cases, including many more challenging cases, some of which we might have been able to manage better if we had seen them sooner. For example, this includes cases of complicated retinal detachment, proliferative diabetic retinopathy, or diabetic macular edema. We need to prepare for them.

For trainees, the flood of cases may mean more time for service but less time for learning. We need to prepare for fewer learning opportunities not only during this crisis but also after it ends.

Q. What do you see as the impact of what you are doing?
Ophthalmic training is very important for producing new generations of qualified ophthalmologists. They are our future.

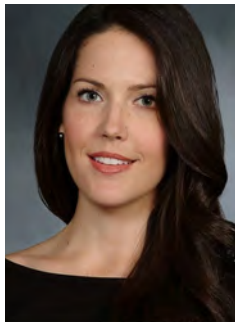
Q. What's your perspective on the pandemic?
In their own way, everyone will learn a great deal about life during this crisis, for example, about society, the environment, politics, ideology, and morality. How will individuals' thoughts and experiences join to shape the world in the future? Will the world be more divided or more coherent? I still believe in the latter. I don't think we can deal with a pandemic like this by creating walls on the borders of countries. We are better off acting as a single country, the "world's country."

Q. What are your thoughts on being an ophthalmologist during the COVID crisis?
As ophthalmologists, we are quite fortunate that we don't have to treat patients with COVID-19 directly as do infectious disease specialists, pulmonary specialists, or emergency room physicians—all of whom we really honor. However, we can choose to volunteer to assist in screening or treating these patients as some of our ophthalmologist colleagues are doing.

Because each ophthalmologist had different roles before this pandemic—as clinicians, researchers, educators, teachers, or trainees—each may be affected by this crisis in different ways. Some may still be able to work in their own areas with limited resources. At a minimum, simply keeping ourselves safe by not contracting the disease may be a great contribution. The world will still need healthy ophthalmologists to prevent blindness after this crisis is over.

FOLLOWING PATIENTS DISCHARGED FROM THE ED

Ashley R. Brissette, MD, MSc
Weill Cornell Medicine and NewYork-Presbyterian, New York, N.Y.



Dr. Brissette

Q. How has the pandemic changed your short-term priorities?
I think we were all used to planning extremely far ahead. Moving toward taking things more day to day has been a big change for me. My surgical and clinic schedules were booked a few months out, and now I have to tell my patients I don't know when we can go back to regular visits or nonemergent surgery. In the short term, I am focused on making sure my patients who need close continued care are getting access—whether via telemedicine or an in-person visit if truly needed. As well, my research studies are currently on hold.

It was difficult when many of our conferences and meetings were canceled. It's something I look forward to every year as a way to connect with colleagues and for continuing education. But it's been incredible to see how ophthalmologists worldwide are starting to turn to online education like webinars. It's been an amazing way to connect us globally and I am getting to learn so much about my colleagues both nationally and

Paisan Ruamviboonsuk, MD

COVID-19 FOLLOW-UP. *Dr. Brissette volunteered for "redeployment" to other areas of her hospital. Now she is following COVID+ patients who have been discharged from the ED.*

internationally. I feel like everyone is really coming together to ensure that we are still learning and connected.

Q. What are you doing now that you would not have done otherwise?

The first week after our offices and ORs closed, I spent a lot of time doing phone and telemedicine visits with my patients, especially those who were post-op or needed close follow-up. After that initial week, I felt a little lost. I wanted to help and didn't know in what capacity I could offer help. Our chairman asked if anyone would be willing to volunteer for "redeployment" to other areas of the hospital to help. So now I am helping with the ED at our institution.

I work four shifts per week and have several tasks. One of the most interesting is that I'm assigned a list of patients who were discharged from the ED with COVID+. I do a video chat with each patient to assess how he or she is doing. I have the patient show me the pulse oximeter readings, and then the patient walks around at home, and I recheck the vital signs. I also have the patient put hand to chest, and I guide him or her through measuring the respiratory rate. I also assess the single breath test and use of accessory muscles for breathing. Based on these results, I determine whether patients need to come back to the ED or if they are okay to stay at home. I also review supportive care measures that they can do at home.

Q. What are the biggest rewards?

Feeling that I have a purpose in all of this has been extremely rewarding. Especially being in New York City where we were hit the hardest in the country, it was a way to give back to the city. I think we have a duty as health care providers, and it's been amazing to see how the medical community has come together to support each other. We are no longer operating within our silos of medical care—we all have a shared goal of getting our patients through these trying times.

Q. What are your greatest concerns?

My biggest concern was that, since it had been a long time since doing general medicine, I wouldn't really be useful. But on my first day, there was an orientation, and the hospital has very strict protocols for seeing and examining COVID patients. In addition, the MDs, nurses, PAs, and other hospital staff are very kind and helpful. Having the support of my institution and hospital and having the protocols really helped.

It may seem surprising, but I'm not too concerned that I will get COVID. Part of me thinks I already had it because I saw so many sick patients in the weeks leading up to the shutdown. And, luckily, there haven't been any problems with PPE here.

Q. What are your biggest challenges day to day?

Balancing the telehealth visits with my own patients, the hospital shifts, teaching for the residents and fellows, and attending online webinars. I think I am as busy as ever, just in a different way. I've accepted that I can't grow my personal practice at this time and instead am focusing on education and helping the COVID efforts.

Q. What do you see as the impact of what you are doing?

I think I was eager to volunteer because I wanted a sense of purpose during this time. None of us could have imagined how much something like this would affect our practices and our lives. So, in these trying times, rather than waiting to see what would happen, I wanted to continue to grow as a physician and person. I want other ophthalmologists to know that they shouldn't be scared if they are called upon to help in their hospitals.

Q. What's your perspective on the pandemic?

I think that it's important to have a growth perspective during this time of uncertainty. It's natural to be nervous or to panic, but it's crucial to accept our situation, live in the now of our new reality, and plan for what's next. I really think that this will also change the way we practice medicine in the future. As we and our patients are getting more comfortable with telemedicine, it might play more of a role in certain situations going forward. I'm interested to see how this will change the practice of ophthalmology in the future.

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ADAPTING WITH FLEXIBILITY

A. John Kanellopoulos, MD
Medical Director, The Laservision.gr Research & Clinical Eye Institute, Athens, Greece, Clinical Professor of Ophthalmology, NYU Medical School, New York, N.Y.


Dr. Kanellopoulos

Q. How has the pandemic changed your short-term priorities?
There has been a dramatic change. From a starting point of 30 associates, we have "leaned" down to three people for an emergency reception, technician, and optometry crew, as well as one ophthalmologist with physical presence at the center and seven more working from home. We alternate personnel on a two-week basis for quarantine reasons and to enhance social distancing for the rest of the team. We started taking these measures two weeks before the lockdown in Greece on March 16.

We are lucky that our electronic medical record system and our phone center can be accessed remotely. Most issues can be taken care of on the phone, by video call, and even email, sometimes with patients sending in photos of their eyes. In person, we are seeing only urgent cases such as trauma; vascular events; active or recurring CNV; retinal detachments, tears, or other urgent retina procedures; anti-VEGF injections for macular degeneration; and urgent glaucoma procedures. The practice has a protocol for this purpose.[1]

Q. What are you doing now that you would not have done otherwise?
We are employing extensive protective measures in the practice. For example, we designed and have been using a do-it-yourself slit-lamp breath shield since the beginning of February (https://youtu.be/jK2pwq8_bLA). In addition, we have organized an IOP drive-through checkup service with a Tonopen and have instituted extensive telemedicine and infectious disease training for our staff (use of PPE, gear-on and gear-off care, etc.).

Of course, like almost everyone else, we are resorting increasingly to electronic forms of communication. I had an international meeting at the beginning of March via WebEx, and doctors from every continent participated. It was a two-day meeting, four hours a session. I must admit that the meeting was by no means inferior to what it would have been if we had all physically traveled to a certain location. On the negative side, I think that most of the conventions this year have been or will be canceled. That is a very big disadvantage for continuing medical education and for sharing our clinical experiences with colleagues throughout the world, as we were used to doing.

As for academics, one positive change is that my duties as a clinical professor of ophthalmology at NYU School of Medicine formerly required me to travel to New York several times a year to work with the residents. Now, most of this work is being done electronically, even by the faculty in New York. For example, the morning lectures are presented via WebEx, and I am very excited and grateful that I can have a more active role in this.

In addition, I am catching up on writing and reading. In fact, I have already submitted five papers that were long overdue! And I've been exploring the ISRS Multimedia Library, past meeting materials, and the *Journal of Refractive Surgery* on ISRS.org, the website for the International Society of Refractive Surgery, the refractive surgery arm of the Academy.

Q. What are your greatest concerns and rewards right now?
One concern is that a lot of significant visual complaints may not be treated with the appropriate care and attention when weighed against the dangers of not enforcing social distancing. Of course, we are working hard to triage and screen patients over the phone. I hope that we will return in some way to offering more in-depth and more comprehensive care to our beloved patients.

On the upside, it is encouraging that our extreme measures and the country's early lockdown seem to have paid off so far. We have reached single-digits of daily new COVID-19 infections, under 65 active ICU cases, and a cumulative 131 reported fatalities so far in Greece (as of April 26). This is probably an all-European record, especially considering the strong tourism and travel activity in Athens and all of Greece throughout the year.

Q. What are your biggest challenges day to day?
Obviously, there are significant financial challenges when a busy, productive practice comes to a near standstill. Beyond that, I think the biggest

All Things Coronavirus

Visit aao.org/coronavirus. It is chock-full of clinical, practice management, and patient education news, information, and resources to help you handle the turbulence of the pandemic.

challenges are to stay proactive, remain emotionally stable, take advantage of this time to tackle some things that have been neglected—and, of course, to retain a healthy lifestyle.

It may be months before we can hope for any type of "normality," but I think that people as a whole have proved that in times of adversity, they are very patient and compassionate and have the perseverance to pull through.

Q. What do you see as the impact of what you are doing?

I think that offering the best possible care under the circumstances provides security and reassurance to our patients. In addition, continuing medical education, research, and academics are greatly important.

Q. What's your perspective on the pandemic?

It is interesting and, at the same time, surreal to see what our everyday life has come down to. I recently took a walk in the center of Athens and realized that life really has come to a standstill. It is the beginning of spring, and the weather has gotten better; nevertheless, the streets are almost empty, with just a few people—in maximum parties of two—walking around at impressive distances from each other. And all commercial businesses are closed, except for news kiosks and some grocery stores.

I think that when we see this and reflect on our lives before the pandemic, we begin to realize that we can live our everyday life with much less, and we can organize and prioritize our life to attain a better balance between our physical health, our emotional and family time, and of course, our professional time. Too often, the boundaries among these are stretched, with our professional life taking over disproportionately. I'm sure that I'm not alone in pondering these points, and when this ordeal is over, I hope that we will apply these lessons to achieve a more productive and happier lifestyle for the future.

Q. What are your thoughts on being an ophthalmologist during the COVID crisis?

In a world that has long seemed to value the talent and abilities of those who are most likely to trend on social media (for example, professional athletes, entertainers, and "famous" people), I think that this pandemic underscores that medicine may be the most important science and profession that humanity has developed. Every aspect of scientific work is obviously important, but during this time, doctors, nurses, hospital staff, and all health care providers "rule"!

It may sound egotistical, but it does fulfill me, as a physician, to be part of this, given the work and sacrifices I have made since my late teens in order to pursue the difficult road of medical education, residency training, multiple subspecialties, and a very demanding professional life.

Of course, I realize that not being a pulmonologist or an infectious disease expert or a critical care expert on the front line of treating COVID-19 patients—and my heart goes out to all these colleagues—makes me less important. But I do feel that the world will come to better understand the value, the dedication, and the daily sacrifices that physicians and health care workers contribute day in and out in order to improve other people's lives. It gives me a significant sense of fulfillment, as an anterior segment eye surgeon, that I can still offer my expertise 24/7, as well as my sense of commitment, to all the wonderful patients I have been blessed to care for even during these very difficult times.

1 The protocol is posted with this article at aao.org/eyenet.

Shutterstock

ATHENS ON LOCKDOWN. *In his now-quiet city, Dr. Kanellopoulos takes time to reflect.*

MORE AT THE MEETING

From research to reimbursement, get up to speed on COVID-19. The program committees for AAO 2020 (Nov. 14-17) and Subspecialty Day (Nov. 13-14) have invited experts from around the world to present the most up-to-the-minute news on COVID-19. And don't miss the American Academy of Ophthalmic Executives' program (Nov. 13-17), which will explain how you and your staff can adapt to the "new normal" by making your practice leaner and more resilient.

AAO 2020 VISION

For more on this year's annual meeting, see Destination AAO 2020,86_8803Stay up to date by bookmarking aao.org/2020.

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See You in Las Vegas in November

Your input led to some exciting changes for AAO 2020. Learn more at aao.org/2020

Registration and Hotel Reservations Open This Month

June 17 – Members
July 8 – Nonmembers

aao.org/registration
aao.org/hotels

No cancellation fee until August 12

Hear From Some of Today's Brightest Minds

Malcolm Gladwell
Keynote

Michael X. Repka, MD
Jackson Memorial Lecture

Justine R. Smith, MD
Foster Lecture

Celebrate This Year's Academy Laureate,
George B. Bartley, MD

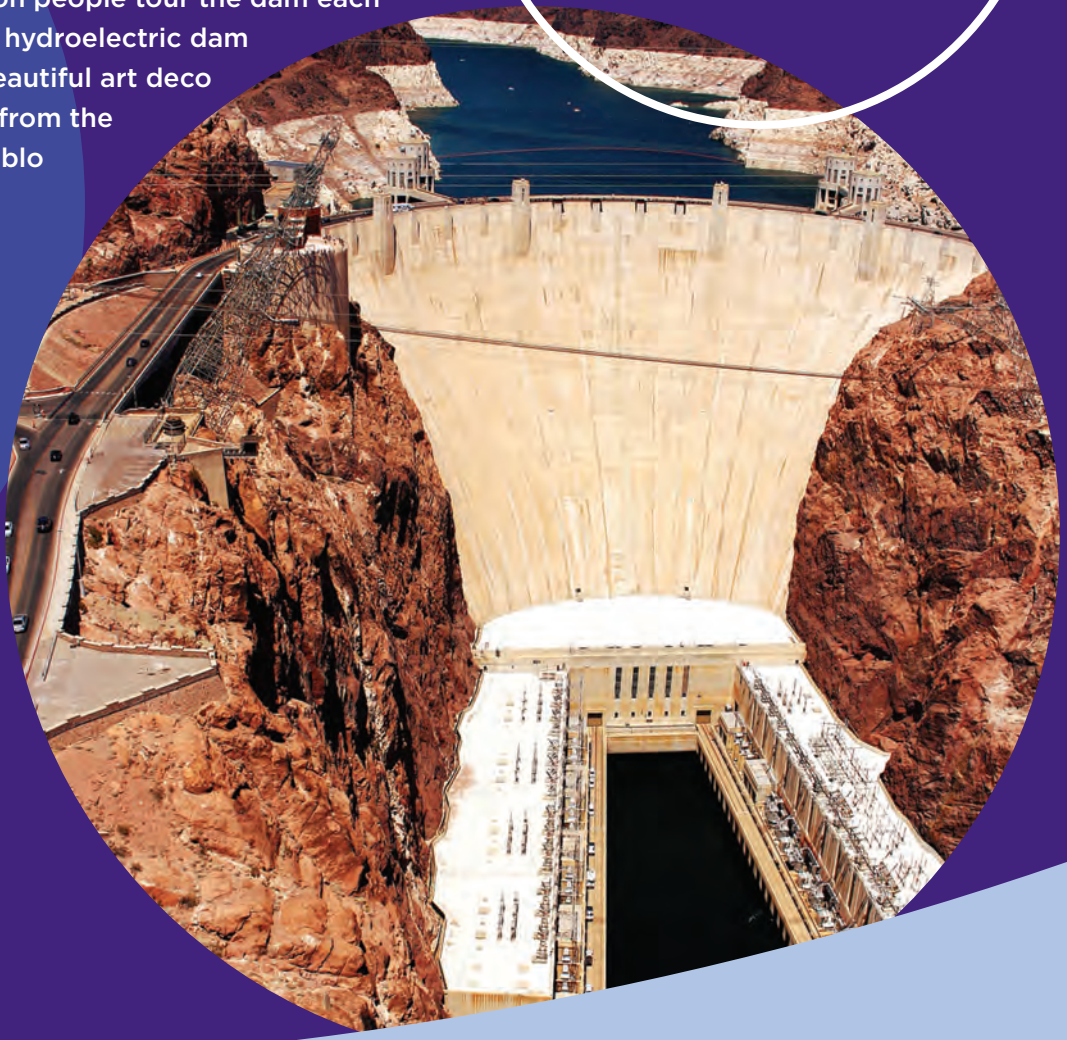
Where All of Ophthalmology Meets®

Protecting Sight. Empowering Lives.®

AAO 2020 VISION

Stand in Awe and Wonder

Just a 30-minute drive from the Las Vegas strip, the Hoover Dam is a national historic landmark that stands proud as a towering monument to human ingenuity. Nearly a million people tour the dam each year to witness how the hydroelectric dam works and take in the beautiful art deco design featuring motifs from the region's Navajo and Pueblo Native American tribes.



Program Highlights

- The Artificial Eye: 2020 and the Dawn of Innovation
- 20/20 in Focus: How Technology Will Bring Us Closer to Perfection
- The Future of Retinal Disease Pharmacological and Gene Therapy Treatments
- Scientific Findings from Big Data from the RPB/AAP Award for IRIS® Registry Research

Telemedicine During the COVID-19 Public Health Emergency

On March 17, in response to the COVID-19 crisis, CMS announced that it would temporarily ease the rules on telehealth, making it feasible for patients across the country to seek health care without traveling to the physician's office. The goal was to reduce the exposure risk for patients, for physicians and their staff, and for the community at large.

Use the online resources. The American Academy of Ophthalmic Executives (AAOE), working closely with the Academy's regulatory experts, has been tracking how CMS is implementing the new rules. They have been keeping members up to date on this with a robust series of webinars, tip sheets, articles, and discussions on the AAOE's eTalk listserv (aao.org/practice-management/listserv).

Bookmark this URL. Government regulations can change quickly. For the latest information on telehealth reimbursement, go to aao.org/practice-management/telehealth.

What questions has the AAOE been fielding? Here is a small sample of frequently asked questions (FAQs).

Telemedicine FAQs

Q. *How long will physicians be able to bill using the new flexibilities of telehealth?*

A. The telehealth waivers will be effective until the Secretary of Health and Human Services declares that the COVID-19 Public Health Emergency (PHE) has ended.

Q. *What about those patients who worry that they'll be out of pocket because Medicare and other payers won't cover telehealth?*

A. During the PHE, you should tell patients that services are available by phone, email, or virtual communication in new locations, including homes.

Q. *Some emergency visits involve the patient coming to our clinic and others are conducted virtually. How do we code for these different types of visit using the 99201-99215 family of Evaluation & Management (E/M) codes?*

A. Modifier –95 flags that a visit involved telehealth. So if the visit was done virtually, append modifier –95 to the relevant E&M code. If you don't use that modifier, the payer will assume that the physician and patient were both physically in the office.

During the PHE, what place of service (POS) code should you use? Even if the visit was conducted via telehealth, use 11 (which is the POS code for the office) when submitting CPT codes for services that would normally only be billable when you performed them in the office.

Q. *Have there been any changes to the supervision rules for testing services?*

A. Yes. Tests that had previously required direct supervision can be done under general supervision during the COVID-19 PHE.

Q. *Previously, Medicare paid for services billed by teaching physicians when the services have been furnished by residents, provided the residents were under direct supervision of a teaching physician. Does that apply to telehealth?*

A. During the PHE, yes. Because physical proximity can result in unnecessary exposure risks, CMS is allowing residents to perform services via telehealth, and it is temporarily redefining the direct supervision requirement to include virtual supervision. The teaching physician doesn't have to be physically present. Instead, he or she can have a virtual presence "through audio/video real-time communications technology when use of such technology is indicated to reduce exposure risks for the beneficiary or health care provider." The regulations describe this as "direct supervision by interactive telecommunications technology."

Q. *In telemedicine, can the history be taken by phone prior to exam by a staff member and documented into the medical record?*

A. Yes. However, staff time can't be included when you determine whether the practice can bill for a phone call, an e-visit, or a telemedicine exam.

Note: If you are billing a commercial payer, make sure you check the individual payer's policies.

BY **SUE VICCHRILLI, COT, OCS, OCSR,** ACADEMY DIRECTOR OF CODING AND REIMBURSEMENT.

MORE ONLINE. See this article at aao.org/eyenet for FAQs on Eye visit codes and on nursing homes.

Practice Recovery Tips From the AAOE

While much of the United States was in lockdown, the American Academy of Ophthalmic Executives (AAOE) started helping ophthalmologists plan for a return to elective procedures (see "Use the AAOE's Resources"). Factors to consider include the following.

1. Modify your office to reduce risk of exposure. Make sure patients can maintain appropriate social distancing. You can, for example, spread out chairs, minimize the time that patients spend in waiting rooms, and use floor markings to indicate where patients can stand.

Use furniture that can be easily sanitized and eliminate any unnecessary opportunities for exposure, such as coffee and water stations, childrens' play areas, and aging copies of *People* magazine. Ensure there is proper ventilation and install air purifiers.

In staff areas, space workstations at least 6 feet apart and eliminate shared phones and workstations. Use signage to provide reminders of best practices.

Conduct a weekly walk-through of the entire facility and identify any new modifications that might be needed.

For more tips on practice operations, including cleaning protocols, visit aao.org/practice-management/article/coronavirus-practice-operations-safety-advice.

2. Before the patient encounter. Here are some critical steps to consider.

a) Screen for possible exposure to COVID-19. For the screening protocol that, as of May 1, was being used by Wilmer Eye Institute, see page 27.

b) Set your patients' expectations for the office visit. Explain, for example, that patients will need a mask; that you'll be taking their temperature; that, apart from some limited exceptions, they can't bring friends and family into the office; and that, to limit face-to-face transactions, you'll be taking copays over the phone or online ahead of the visit.

c) Explain patient safety precautions and office protocols. You can try to set patients' minds at rest by sharing a brief overview of your office protocols for sterilization, safety, and social distancing. Confirm that you are complying with state and local regulations for health care facilities. Ask whether patients have any questions or concerns about your protocols.

d) Get patients' key information. To minimize face-to-face interactions during the visit, obtain patients' demographic information, history, and insurance details before they arrive at your office.

3. Stay connected with patients during practice recovery. Maintaining direct communication with your patients can help assuage their fears, preserve your relationship with them, and provide them with guidance for their ongoing ophthalmic care. (See aao.org/practice-management/article/stay-connected-with-your-patients-during-recovery.)

4. Create a prioritizaton process for nonurgent appointments. Develop guidelines for prioritizing nonurgent appointments. Use your practice management system or electronic health record (EHR) system to create a wait-list report of nonurgent appointments and surgeries. Include, if possible, the patient's diagnosis, age, and risk factors. Surgeons should review surgery lists and assign scheduling priority. (See aao.org/practice-management/article/prioritize-patient-wait-lists-your-practice-reopen.)

5. Use the AAOE's eTalk listserv to exchange tips and share news. AAOE members can subscribe to the listserv at aao.org/practice-management/listserv. You can join the AAOE at aao.org/member-services/join-aaoe.

Use the AAOE's Resources

Practice survival and recovery. For a wide range of practice recovery resources, including tips for resuming surgery and reopening ambulatory surgical centers, go to aao.org/practice-management/resources/reopening-recovery.

Free access until July 31. The AAOE is making many of its resources available to Academy members until July 31. These include materials unrelated to the pandemic, such as coding courses, but not the eTalk listserv.

BY **JOY WOODKE,** AAOE CODING AND PRACTICE MANAGEMENT EXECUTIVE.

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Foundation

Swing Into a Marvelous Evening at the Orbital Gala

Channel the slick style of Sinatra and Martin, Dickinson and MacLaine at the 17th annual Orbital Gala. At this vintage Vegas-themed fundraiser, you'll dine, dance and bid on one-of-a-kind auction treasures.

We're thrilled to celebrate **David J. Noonan**, former Academy deputy executive vice president. To make a tribute gift and include a message in the Orbital Gala booklet, go to aao.org/tribute.

Purchase tickets starting June 17 at aao.org/foundation

Orbital Gala 2020

The Venetian Resort
Las Vegas
Sunday, Nov. 15
6 – 10 p.m.

Academy Notebook

NEWS • TIPS • RESOURCES

WHAT'S HAPPENING

Dr. Mills, Past President of the Academy, Dies at 76

Richard P. Mills, MD, MPH, died on May 9 of complications from COVID-19. He was 76. He played integral roles in the Academy, starting in the 1980s, when his work on a Washington state pilot program was instrumental in the launch of the National Eye Care Project, now EyeCare America (ECA). His leadership roles included Academy president (1995), *EyeNet Magazine* chief medical editor (2002-2016), and ECA chair (2007-2013). He served in myriad other Academy positions and was honoree of the Foundation's Orbital Gala in 2016.

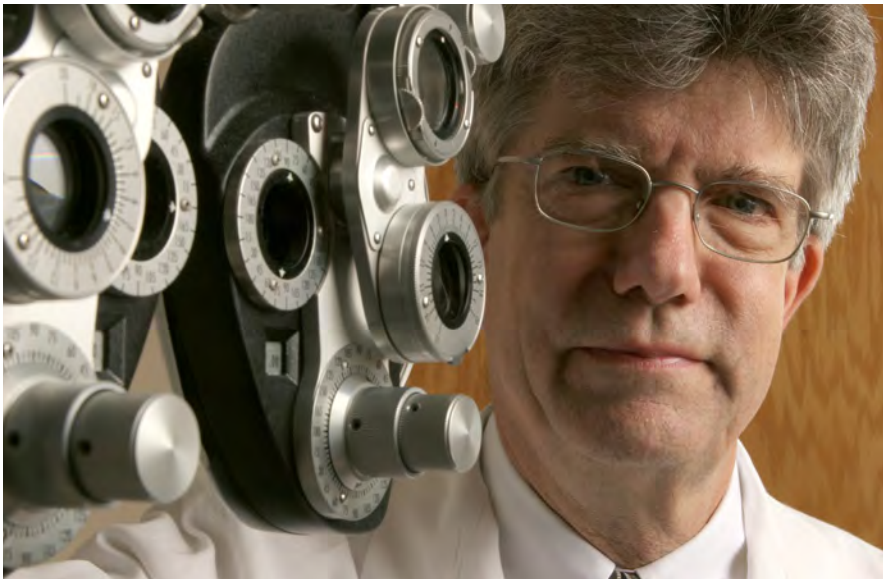
Academy CEO **David W. Parke II, MD,** referred to Dr. Mills' contributions to the Academy as protean. "He believed fervently that every ophthalmologist had a responsibility to serve others, rather than (as he referred to it) 'hitchhike' on the contributions of others . . . His laugh was unmistakable, and his comments were pithy and humorous. Dick was one of the good guys—the best guys. We will miss him."

Dr. Mills was active with other organizations, including the American Glaucoma Society, American Board of Medical Specialties, American Board of Ophthalmology, the American Ophthalmological Society, and the Washington state society, to name a few.

In 1968, he graduated from Yale University Medical School. He did his residency at the University of Washington (UW) followed by three fellowships, two in neuro-ophthalmology, one in glaucoma. In 1972, he joined the faculty at UW, rising to professor and acting Chair of Ophthalmology. In 1999, he completed a master's in public health at UW. He served briefly as Chair of Ophthalmology at the University of Kentucky.

He was an important contributor in glaucoma clinical research, notably the Collaborative Initial Glaucoma Treatment Study trial. He also took pleasure in his private practice at Glaucoma Consultants Northwest, sometimes incorporating patient encounters into *EyeNet* editorials.

He is survived by his wife Karen, daughters Lianne, Lissa, and Emily, and seven grandchildren: Savanna, Murron, Audrey, Hannah, Max, Frankie (Francesca), and Evey.



CLINICIAN, TEACHER, LEADER. *Richard P. Mills, MD, MPH (1943-2020).*

Adapting to a New Normal: Resources for Your Practice

This year's pandemic presents practices with unprecedented challenges. How does your practice maintain its operating income? What's the best way to keep patients and staff members safe? Do you have a checklist of steps to take if a physician or member of staff becomes ill with COVID-19? Physicians and their staff members must be nimble in navigating the evolving health care landscape.

Help is available. For authoritative ophthalmology-specific coronavirus materials, go to aao.org/coronavirus and click "For Practice Management." Among the resources posted there, you will find the following:

The AAOE's road map for practice recovery. The American Academy of Ophthalmic Executives (AAOE) has developed a detailed step-by-step guide to practice recovery and is adding to it each week.

Updates on the rapidly changing regulations. Starting from the earliest days of the pandemic, the AAOE's prac-

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tice management experts—working closely with the Academy's D.C. staff—have helped practices keep up with frequent changes in government rules and policies. From checklists and tip sheets to videos and webinars, AAOE and Academy resources have highlighted the critical information that ophthalmologists need to know.

Until July 31, selected AAOE resources are free to Academy members. To help practices in their recovery, the AAOE is giving Academy members temporary access to some of its member benefits, including its Practice Management Resource Library at aao.org/aaoe-resources, which features practice efficiency tools, videos, webinars, and more. If staff members have downtime, they can work their way through five one-hour coding courses.

Explore the other newly opened resources at aao.org/practice-management/resources/coronavirus-resources.

Crowdsource solutions with AAOE. If you are a member of the AAOE, use the e-Talk listserv to share tips, post queries, and find out what has and hasn't worked for other practices. Not an AAOE member? Visit aao.org/join-aaoe.

Michigan Society Teams With Leader Dogs for the Blind

Two years ago, the Michigan Society of Eye Physicians and Surgeons (MiSEPS) rekindled its relationship with Leader Dogs for the Blind. Both organizations realize that the work they do is complementary. At one of the first meetings with the charity, MiSEPS Public Service Chair **Anne M. Nachazel, MD,** was discussing how hard it is for ophthalmologists when they realize that they can do no more for a patient and that they need to connect the patient to resources to support them in a new phase of life as visually impaired or blind.

Since then, MiSEPS and Leader Dogs for the Blind have supported each other's events, distributed informational resources, and raised awareness about their respective missions. MiSEPS President **Paul A. Edwards, MD,** serves on the charity's board. MiSEPS has featured the organization's puppies and handlers at both its 2018 and 2019 annual conference banquets, and at an EYES Cream Social with MiSEPS members and their families.

On March 6 in Detroit, a MiSEPS group—including Dr. Edwards and Dr. Nachazel—gathered at the charity's annual Dinner in the Dark benefit. They met people whose lives have been transformed by the freedom and companionship that Leader Dogs provide them. During dinner, each sighted guest put on a blindfold to experience what it's like to eat as a blind person.

"This was our last big social outing before everything changed with the pandemic," Dr. Edwards said, adding, "MiSEPS is moved and impressed by the transformational work Leader Dogs for the Blind does." MiSEPS hopes to welcome Leader Dogs for the Blind to its annual conference from Aug. 6-8 on Mackinac Island.

TAKE NOTICE

Volunteer for Clinical Currency Review

Do you enjoy CME activities from the Academy? If so, consider volunteering to review educational materials for clinical currency.

Projects include reviewing everything from interactive cases to book chapters to learning plans, and more. Deadlines and time commitments vary by product, so reach out to the education division (clinical_education@aao.org) to find a project that works for your schedule.

Volunteers must have no financial relationships with industry and must have experience formally teaching, managing, or collaborating with the publication's target audience.

For more information about this volunteer opportunity, visit aao.org/volunteering and select "Clinical Currency Review" under the "Review" tab.

Use the IRIS Registry for MOC and MIPS

The American Board of Ophthalmology can help you to create an Improvement in Medical Practice project that can earn you credit for both Maintenance of Certification (MOC) and the Merit-Based Incentive Payment System (MIPS).

Do you have an EHR system? If you have integrated your electronic health record (EHR) system with the IRIS Registry, you can use data from your IRIS Registry dashboard to design and implement a quality improvement project.

Design your plan. Start by identifying one or two IRIS Registry measures that you would like to improve, set goals for those measures, and determine the steps needed to achieve those goals. The ABO can provide details of what needs to be in your plan.

Submit your plan to the ABO no later than Aug. 31, 2020. The ABO has said that you should expect the review and approval process to take up to two weeks.

Implement your plan. Use the IRIS Registry dashboard to check on your progress and fine-tune your processes if necessary. Once the project is complete, review its effectiveness and send a summary to the ABO.

Earn credit for MOC and MIPS. To get credit for MOC, you must implement your plan for at least 30 days. If you implement it for at least 90 days, you might meet the requirements of a medium-weighted MIPS improvement activity—IA_PSPA_2: Participation in MOC Part IV. For a detailed guide to that MIPS improvement activity, see aao.org.org/medicare/improvement-activities.

Read the IRIS Registry's comprehensive guide to the process at aao.org/iris-registry/maintenance-of-certification.

Visit the ABO's website to learn more at https://abop.org/IRIS.

Learn About the Impact of Academy Donors

In the Foundation annual report, *For A Better Tomorrow,* learn about the invaluable impact that donor support has had on the success of Academy programs.

Foundation funding of the ONE Network, IRIS Registry, and EyeCare America makes projects like correcting a 22-year case of strabismus, performing 532 cataract surgeries in the Philippines, and restoring a 107-year-old's vision

possible. Through these donor-supported programs, Academy members are protecting sight and empowering lives every day.

Access the report at aao.org/foundation/2019-annual-report/overview-2019.

Read the Latest Edition of *Scope*–Spring 2020

Channel your inner ophthalmic historian and read the Spring 2020 edition of *Scope*, the quarterly newsletter for senior ophthalmologists.

In this issue, children of ophthalmic icons tell their fathers' stories, including "Claes Dohlman, MD: A Leader in American Ophthalmology and Proud Son of Sweden," written by Henrik Dohlman, PhD, and "Lorenz E. Zimmerman, MD: A Legacy in Ophthalmic Pathology," written by his daughter, Mary Louise Z. Collins, MD.

In the column "What We're Doing Today," M. Bruce Shields, MD, editor of *Scope*, highlights the many hobbies of retired ophthalmologists, and this issue features avid birder Robert Forester, MD.

Read the feature on ergonomics, by Samuel Masket, MD, and explore *Scope*'s book review column for a variety of reads suggested by your colleagues.

For these stories and more, visit aao.org/senior-ophthalmologists/scope.

ACADEMY RESOURCES

Don't Miss Important Updates to the *BCSC*

The 2020-2021 edition of the *Basic and Clinical Science Course* (*BCSC*) is available for advance order and will ship by mid-June. The *BCSC* is rigorously reviewed by more than 100 ophthalmologists and is organized so you can find the information that is most relevant to you. Practicing ophthalmologists and residents worldwide use the *BCSC* to ensure the highest-quality patient care.

The new 2020-2021 edition includes major revisions to the following sections:

- Section 4: Ophthalmic Pathology and Intraocular Tumors
- Section 10: Glaucoma
- Section 11: Lens and Cataract

Buy the print and/or eBook version. Choose from the print or eBook format (eBooks are also available starting mid-June). Purchase an individual section or save when you buy a complete set of all 13 sections of the *BCSC*.

Take the Self-Assessment Program. Efficiently identify and fill knowledge gaps while earning Self-Assessment CME credits with the online companion, the *BCSC* Self-Assessment Program, which is the only resource with questions and discussions derived directly from the *BCSC*.

For pricing, visit aao.org/bcsc.

D.C. REPORT

Progress in Averting Drug Shortages

In recent years, ophthalmologists had reported problems in obtaining critical diagnostic tools (such as fluorescein strips) and essential drugs (including atropine, dorzolamide, and erythromycin). Ensuring that patients won't lose vision because ophthalmologists lacked such drugs became a priority of the Academy, which has been pushing the issue with the Food and Drug Administration, drug manufacturers, and legislators.

Building a base of support in D.C. The Academy—in concert with several other health care organizations—has worked assiduously to enlist the support of federal lawmakers in tackling the problem of drug shortages. During this long-term effort, the Academy has educated legislators about the fragility and opaqueness of the drug supply chain, as well as the problem of manufacturers discontinuing production of low-profit drugs.

The MEDS Act showed promise. Thanks, in part, to the Academy's advocacy, there was bipartisan support when Sen. Susan M. Collins (R-Maine) and Sen. Tina Smith (D-Minn.) introduced the Mitigating Emergency Drug Shortages (MEDS) Act in late 2019. Throughout the political turbulence of early 2020, the Academy continued to remind lawmakers about the importance of getting the MEDS Act signed into law.

COVID-19 crystallizes the issue for many legislators. As the coronavirus crisis heightened concerns about the integrity of drug supply chains, the Academy's earlier advocacy efforts bore some fruit: Elements of the earlier MEDS legislation were incorporated into the Coronavirus Aid, Relief, and Economic Security (CARES) Act, which was signed into law on March 27. For example, to help mitigate a drug shortage, the CARES Act requires the FDA to prioritize and expedite reviews of drug applications and inspections of manufacturing facilities.

More work to be done. While the CARES Act is an important step forward, there are still issues that need to be addressed. For the latest news on the Academy's ongoing campaign against drug shortages, check your email each Thursday for *Washington Report Express*. To find out how you can help with the Academy's advocacy efforts, visit aao.org/volunteering.

Drive Your Practice Success With Benchmarking

The Academy/AAOE AcadeMetrics practice management benchmarking survey closes July 31.

Enter your 2019 practice management data by the deadline and use the AcadeMetrics benchmarking tool all year to compare your financial data to that of similar practices. Get valuable insight into optimal staffing levels, number of satellite offices, and more.

Find out more about these free member tools at aao.org/practice-management/analytics.

WORKING TO EMPOWER A NEW ERA OF

PROACTIVE GLAUCOMA SURGERY

> We might see a day in which the subjective portion of surgery is minimal and **we have more objective ways of lowering IOP**.
>
> **— Dr. Arsham Sheybani**

Santen is partnering with glaucoma surgeons to improve glaucoma surgical outcomes.

Santen

A Clear Vision For Life™

Hear from your peers in a new video series
AdvancingGlaucomaSurgery.com

Destination AAO 2020

GET READY FOR LAS VEGAS • PART 2 OF 6

COVID-19 AND PRACTICE RECOVERY. *As your practice recovers from the impact of the pandemic, the AAOE can help make your operations even more efficient and resilient post–COVID-19. AAOE leaders will provide advice and tips to use this opportunity to wipe the slate clean and build stronger and thriving practices. Throughout the AAOE program, experts will provide up-to-the-minute advice on short-, medium-, and long-term strategies. For example, you won't want to miss the free recovery workshop on Monday, Nov. 16, which supplements the valuable information that is already online at aao.org/coronavirus.*

OPENING JUNE 17

Registration for AAO 2020 Opens Soon

Meeting registration opens on June 17 if you are a member of the Academy or the American Academy of Ophthalmic Executives (AAOE) and July 8 for everybody else.

Register for any or all of the following:

- AAO 2020. Registration for AAO 2020 includes access to AAOE sessions and the American Society of Ophthalmic Registered Nurses (ASORN) program.
- Subspecialty Day (Nov. 13-14).
- Half-day AAOE coding sessions (Nov. 14).

New cancellation policy. This year, should you wish to cancel your registration, the Academy will waive the standard cancellation fee if you submit a written request for a full refund by Aug. 12.

Find registration information at aao.org/registration.

It's Almost Time to Reserve Your Hotel Room

Hotel reservations open on June 17 for Academy or AAOE members and July 8 for everyone else. Group reservations for international attendees are also available.

Pick your hotel. See the map on page 65. In addition, an interactive map and a link to group reservations for international attendees are available at aao.org/hotels.

Avoid scams. Be sure to book only through the Academy's website or through AAO 2020's official hotel reservation provider, Expovision, at aaohotels@expovision.com, or call toll-free from within the United States at 866-774-0487.

How to Spot a Scam

Watch out for fraud. Why? Because scammers send phony emails to ophthalmologists. In addition, their fraudulent webpages may appear in searches for the Academy's annual meeting.

These scammers pretend to be associated with AAO 2020 by using the Academy's name and claim that they can book hotel rooms or register you for AAO 2020, but they are unaffiliated with the Academy.

To protect yourself, use this checklist to spot a scam. If the answer to one or more of the questions below is "yes," delete the email or close the website immediately:

☐ Is the Academy's official logo out of focus or fuzzy?
☐ Is the Academy's official AAO 2020 email header or the Academy logo missing?
☐ Is a deposit larger than the price of a one-night stay requested for your hotel room?
☐ Are you told to wait to be contacted by a representative after completing an online form?
☐ Are you being charged more for registration than the amounts posted on the AAO 2020 registration Categories

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and Fees webpage (aao.org/annual-meeting/registration/categories-and-fees)?

☐ Are you being asked to verify your membership by providing both a member ID and a password?

☐ Does the email link you to a "special" website for AAO 2020 that is not connected to aao.org?

Book hotel rooms and register only through the links provided by the Academy at aao.org/registration and aao.org/hotels.

If you are ever in doubt about the legitimacy of an email or website, don't hesitate to contact the Academy at meetings@aao.org or 1-415-561-8500 with your inquiry.

Don't Miss This Year's Ticketed Events

Registration for AAO 2020 gives you access to many different types of sessions, including papers, Poster Theater presentations and Poster Discussions, conversation (and coffee) at the Academy Café, and Symposia. You also will get access to e-posters and videos on demand.

Some events require tickets or separate registration. Tickets are required for Skills Transfer labs, some special meetings, and AAOE Practice Management Master Classes, among other sessions. (Note: Tickets are no longer printed. Instead, your badge will be scanned to allow entry to these ticketed events.)

Tickets will be available for purchase starting June 17 for Academy and AAOE members.

For more information, visit aao.org/registration.

June 17: Access Full Program Information

The full, official program for AAO 2020, including Subspecialty Day schedules, will be online starting June 17.

You will be able to look up information by day, topic, type of event or course, special interest, or presenter. You don't have to log in or be a member to view program information, but you will need to log in to build a personal calendar and register.

Learn more at aao.org/program.

PROGRAM & ACTIVITIES

Attend a Named Lecture

Listening to an eminent scientist or scholar deliver an honorary lecture is a highlight at every Academy annual meeting. Here is a sneak peek at the programming you can look forward to:

- David S. Friedman, MD, MPH, PhD, will give the Robert N. Shaffer Lecture.
- Valerie Biousse, MD, will give the William F. Hoyt Lecture.
- Justine R. Smith, MD, will give the C. Stephen and Frances Foster Lecture on Uveitis and Immunology.
- Jerry A. Menikoff, MD, JD, will give the Dr. Allan Jensen & Claire Jensen Lecture in Professionalism and Ethics.
- Patricia Chevez-Barrios, MD, will give the Zimmerman Lecture.

For other lectures, check the program at aao.org/program.

Get Ready for the Vintage-Vegas 2020 Orbital Gala at the Venetian Resort

Channel the cool style of Frank Sinatra and Dean Martin, Angie Dickinson and Shirley MacLaine at the 17th annual Orbital Gala on Sunday, Nov. 15, at the Venetian Resort in Las Vegas. Bid on one-of-a-kind auction items and jive to a live band at this fundraiser. Young ophthalmologists save 50% on tickets.

For more information, visit aao.org/foundation.

INTERNATIONAL GUESTS. *Participants in the 2019 Rotary Club Host Project explore the exhibit hall.*

Rotary Club Host Project Garners Much Interest in Its Biggest Year Yet

This year, more than 100 ophthalmologists from developing countries applied for nine openings offered by the 2020 Rotary Club Host Project. This is the largest applicant pool in the program's history.

Now in its 21st year, the Rotary Club Host Project, a collaborative effort of the Academy and Rotary Clubs, is dedicated to the prevention of blindness worldwide and brings ophthalmologists to the United States to attend the Academy's annual meeting, all travel expenses paid.

Guest ophthalmologists also spend an additional week in a sponsoring Rotary Club's community, working with a local ophthalmologist.

The selection process evaluates applicants based on various criteria, including their commitment to the prevention of blindness, and the likelihood that they will share knowledge gained from the visit to train colleagues at home in prevention of blindness. Invitations were sent to the potential participants in late May.

Baxter McLendon, MD, chair of the Rotary committee, is pleased with the high level of interest in the program and looks forward to working with this year's group. "Participants bring a multitude of experiences and perspectives to the program and are dedicated to the project's mission.

"Previous guests have gone on to hold important positions with local and international ophthalmic nongovernmental organizations or the International Agency for the Prevention of Blindness, Vision 2020, and other organizations that work toward the mission of reducing and preventing blindness," he said.

Since its start in 2000, the Rotary Club Host Project has hosted 141 guest ophthalmologists from 62 different countries around the world and has partnered with 36 Rotary Clubs throughout the United States.

OFFICIAL AAO 2020 HOTELS

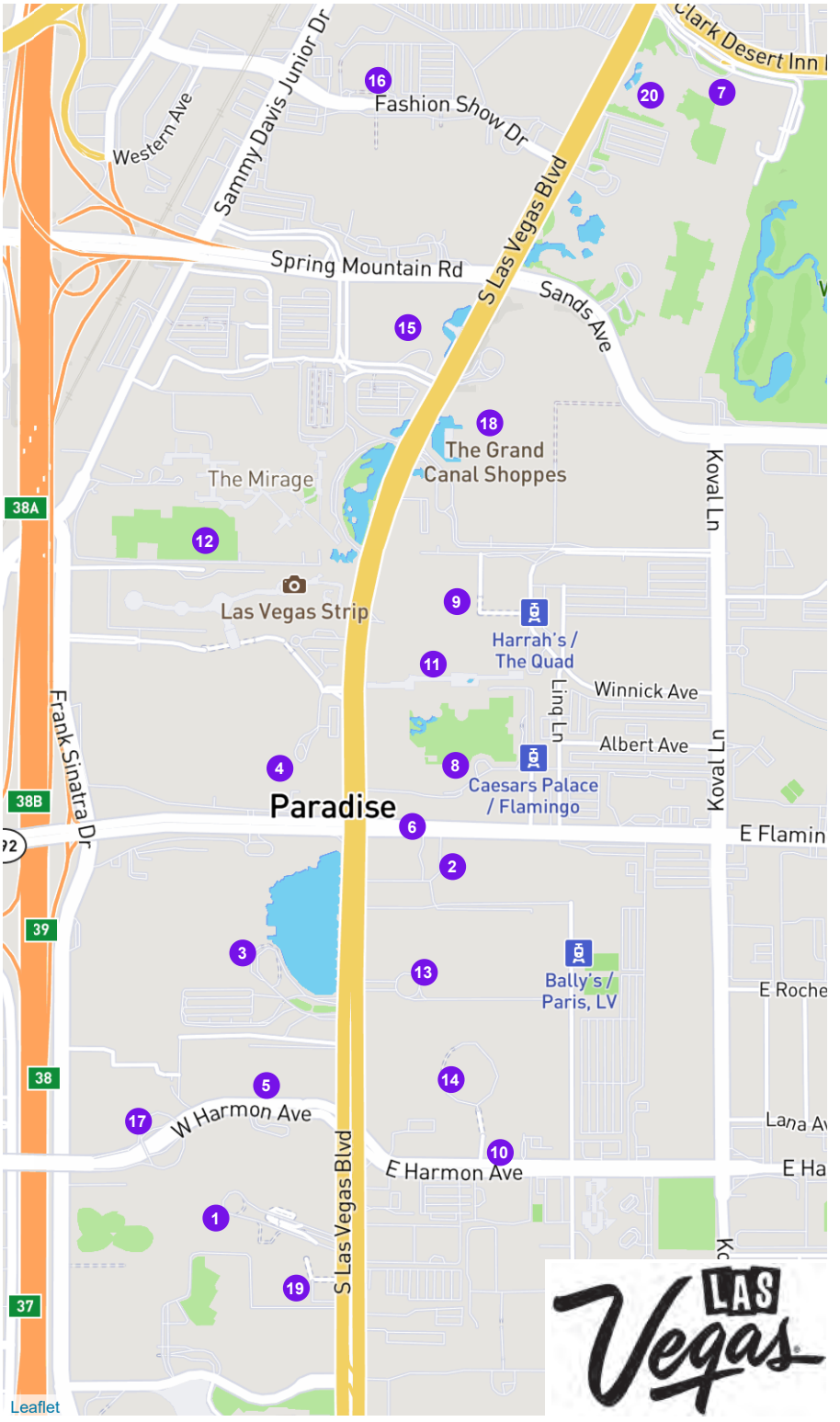
Reservations open June 17 for Academy and AAOE members. Visit aao.org/hotel for more hotel reservation information.

Beware of scams. Fraudulent companies pretending to be associated with the Academy and AAO 2020 may appear in web searches or contact you via email. Only book hotel rooms and registration through the Academy's website and official housing provider, Expovision.

If you are ever in doubt, email meetings@aao.org or call 1-415-561-8500 to confirm.

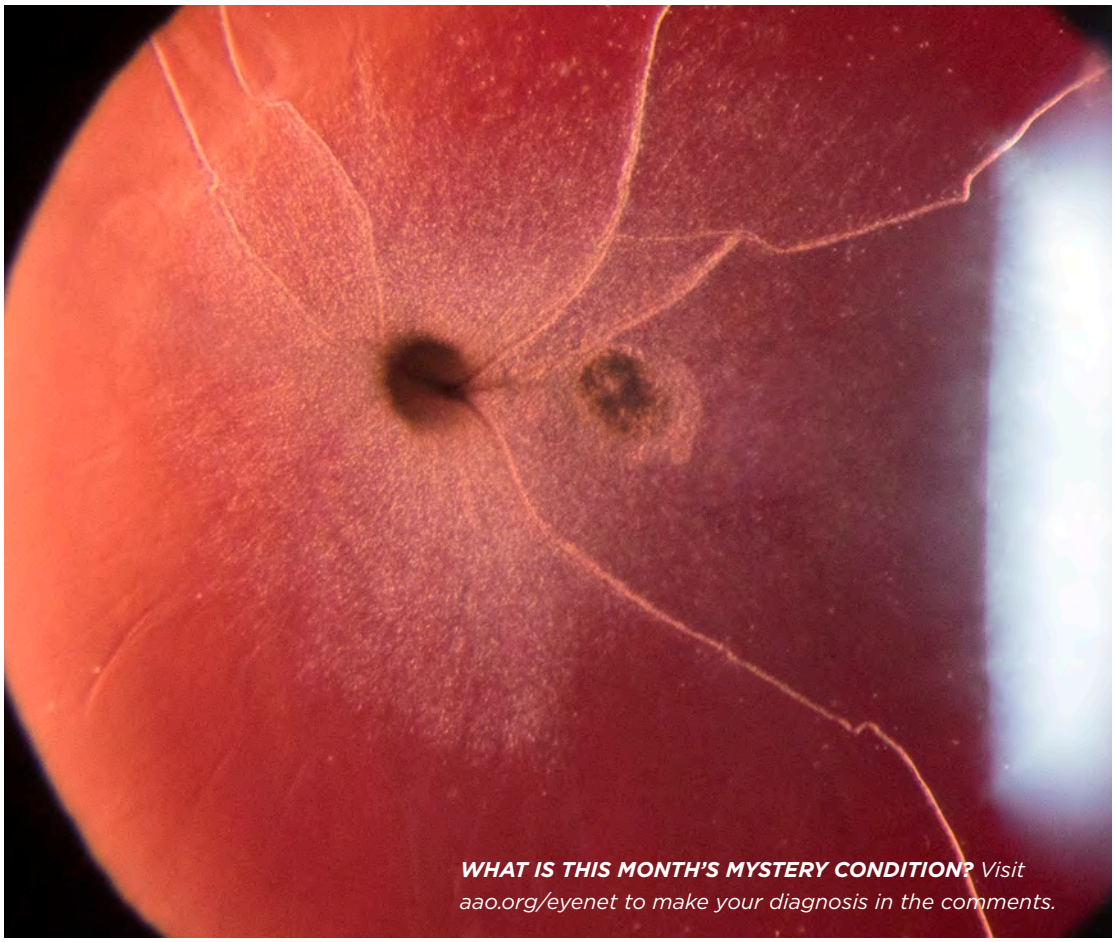
Event Hotels

1. Aria Resort & Casino
2. Bally's Las Vegas
3. Bellagio
4. Caesars Palace/Nobu
5. Cosmopolitan of Las Vegas
6. Cromwell Las Vegas
7. Encore at Wynn Las Vegas
8. Flamingo Las Vegas
9. Harrah's Las Vegas
10. Hilton Grand Vacations - Elara
11. LINQ Hotel + Casino
12. Mirage
13. Paris Las Vegas
14. Planet Hollywood
15. Treasure Island
16. Trump International Hotel Las Vegas
17. Vdara Hotel & Spa
18. Venetian/Palazzo
19. Waldorf Astoria Las Vegas
20. Wynn Las Vegas



MYSTERY IMAGE

BLINK



Angela Chappell CRA, OCT-C, Flinders Medical Centre Ophthalmology Department, Adelaide, Australia.

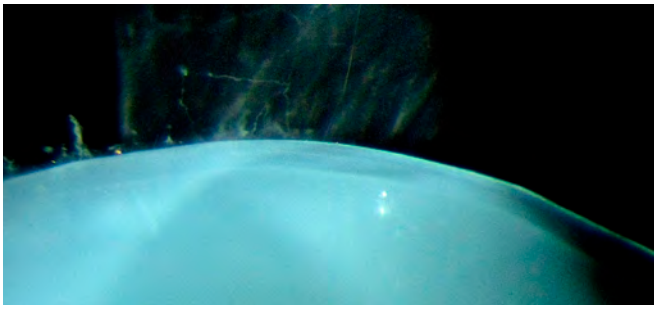
LAST MONTH'S BLINK

Ectopia Lentis in a Patient With Homocystinuria

A 9-year-old girl had been diagnosed with homocystinuria as an infant and, over the years, had ophthalmic screening for ocular associations of the disorder. She was found to have bilateral inferior subluxation of clear lenses. By age 9, the subluxation had progressively worsened (see photo) such that it was affecting her aided vision significantly. Her visual acuity was 20/63 in the right eye and 20/50 in the left.

Homocystinuria is an autosomal recessive inherited disorder of methionine metabolism due to deficiency of cystathionine beta-synthase. The zonule normally contains high levels of cystine, and a deficiency of this amino acid leads to increased fragility of the zonular fibers, which then alters the lens stability.

Of interest in this photograph of the right eye are the curly ends of the broken zonular fibers seen at the lens equator of the subluxated lens.



This is an important differentiating feature for ectopia lentis seen in Marfan syndrome. In that setting, these fibers are abnormally elongated but not fragile and broken.

WRITTEN BY **DEEPA TARANATH, MBBS, MS, FRANZCO.** PHOTOGRAPH BY **ANGELA CHAPPELL, CRA, OCT-C.** BOTH ARE AT FLINDERS MEDICAL CENTRE OPHTHALMOLOGY DEPARTMENT, ADELAIDE, AUSTRALIA.

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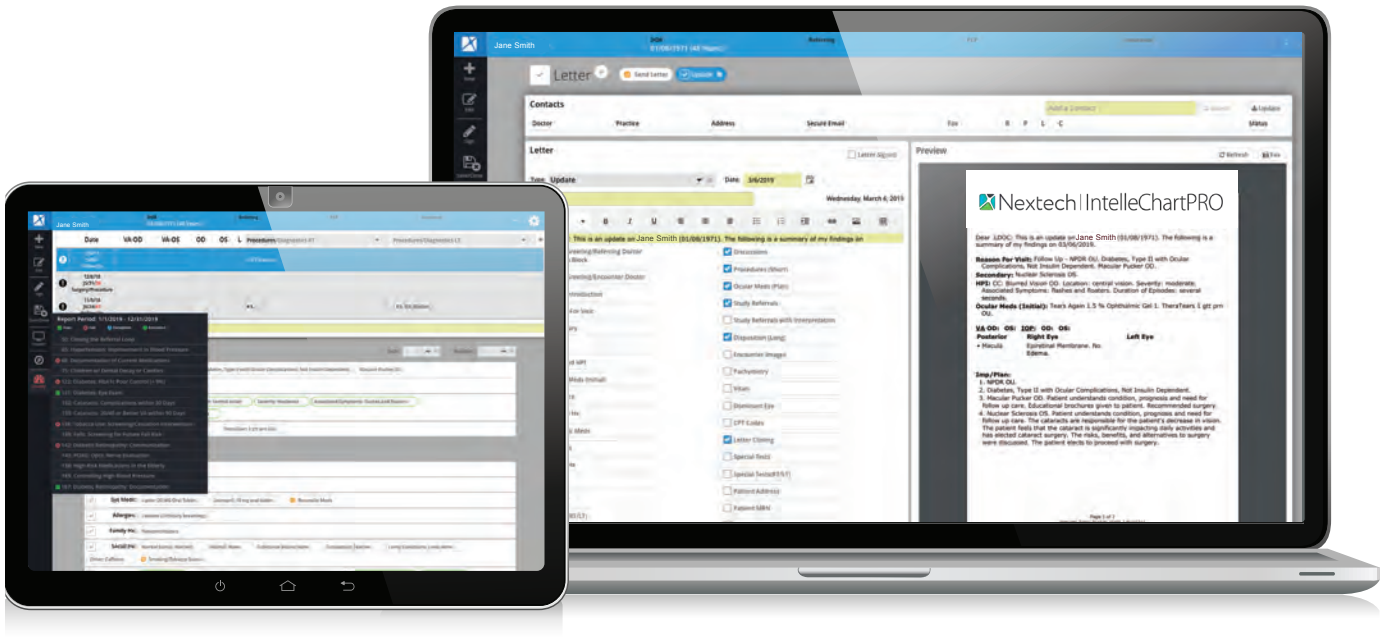

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