



AMERICAN ACADEMY
OF OPHTHALMOLOGY®

AAO 2018

EyeNet News

SUBSPECIALTY DAY EDITION
CHICAGO

Subspecialty Day Meetings

An Insider's Guide

AAO 2018
ART + SCIENCE



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FOR THE RECORD

ANNUAL BUSINESS MEETING. Notice is hereby given that the Annual Business Meeting of the American Academy of Ophthalmology will be held in conjunction with the Opening Session on Sunday, Oct. 28, from 8:30-10:00 a.m., in Lakeside E354 at the McCormick Place Convention Center in Chicago. Candidates for membership will be approved during this meeting.

For the full list of candidates, visit aao.org/member-services. To see the full order of business, refer to the "Opening Session" page of the *AAO 2018 Meeting Program*.

CALLING ALL VOTING MEMBERS AND FELLOWS. Election materials will be sent to all voting Academy fellows and members. Voting opens on Monday, Oct. 29, and closes Tuesday, Nov. 27, at noon EST. Results will be posted on the Academy's website at aao.org/about/governance/elections by Dec. 6, 2018.

The candidates' stated goals are as follows:

President-Elect: Anne L. Coleman, MD, PhD. "To help Academy members achieve our mutual goals to protect and restore sight and empower lives, and to enhance AAO programs for professional and personal improvement."

Trustee-at-Large: Judy E. Kim, MD. "To be the voice of our members with integrity and passion and to work with all stakeholders through communication and collaboration."

Senior Secretary for Clinical Education: Christopher J. Rapuano, MD. "I feel strongly that the backbone of the organization is education. My goal for the Academy is to continue to provide the best ophthalmic education in the United States and around the world."

For candidates' full statements, visit aao.org/about/governance/elections, or visit the candidate display in the Main Concourse of McCormick Place during AAO 2018.

NOTICE: This publication was printed in advance of Subspecialty Day and AAO 2018. For the most up-to-date information, check the Program Search (aao.org/programsearch) or the Mobile Meeting Guide (aao.org/mobile). American Academy of Ophthalmic Executives®, EyeNet®, EyeSmart™, IRIS® Registry, ONE®, and Preferred Practice Patterns™ are trademarks of the American Academy of Ophthalmology®. All other trademarks are the property of their respective owners. © 2018 American Academy of Ophthalmology.

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The program directors preview highlights from their programs.

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Preview 10 of this year's named lectures.

26-30 Most-Read "Journal Highlights"

The year's most interesting studies, plus Editor-in-Chief Henry D. Jampel, MD, MHS, on *Ophthalmology Glaucoma*, the Academy's newest journal.

From the Editor

Welcome to Subspecialty Day 2018!

This year's Subspecialty Day features presentations on the latest developments in diagnosis, treatments, and procedures. The Subspecialty Day lineup features refractive surgery on Friday and retina on both Friday and Saturday. On Saturday, there will be Subspecialty Day meetings in cornea, glaucoma, ocular oncology and pathology, oculofacial plastic surgery, pediatric ophthalmology, and uveitis. I urge you to take time to explore disciplines other than your own. Often, pearls from 1 subspecialty can be applied to a completely different arena in surprising and useful ways. Check out this year's "Program Directors Talk About What's Hot at Subspecialty Day" (page 4) to find topics that might interest you. Look for the second edition of *AAO 2018 News* on Sunday and check your email each evening for *AAO 2018 Daily*, a roundup of news from Subspecialty Day and AAO 2018. The content can also be found at aao.org/eyenet/daily.



Ruth D. Williams, MD
Unofficial tour guide (see page 14) and
Chief Medical Editor, *EyeNet Magazine*

On the Cover
CHRPE

Kit Morehead, CRA
University of Michigan
Kellogg Eye Center

Program Directors Talk About What's Hot at Subspecialty Day From Cornea to Uveitis

To provide an inside look at Subspecialty Day, *AAO 2018 News* contacted the program directors from each meeting and asked the following questions: 1) Which presentations will have broad appeal across subspecialties? 2) Which presentations might cause subspecialists to reconsider an area of their clinical practice? 3) Which presentations address particularly novel or exciting developments within the field? Here are those answers, with descriptions provided by the program directors.

Most Subspecialty Day meetings take place on Saturday. However, Refractive Surgery Subspecialty Day is Friday only, allowing refractive surgeons to register for the Saturday Cornea Subspecialty Day—or any other Saturday program. As always, Retina Subspecialty Day takes place over Friday and Saturday.

Note: All summaries were written in advance of Subspecialty Day. Be sure to check the Mobile Meeting Guide (aao.org/mobile) for any last-minute changes to the Subspecialty Day schedules.

Of Interest Across Subspecialties

CORNEA

Grand Ballroom S100ab

There's Pigment on the Conjunctiva: When to Worry, presented by Carol L. Shields, MD (Saturday, 10:55-11:03 a.m.)

All ophthalmologists see patients with pigment on their conjunctiva. This is an everyday occurrence. The question is: When should you worry, and when should you watch? The differential includes benign complexion-associated melanosis (racial melanosis), nevi, primary acquired melanosis with risk for malignant transformation, and frank melanoma. Carol L. Shields, MD, will engage the audience with cases and a salient algorithm for approaching these lesions. The session will also offer several examples of lesions commonly seen in practices, and will help clinicians of all subspecialties diagnose and develop a treatment plan. Come to this session and develop expertise in how to manage these lesions you see every day; learn when you need to observe versus take action!

—Carol L. Karp, MD,
Cornea program director

GLAUCOMA

Room E354

New Surgeries, moderated by Lama A. Al-Aswad, MD, MPH, David G. Godfrey, MD, and Cynthia Mattox, MD, FACS (Saturday, 10:33-11:41 a.m.)

New minimally invasive glaucoma surgery (MIGS) devices have brought a solution to patients with earlier stages of glaucoma. These procedures also make performing glaucoma surgery more attractive to the comprehensive ophthalmologist, as well as to the cataract, cornea, and even pediatric specialist. The dizzying number of devices one can choose from, however, can make it hard to decide which device is right for a specific patient.

Brian A. Francis, MD, will start off the session with an overview, “How Do I Choose the Right MIGS?” The speakers will present optimal techniques for performing each of the currently available MIGS procedures and discuss who they think is the optimal patient for the surgery they present, including ab interno filtration, ab externo microshunt, supraciliary shunt, devices in the canal, and ab interno trabeculectomy. Next, the speaker panel will dissect a series of cases. Questions and comments from the audience are always welcome.

—JoAnn A. Giaconi, MD,
Glaucoma program director

OCULAR ONCOLOGY AND PATHOLOGY

Room E350

Pro and Con Debate and Roundtable on Retinoblastoma, moderated by Dan S. Gombos, MD, and Miguel A. Materin, MD (Saturday, 9:15-10:05 a.m.)

Uveal Melanoma: Hot and Spicy Topics, moderated by Paul J. Bryar, MD, and Carol L. Shields, MD (Saturday, 1:16-1:51 p.m.)

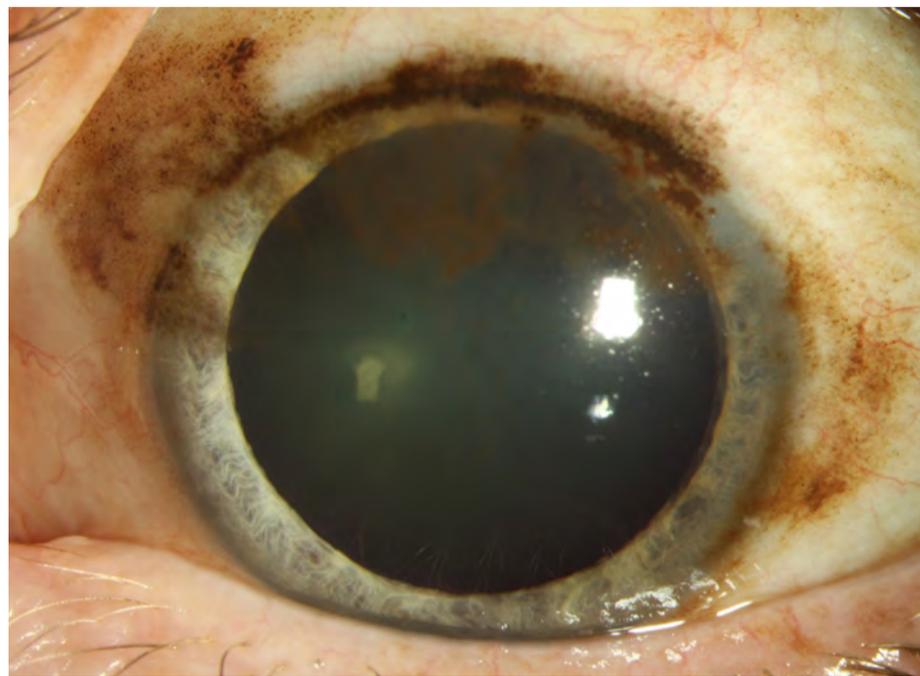
Uveal Melanoma—Pro and Con Debate, moderated by Arun D. Singh, MD (Saturday, 1:51-2:41 p.m.)

Gender Research in Ocular Tumors, moderated by Mary E. Aronow, MD, and N. Grace Lee, MD (Saturday, 3:58-4:33 p.m.)

This year's Subspecialty Day in ocular oncology and pathology will cover rapidly evolving advances in the field. Vigorous debates and roundtables will highlight areas of consensus and disagreement.

In a morning session, experts will discuss the medium- and long-term risks of intra-arterial chemotherapy for retinoblastoma, which is approaching its first decade of use in some U.S. centers.

Personalized care is now standard in oncology, and, accordingly, in 2 afternoon sessions devoted to uveal melanoma, experts will evaluate how ophthalmic tumors have benefited significantly from



CORNEA. A 56-year-old white woman with unilateral conjunctival and corneal pigmentation, highly suggestive of primary acquired melanosis with atypia and foci of melanoma.

prognostic testing and mutational analysis. The impact on patient survival will also be debated.

And, new this year will be a section on gender disparity research.

—Patricia Chévez-Barrios, MD, and
Dan S. Gombos, MD,
Ocular Oncology and Pathology program directors

OCULOFACIAL PLASTIC SURGERY

Room S406a

The Crying Game—Lacrimal, moderated by Andrea N. Kossler, MD (Saturday, 4:05-5:27 p.m.)

The tearing patient is no stranger to the oculoplastic surgeon, comprehensive ophthalmologist, or any other eye care provider. The fact that a multitude of factors can cause tearing often results in the involvement of many subspecialists for diagnosis.

“The Crying Game” is our last session of the day and will explore the many facets of the evaluation and workup of the patient with tearing. Stephen C. Pflugfelder, MD, will discuss the approach to tearing from the ocular surface specialist's point of view, while Roger A. Dailey, MD, Meredith S. Baker, MD, and Erin M. Shriver, MD, will discuss the benign as well as malignant causes of lacrimal outflow obstruction. The expert panel will also review a number of complex cases of tearing.

—Richard C. Allen, MD, PhD, Oculofacial Plastic Surgery program director

PEDIATRIC OPHTHALMOLOGY

Grand Ballroom S100c

Here Comes the Sun: Myopia Prevention, moderated by Nils K. Mungan, MD (Saturday, 1:55-2:31 p.m.)

Comprehensive ophthalmologists and pediatric ophthalmologists all encounter patients who are anxious to slow down—or even reverse—the progression of their myopia. Experts in myopia will share the latest research in myopia prevention and how it applies to their clinical practice. After hearing talks on topics such as “Atropine for Myopia” and “Contact Lens Therapies for Myopia Control,” every attendee will take home new perspectives and insights on myopia that will be helpful in their everyday clinical practice. Wondering if low-dose atropine is currently the best treatment for preventing myopia progression? After this session you will be better able to answer this question and others, treat the condition, and counsel your patients with myopia.

—Jonathan M. Holmes, MD, and
Scott A. Larson, MD,
Pediatric Ophthalmology program directors

REFRACTIVE SURGERY

Room E354

Keynote Lecture, presented by Marguerite B. McDonald, MD (Friday, 8:05-8:20 a.m.)

Advances in Refractive Surgery, moderated by William B. Trattler, MD, and Kendall E. Donaldson, MD (Friday, 8:20-10:15 a.m.)

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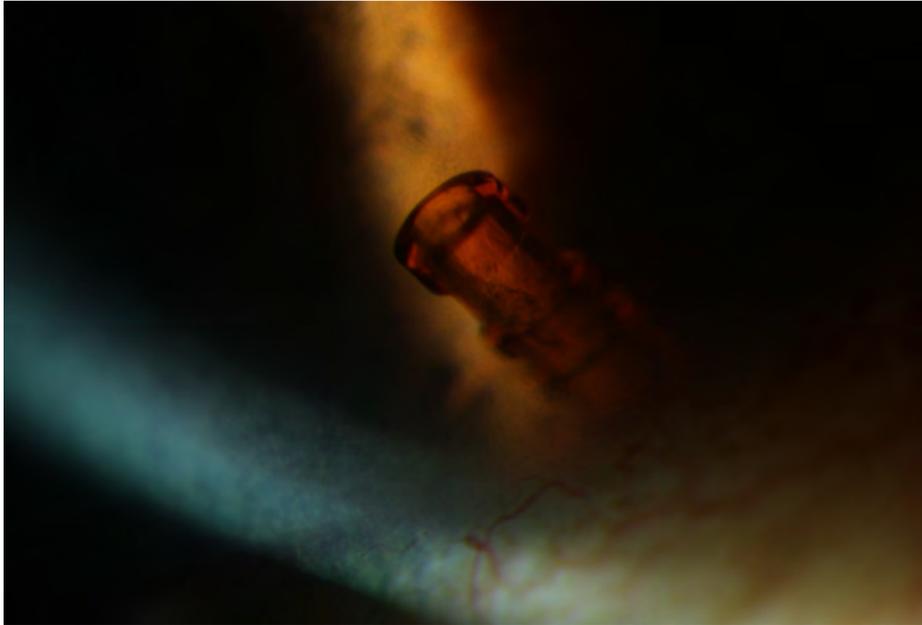
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REFERENCES: 1. iStent inject® Trabecular Micro-Bypass System: Directions for Use, Part #45-0176. 2. Hengerer FH. Personal experience with second-generation trabecular micro-bypass stents in combination with cataract surgery in patients with glaucoma: 3-year follow-up. ASCRS 2018 Presentation.

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GLAUCOMA. The patient was rubbing his eye, which brought the CyPass forward into better view.

Management and Prevention of Complications in Refractive Surgery, moderated by Marcony R. Santhiago, MD (Friday, 10:55 a.m.-12:10 p.m.)

The Refractive Surgery Subspecialty Day program will kick off with a keynote lecture by Marguerite McDonald, MD, who will reflect on 30 years of laser vision correction and the challenges of getting laser vision correction started.

The first session, moderated by William B. Trattler, MD, and Kendall E. Donaldson, MD, will focus on corneal and intraocular refractive procedures. This session will include talks by Renato Ambrósio Jr., MD, who will discuss “Advances in Preoperative Assessment for Corneal Refractive Surgery,” by George O. Waring IV, MD, who will discuss “Refractive Index Reshaping of the Lens,” and others, who will give insightful presentations of interest to refractive surgeons and comprehensive ophthalmologists alike.

Later, Marcony R. Santhiago, MD, will moderate a session on complications in refractive surgery, which will include “Pearls and Pitfalls in Biometry Following Corneal Refractive Surgery or Keratoconus,” presented by Jack T. Holladay MD, MSEE, FACS, and “Managing the Dissatisfied Refractive Surgery Patient,”

presented by Vance Michael Thompson, MD. —William B. Trattler, MD, and Marcony R. Santhiago, MD, Refractive Surgery program directors

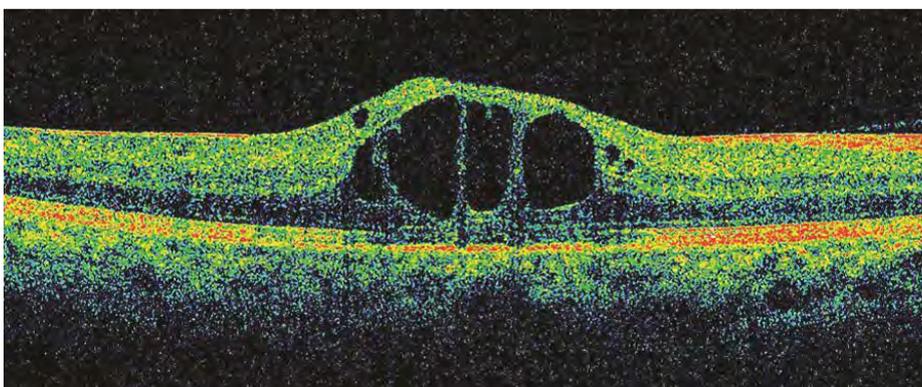
RETINA

Arie Crown

Diabetes, moderated by Lloyd P. Aiello, MD, PhD, and Lawrence J. Singerman, MD (Saturday, 11:20 a.m.-12:24 p.m.)

The Diabetic Retinopathy Clinical Research network (DRCR.net) has undertaken numerous clinical trials, including the Protocol I, S, T, and U studies. The presentation on lessons learned from these protocols should be of interest to all ophthalmologists—from retina specialists to comprehensive ophthalmologists—as the findings have implications for providing optimal care to patients with diabetic macular edema (DME) and proliferative diabetic retinopathy (PDR). Other presentations, focusing on diabetic retinopathy, DME, and PDR, look at various questions and findings related to anti-VEGF therapy. During a panel discussion, leading experts in the field will provide further perspective on this disease that affects so many patients.

—Richard F. Spaide, MD, and Mark S. Humayun, MD, PhD, Retina program directors



RETINA. Diabetic macular edema will be one of many topics covered in the Retina Subspecialty Day session dedicated to diabetes.

UVEITIS

Room E450

Basic Blues, moderated by Albert T. Vitale, MD (Saturday, 8:05-9:10 a.m.)

The 2018 Uveitis Subspecialty Day, Uveal Blues, takes a combined approach, beginning with a return to the basics in the diagnostic and therapeutic approach to the uveitis patient; followed by case-based presentations highlighting both the fundamentals and nuances of diagnosis and treatment of anterior and posterior segment uveitis. The day will end with late-breaking developments in clinical trials and a glimpse into the future of uveitis.

The initial section on fundamentals, or the “Basic Blues,” is intended to provide the nonuveitis specialist with a structured and logical approach to intraocular inflammatory disease with particular emphasis on the generation of a differential diagnosis, appropriate testing, and the formulation of a treatment plan. Highlights of this section will include presentations on epidemiology, diagnostic approaches to uveitis, and practical treatment paradigms for both local and systemic therapies.

—H. Nida Sen, MD, MHSc, and Albert T. Vitale, MD, Uveitis program directors

Clinical Practices to Reconsider

CORNEA

Grand Ballroom S100ab

Descemet Stripping Only (DSO)—Can We Do Without a Graft? presented by Kathryn A. Colby, MD, PhD (Saturday, 9:44-9:52 a.m.)

Corneal transplantation surgery has evolved rapidly over the past 10 years. We have expanded our surgical techniques from full-thickness corneal transplantation to all forms of selective lamellar keratoplasty, and, in particular, Descemet-stripping and Descemet membrane endothelial keratoplasty. As we look forward 10 years, we cannot help but wonder what will be the next step in this evolutionary process.

During Cornea Subspecialty Day, Kathryn A. Colby, MD, PhD, will address just what we should be expecting. Her talk, entitled “Descemet Stripping Only (DSO)—Can We Do Without a Graft?” will provide insight into how this procedure may change our approach to treating patients with Fuchs corneal endothelial dystrophy (FCED). Given that FCED accounts for nearly half of all endothelial keratoplasties in the United States, the advent of a technique that would be easier and safer to perform, would eliminate rejection, and would decrease our dependency on donor corneal tissue would truly be another Copernican Revolution.

—Jennifer Li, MD, Cornea program director

GLAUCOMA

Room E354

Surgical Complications, moderated by Malik Y. Kahook, MD, and Dale K. Heuer, MD (Saturday, 4:47-5:33 p.m.)

New shunt and stent devices as well as traditional glaucoma procedures all have their complications and challenges. This session will focus on questions that arise when the surgeon is faced with an unexpected complication. Should one proceed with planned ab interno angle surgery if the posterior capsule tears and vitreous comes forward? How should a ciliary body cleft and hypotony be managed after supraciliary shunt implant? What should one do if there is a conjunctival buttonhole during implantation of an ab interno shunt? What are solutions for covering a tube or trabeculectomy when the conjunctiva doesn't want to cooperate? How should one manage blood reflux and hyphema in angle surgery? You will hear from surgeons who deal with such cases frequently. They will discuss their mistakes and what they've learned, providing attendees with new perspectives on these surgeries. The session will wrap up with a discussion in which audience members can bring their own surgical questions.

—JoAnn A. Giaconi, MD, Glaucoma program director

OCULAR ONCOLOGY AND PATHOLOGY

Room E350

Multicenter Trials in Ocular Oncology—2018 Update, moderated by Sander Dubovy, MD, and Amy C. Schefler, MD (Saturday, 3:21-3:58 p.m.)

The Children's Oncology Group has spent much of the last decade sponsoring a series of prospective multicenter trials within the field of retinoblastoma. It has investigated the role of adjuvant chemotherapy for advanced unilateral disease, looked at modified therapies for various stages of intraocular retinoblastoma, and assessed new approaches for treating metastatic disease. Many of these trials have now completed accrual and have data available for analysis. We have invited the principal investigators of these high-impact studies to present their data and provide context for clinical care.

—Patricia Chévez-Barrios, MD, and Dan S. Gombos, MD, Ocular Oncology and Pathology program directors

OCULOFACIAL PLASTIC SURGERY

Room S406a

Orbitology, moderated by Chrisfouad R. Alabiad, MD (Saturday, 8:05-9:25 a.m.)

The Oculofacial Plastic Surgery Subspecialty Day will kick off with a session

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on orbitology, including a discussion of thyroid eye disease and idiopathic orbital inflammation, both of which have seen a paradigm shift in treatment. Don O. Kikkawa, MD, will discuss thyroid eye disease, including the latest medical and surgical treatments. Additionally, Jurij R. Bilyk, MD, will address the workup and treatment of idiopathic orbital in-

flammation. Recent advances in monoclonal antibody therapy have resulted in a number of agents showing promise in treating these diseases. These agents include teprotumumab, rituximab, infliximab, adalimumab, and tocilizumab. The lecturers and expert panel will discuss the efficacy of these agents as well as their indications and risks.

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—Richard C. Allen, MD, PhD,
Oculofacial Plastic Surgery program
director

PEDIATRIC OPHTHALMOLOGY

Grand Ballroom S100c

Weathering the Storm: Surgical Approaches to Vertical Strabismus,

moderated by Jonathan M. Holmes, MD
(Saturday, 8:01-9:31 a.m.)

Strabismus surgeons will enjoy an exciting back-and-forth discussion of 4 challenging cases. For each case, 2 experienced strabismus surgeons will present their preferred surgical approach with clinical pearls and tips. This will be followed by a panel discussion. Audience members will vote on their preferred approach for each case, both before and after the presentations. Attendees will take home ideas for improving their own previously preferred technique—and, perhaps, practical recommendations for an alternative technique that they are not using.

One clinical scenario to be discussed is a moderate angle hypertropia, which could either be treated simply with an inferior oblique recession or by adding an inferior rectus recession on adjustable sutures. Panelists will share clinical advice and the reasons they prefer one technique over another, with practical step-by-step illustrations of how to perform each specific type of procedure.

—Jonathan M. Holmes, MD, and
Scott A. Larson, MD,
Pediatric Ophthalmology
program directors

REFRACTIVE SURGERY

Room E354

ISRS Member Lunch: Presbyopic IOLs, moderated by John So-Min Chang, MD (Friday, 12:10-1:30 p.m.)

Video-Based Master Complications,

moderated by Amar Agarwal, MD, Jennifer M. Loh, MD, and Sathish Srinivasan, MBBS (Friday, 1:30-2:25 p.m.)

ESCRS Symposium—Will Small Lenticule Extraction Replace LASIK?

moderated by Beatrice Cochener, MD
(Friday, 2:25-3:10 p.m.)

A special members' lunch will be available to current International Society of Refractive Surgery members. During the lunch, John So-Min Chang, MD, will moderate a focused session on optimizing success with presbyopic lenses.

Immediately following lunch, meeting attendees will be treated to one of the highlights of the meeting: the "Video-Based Masters Complications" session. An extensive list of cases will be presented, ranging from management of intraoperative challenges during LASIK by A. John Kanellopoulos, MD, to how to manage phakic IOL complications by Alaa M. ElDanasoury, MD.

The European Society of Refractive & Cataract Surgeons will then host a mini symposium on small-incision lenticule extraction, with the title "Will Small Lenticule Extraction Replace LASIK?" Beatrice Cochener, MD, will moderate this informative session.

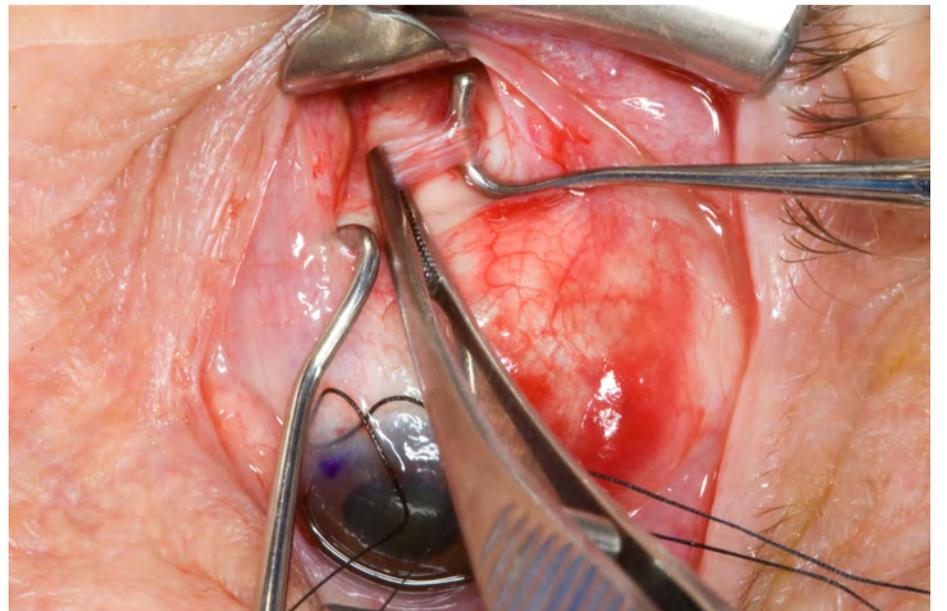
—William B. Trattler, MD, and
Marcony R. Santhiago, MD,
Refractive Surgery program directors

RETINA

Arie Crown

Imaging, moderated by Brandon J. Lujan, MD, and Amani Fawzi, MD (Saturday, 8:05-9:08 a.m.)

The Saturday morning program will start with a bang: Jay S. Duker, MD, will present on the clinical utility of optical coherence tomography angiography (OCT-A) technology—a modality that is relatively



PEDIATRIC OPHTHALMOLOGY. Loading the superior oblique tendon onto a small hook from the temporal side of the superior rectus. Techniques for oblique muscle surgery and vertical rectus muscle surgery will be discussed, and further illustrated, in the case-based session "Surgical Approaches to Vertical Strabismus."

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Published and presented clinical studies report that in post-launch (i.e., not included in current labeling), prospective and retrospective, double-masked and open-label, cohort and case-controlled, single- and multi-center analyses, the use of OMIDRIA, compared to the surgeons' standard of care, statistically significantly:

- Prevents Intraoperative Floppy Iris Syndrome (IFIS)¹
- Reduces complication rates (epinephrine comparator)²
- Decreases use of pupil-expanding devices (epinephrine comparator)²⁻⁷
- Reduces surgical times (epinephrine comparator)^{2,4,6,7}
- Prevents miosis during femtosecond laser-assisted surgery (epinephrine comparator)^{5,8}
- Improves uncorrected visual acuity on day after surgery (epinephrine comparator)²
- Delivers NSAID to the anterior chamber and related structures better than routine preoperative topical drug administration, resulting in effectively complete postoperative inhibition of COX-1 and COX-2^{9,10}

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You are encouraged to report Suspected Adverse Reactions to the FDA.

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References: 1. Silverstein SM, Rana V, Stephens R, Segars L, Pankratz J, Shivani R, et al. Effect of phenylephrine 1.0%-ketorolac 0.3% injection on tamsulosin-associated intraoperative floppy-iris syndrome. *J Cataract Refract Surg.* 2018;44(9):1103-1108. 2. Rosenberg ED, Nattis AS, Alevi D, et al. Visual outcomes, efficacy, and surgical complications associated with intracameral phenylephrine 1.0%/ketorolac 0.3% administered during cataract surgery. *Clin Ophthalmol.* 2018;12:21-28. 3. Bucci FA Jr, Michalek B, Fluet AT. Comparison of the frequency of use of a pupil expansion device with and without an intracameral phenylephrine and ketorolac injection 1%/0.3% at the time of routine cataract surgery. *Clin Ophthalmol.* 2017;11:1039-1043. 4. Visco D. Effect of phenylephrine/ketorolac on iris fixation ring use and surgical times in patients at risk of intraoperative miosis. *Clin Ophthalmol.* 2018;12:301-305. 5. Walter K, Delwadia N. Miosis prevention in femtosecond cataract surgery using a continuous infusion of phenylephrine and ketorolac. Presented at: 2018 American Society of Cataract and Refractive Surgery (ASCRS) and American Society of Ophthalmic Administrators (ASOA) Annual Meeting; April 13-17, 2018; Washington, DC. 6. Matossian C. Clinical outcomes of phenylephrine/ketorolac vs. epinephrine in cataract surgery in a real-world setting. Presented at: American Society of Cataract and Refractive Surgery (ASCRS) and American Society of Ophthalmic Administrators (ASOA) Annual Meeting; April 13-17, 2018; Washington, DC. 7. Al-Hashimi S, Donaldson K, Davidson R, et al. Medical and surgical management of the small pupil during cataract surgery. *J Cataract Refract Surg.* 2018;44:1032-1041. 8. Gayton JL. E-poster presented at: 15th International Congress on Vision Science and Eye; 2017 Aug 10-11; London, UK. 9. Katsev DA, Katsev CC, Pinnow J, Lockhart CM. Intracameral ketorolac concentration at the beginning and end of cataract surgery following preoperative topical ketorolac administration. *Clin Ophthalmol.* 2017;11:1897-1901. 10. Waterbury LD. Alternative drug delivery for patients undergoing cataract surgery as demonstrated in a canine model. *J Ocul Pharmacol Ther.* 2018;34:154-160.



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new to clinicians but that is evolving quickly and starting to find a place in retina practices. Just as OCT is evolving and providing clinicians with new diagnostics, so too is fundus autofluorescence imaging. Frank G. Holz, MD, will provide an overview of this growing area. In addition, Ursula M. Schmidt-Erfurth, MD, will give an intriguing talk about a potentially relevant biomarker for macular disease activity: hyper-reflective foci. These are only 3 presentations among many in this strong, exciting session.

—Richard F. Spaide, MD, and
Mark S. Humayun, MD, PhD,
Retina program directors

UVEITIS

Room E450

Modal Blues Variations—Imaging in Uveitis, moderated by Sunil K. Srivastava, MD (Saturday, 3:00-3:55 p.m.)

Operational Blues—Surgery in Uveitis, moderated by Emil Mitchel Opremcak, MD (Saturday, 3:55-4:30 p.m.)

This year's program will include a new section on multimodal imaging in uveitis, which will highlight the utility of cutting-edge technology in diagnosis and management of complex cases for providing new insights and approaches for uveitis subspecialists.

Many sessions will present a progression of cases from basic to more complex to provide educational value for both the generalist and the uveitis specialist. This case-based learning system is intended to be engaging and interactive, simulate real-life clinical decision-making, and underscore the nuances involved in uveitic patient care.

The surgical management of uveitis' complications requires special attention and will be addressed separately in the "Operational Blues" section. A presentation on the fundamentals in the surgical management of patients with uveitic cataract and glaucoma will be followed by "Diagnostic Fluid, Tissue Sampling, and Processing in Uveitis," presented by Thomas A. Albini, MD.

In addition, for the first time this year, Uveitis Subspecialty Day will adopt interactive audience questions for a livelier panel discussion.

—H. Nida Sen, MD, MHSc, and
Albert T. Vitale, MD,
Uveitis program directors

Exciting Developments

CORNEA

Grand Ballroom S100ab

Zoster: Give It a Shot, presented by Keith Hugh Baratz, MD (Saturday, 4:14-4:22 p.m.)

Keith H. Baratz, MD, will discuss herpes zoster. This is a serious health problem in the United States, with over 1 million new cases annually. Approximately 20%

of all cases are the subtype herpes zoster ophthalmicus, and up to 20% of these cases develop potentially serious ocular sequelae, including keratitis, uveitis, glaucoma, or neurotrophic disease. Performed acutely, prompt, systemic antiviral therapy can decrease but not eliminate the ocular risks.

Previously, an attenuated live vaccine,

Zostavax, had been advocated for use on immunocompetent patients 60 years and older. In early 2018, the Centers for Disease Control and Prevention made recommendations to begin vaccination of immunocompetent people 50 years and older with Shingrix, a new vaccine containing a zoster glycoprotein subunit and an immune-stimulating adjuvant.

Shingrix is more effective than Zostavax and is predicted to provide protection over a longer period. Vaccination at an earlier age will greatly decrease the burden of disease, as the mean age of incidence of zoster is currently below age 60 years.

—Sanjay V. Patel, MD, FRCOphth,
Cornea program director

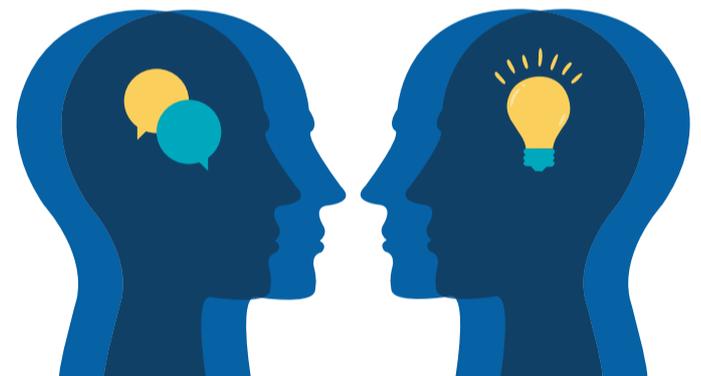
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Saturday, October 27, 2018

McCormick Place- Alcon Booth

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Saturday's Schedule:

	Counter 1	Counter 2
10:00 - 10:30 AM	Donald Serafano, MD	TBA
10:30 - 11:00 AM	William F. Wiley, MD	Jeffrey D. Horn, MD
11:00 - 11:30 AM	Richard Tipperman, MD	Zaina Al-Mohtaseb, MD
11:30 - 12:00 PM	Constance Okeke, MD	Brandon Ayres, MD
1:00 - 1:30 PM	Robin R. Vann, MD	Quang Nguyen, MD
1:30 - 2:00 PM	Michael Greenwood, MD	TBA
2:00 - 2:30 PM	Bonnie Henderson, MD	Steve Sarkisian, MD
2:30 - 3:00 PM	TBA	John Berdhal, MD
3:00 - 3:30 PM	John Hovanesian, MD	Greg Katz, MD
3:30 - 4:00 PM	TBA	Cathleen McCabe, MD

Please visit the Alcon Booth for the full Surgeon to Surgeon schedule. Please note that attendance at these presentations are limited to healthcare professionals. These presentations are not affiliated with the official program of AAO 2018.

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GLAUCOMA

Room E354

Exciting New Research, moderated by Albert S. Khouri, MD, and Harry A. Quigley, MD (Saturday, 3:40-4:47 p.m.)

Anyone taking care of patients with glaucoma will be excited to learn new clinical and basic science research is

providing more effective and innovative tools to treat patients with glaucoma. This is news to take back to patients to give them hope about their future. Some of the exciting topics to be presented include virtual reality in glaucoma, use of pluripotent stem cells, neural stimulation to promote retinal ganglion cell regeneration, Schlemm's canal and collector

channel imaging, artificial intelligence, in vivo imaging of apoptosis, and teleglaucoma. Your patients will thank you for attending this session because now you will have a satisfactory answer to their question, "What research is happening to cure my glaucoma?"

—*JoAnn A. Giacomi, MD,*
Glaucoma program director

OCULAR ONCOLOGY AND PATHOLOGY

Room E350

Pro and Con Debate and Roundtable on Retinoblastoma, moderated by Dan S. Gombos, MD, and Miguel A. Materin, MD (Saturday, 9:15-10:05 a.m.)

Uveal Melanoma: Hot and Spicy Topics, moderated by Paul J. Bryar, MD, and Carol L. Shields, MD (Saturday, 1:16-1:51 p.m.)

Uveal Melanoma—Pro and Con Debate, moderated by Arun D. Singh, MD (Saturday, 1:51-2:41 p.m.)

A roundtable of experts will discuss and debate 2 of the most significant advances in the field.

First, intra-arterial chemotherapy for the treatment of retinoblastoma has now reached a decade of use in some U.S. centers, yet the short- and long-term impacts of this therapy, including the risk of secondary cancers, remain a concern to many.

Second, uveal melanomas can now be biopsied for metastatic risk with one of the most accurate prognostic tests available within oncology, yet the impact of the test on patient morbidity and mortality and the test's overall utility remain in question.

—*Patricia Chévez-Barrios, MD, and Dan S. Gombos, MD,*
Ocular Oncology and Pathology program directors

OCULOFACIAL PLASTIC SURGERY

Room S406a

Without the Knife: Nonsurgical Aesthetics, moderated by Jose R. Montes, MD (Saturday, 9:55-11:00 a.m.)

With the Knife: Surgical Aesthetics, moderated by Robert M. Schwarcz, MD (Saturday, 11:00 a.m.-12:25 p.m.)

This year, Oculofacial Plastic Surgery Subspecialty Day will include a diverse group of international and U.S. experts who will challenge our current thinking on the approach to the cosmetic patient. In addition, renowned facial plastic surgeon Michael J. Lee, MD, will discuss face and neck lifts. These sessions will provide the latest developments in treatment of the cosmetic patient, including incisional and nonincisional techniques.

—*Richard C. Allen, MD, PhD,*
Oculofacial Plastic Surgery program director

PEDIATRIC OPHTHALMOLOGY

Grand Ballroom S100c

Sudden Showers—Late Breaking RCTs and Observational Studies, moderated by Scott A. Larson, MD (Saturday, 9:31-10:29 a.m.)

Raining Cats and Dogs—Challenges of Applying Evidence-Based Medicine, moderated by Michael F. Chiang, MD (Saturday, 10:59-11:53 a.m.)

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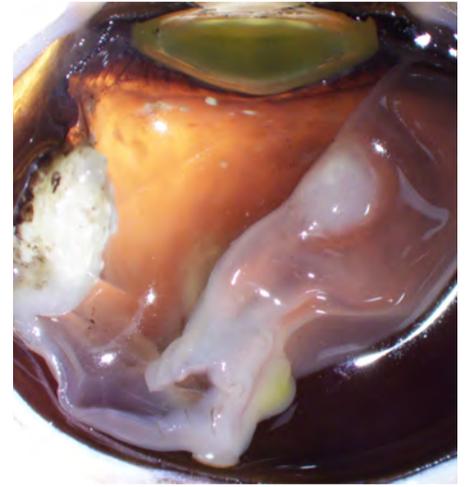
We are fortunate this year to have new data from randomized clinical trials that are just being completed. Lisa C. Verderber, MD, will unveil the results of the randomized clinical trial comparing the new *Dig Rush* binocular game (played on a handheld tablet) with continued optical treatment (spectacles) for children with amblyopia. Many of us were disappointed

by the results of the previous randomized clinical trial comparing a falling-blocks binocular game with part-time patching. Children wouldn't play the game. They found it too boring! Dr. Verderber will reveal whether treatment with the more engaging binocular game (*Dig Rush*) was any more successful.

On the theme of randomized clinical

trials, Michael F. Chiang, MD, will moderate a subsequent session entitled "Raining Cats and Dogs—Challenges of Applying Evidence-Based Medicine," in which experts will debate whether, and how, recently published studies can or cannot be applied to everyday patients in their clinics. Attendees will leave with a practical approach to applying the evidence to patients with amblyopia, intermittent exotropia, and retinopathy of prematurity.

—Jonathan M. Holmes, MD, and
Scott A. Larson, MD,
Pediatric Ophthalmology
program directors



ONCOLOGY AND PATHOLOGY. Macroscopic photograph of retinoblastoma after intra-arterial chemotherapy with persistent retinal detachment involving the macula.

on an injectable fluocinolone implant for posterior uveitis; TIE2 activation for diabetic retinopathy and diabetic macular edema; blockade of angiotensin-2 and VEGFA with RG7716 for diabetic macular edema and neovascular age-related macular degeneration; and Nd:YAG vitreolysis.

But this session on innovations is only one of many exciting sessions, including the very popular "Late-Breaking Developments," which delivers the latest on various emerging treatments.

Brand-new this year is the "Special Lecture" during Retina Subspecialty Day. Google technical lead Dale Webster, PhD, will give this inaugural talk, titled "Machine Interpretation of Fundus Photographs." Considering that artificial intelligence has been getting much attention recently, this lecture should have broad appeal and provide insight into the future of our field.

—Richard F. Spaide, MD, and
Mark S. Humayun, MD, PhD,
Retina program directors

UVEITIS

Room E450

Avant-Garde Blues, moderated by H. Nida Sen, MD (Saturday, 4:30-5:32 p.m.)

The final session of the program, "Avant-Garde Blues," will give the audience a glimpse into the exciting and rapidly evolving future of the field of uveitis. Speakers will present on SITE-2 study results and on late-breaking developments, including the POINT, FAST, Fluocinolone Acetonide Intravitreal Implant, and Phase 3 PEACHTREE (on suprachoroidal delivery of CLS-TA for uveitic macular edema) Trial results. Toward the end of the session, C. Stephen Foster, MD, one of the founding figures of uveitis, will deliver a speech reflecting on a career in uveitis, entitled "Where We Have Been and the View Forward".

—H. Nida Sen, MD, MHSc, and
Albert T. Vitale, MD,
Uveitis program directors

REFRACTIVE SURGERY

Room E354

JRS: Hot, Hotter, Hottest—Late-Breaking News, moderated by J. Bradley Randleman, MD (Friday, 3:55-5:20 p.m.)

The final session of this information-rich day will feature new and innovative techniques and technologies in the area of refractive surgery. The session will kick off with the Troutman Prize lecture by Yumeng Wang, MD, PhD, titled "Histological and MicroRNA Signatures of Corneal Epithelium in Keratoconus." Subsequent presentations will include: "Corneal Allogenic Intrastromal Ring Segments (CAIRS) Combined With Corneal Cross-linking for Keratoconus," by Soosan Jacob, FRCS; "Customized Corneal Cross-linking Using Different UVA Beam Profiles," by Rohit Shetty, MBBS; "Ciliary Muscle Electrostimulation to Restore Accommodation in Patients With Early Presbyopia," by Luca Gualdi, MD; and "Outcomes of Re-treatment by LASIK After SMILE," by Dan Z. Reinstein, MD.

—William B. Truttler, MD, and
Marcony R. Santhiago, MD,
Refractive Surgery program directors

RETINA

Arie Crown

Innovative Retinal Interventions, moderated by Yale L. Fisher, MD, and Rajendra S. Apte, MD, PhD (Saturday, 1:39-2:21 p.m.)

Late-Breaking Developments, Part I, moderated by Mark S. Humayun, MD, PhD (Friday, 4:20-5:08 p.m.)

Late-Breaking Developments, Part II, moderated by Hugo Quiroz-Mercado, MD (Saturday, 9:08-9:38 a.m.)

Machine Interpretation of Fundus Photographs, presented by Dale Webster, PhD (Friday, 12:00-12:12 p.m.)

The field of retina continues to move forward at a rapid pace. The session "Innovative Retinal Interventions," new last year, was very well received. Accordingly, we are bringing it back this year, featuring presentations on nanoretina; gene therapy; results from 2 phase 3 trials

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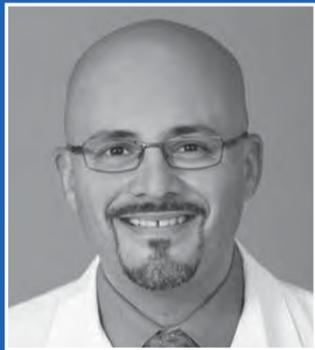
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ELLEX EXHIBIT #1044

*These sessions are not affiliated with the official program of AAO 2018



An Insider's Guide to Touring Chicago Ruth Williams' Top Favorite Things to Do in the City

Chicago is always a spectacular city, and October is its best month because the weather is predictably lovely and the summer revelers have quieted. I love my city, and even though we live in the western suburbs, my family and I regularly visit downtown. Here is my personal “top 10” insider’s guide to America’s very best city.

Chicago Riverwalk

The recently completed Chicago Riverwalk is a path along the Chicago River that begins at Lake Shore Drive and extends for over a mile. The Riverwalk is accessible by stairs adjacent to the main bridges and the River Theatre section, where coliseum-like steps connect the street level to the river level. Walk along the river and take in some of Chicago’s iconic architecture and vibrant city mood.

Outdoor cafés and ice cream kiosks line the pedestrian path. City Winery is a popular spot for enjoying a glass of wine and absorbing the riverfront vibe. Alternatively, cross to the other side of the river for dinner at River Roast or The Kitchen on a terrace that overlooks the water.

The Architectural Boat Tour is a favorite with visitors to Chicago, but I suggest a do-it-yourself tour along the same waterway. Rent a boat for a dozen colleagues at Chicago Cycleboats or the Chicago Electric Boat Company, or rent a kayak at Urban Kayaks.

The Field Museum

The Field Museum is worth a visit, especially this year, because Sue, the world-famous *T. rex*, has been replaced in the Grand Hall by an even larger dinosaur. The new behemoth, the titanosaur *Patagotitan mayorum*, is named Maximo and was excavated in Patagonia on a ranch owned by the Mayo family (hence the name). Sue is finding a new home in the Evolving Planet, which is one of my favorite exhibits because it’s a walk through time and gives a visual reminder of the epochs. (By the way, my ophthalmologist husband makes a cameo appearance in a video about the Green River Formation in the Eocene hall.) For ancient history buffs, the museum currently features an Egyptian and Peruvian mummy exhibit as well.

Outdoor Dining

When October delivers a typical comfort-

able, sunny day, find an outdoor space for a meal, a beer, or a cocktail. The current outdoor hot spot is LH on 22, the rooftop bar at London House, which has sweeping views of the Chicago River.

My favorite is the quiet (and much less crowded) chic oasis at The Peninsula’s Shanghai Terrace. Randolph Street on the Near West Side, formerly the famed meatpacking district (and former home of Harpo Studios—now the just-opened headquarters for McDonald’s), hosts several blocks of hip restaurants. A few casual spots with outdoor seating are Rick Bayless’ Cruz Blanca Brewery & Taqueria, Stephanie Izard’s Little Goat Diner (since her *Girl and the Goat* is always booked), and bellyQ, a modern take on Korean barbeque. Another favorite outdoor eatery is Mott Street in Wicker Park, which serves up tapas-style Asian fusion food. And for lovers of pie, Bang Bang Pie in Wicker Park has a backyard with picnic tables.

Lyric Opera

Let me convince you to take in an opera while in Chicago. Opera is the most extravagant art form because it combines orchestral music, exquisite singing, poetry, acting, costumes, and sets. “The Lyric,” one of the world’s great opera houses, is the perfect venue for first-time opera-goers. *Idomeneo* is a Mozart opera with 2 performances during Academy week (however, the Sunday performance conflicts with the even better choice of the Academy Foundation’s Orbital Gala!). The Lyric Opera hall is an opulent, gold-toned Art Deco space and is a contrast to the cool, silvery, elegant hall of the Chicago Symphony Orchestra, which has 2 concerts during Academy week.

Bike or Hike Along the Lake

The Chicago Lakefront Trail is a 19-mile path for walking, jogging, and biking. The trail begins several miles south of McCormick Place, so theoretically one could beat the traffic to the annual meeting by jogging or biking from downtown. The most popular section of the trail is around Navy Pier, but perhaps the most beautiful section is heading south from Buckingham Fountain. I’ve often rented bikes at the McDonald’s Cycle Center in the northeast corner of Millennium Park. A fun biking route begins at Millennium Park and goes north by Navy Pier, includes a stop at Oak Street Beach for a soda, crosses over Lake Shore Drive on



THE CHICAGO RIVER. Kayaking and boating provide a unique perspective on Chicago’s architecture. **THE LYRIC.** In 2016, the Lyric Opera hall celebrated the Chicago Cubs’ historic World Series run by adding a “Cubs Win” flag to its elegant interior.



a pedestrian bridge, and ends at Lincoln Park Zoo.

Shopping

Chicago shopping is truly glorious, and Michigan Avenue has the usual favorite stores. Bargain shoppers should detour to the Old Town neighborhood or Michigan Avenue to visit the storefront for Luxury Garage Sale, which is a Chicago-based online consignment and discount site where you can find great deals on authenticated LV, Dior, and Chanel bags. Wicker Park and Bucktown are contiguous neighborhoods with great boutiques and some of the best vintage shopping in Chicago. These 2 neighborhoods have dozens of hipster dive bars and great restaurants for the weary shopper.

Eating

Chicagoans love to eat out, and I have a few insider-favorite restaurants. Beatnik is a hip new spot in the Ukrainian neighborhood on the West Side. It is worth visiting just for the eclectic décor that includes a Balinese cabana, 15 huge vintage chandeliers, a 1920s Parisian bar, and giant tropical plants. The food and cocktails are equally intriguing.

The Bongo Room in Wicker Park has the most decadent breakfast menu imaginable and is next door to The Wormhole Coffee, a funky café that displays a *Back to the Future* car high on the back wall.

Lincoln Park Zoo

The Lincoln Park Zoo is intimate and charming. This urban oasis evokes the mood of a laconic Sunday afternoon Parisian stroll. My favorite is the lion den with its plexiglass viewing wall where Sahar, the zoo’s 8-year-old male lion, sometimes takes a nap on the other side. The Farm-in-the-Zoo is especially adapted for toddlers and little children. Additionally, I recommend the Nature Boardwalk, which winds through a prairie ecosystem along a pond. The Chicago skyline is a reminder that this serene walk is in the middle of an urban landscape.

The Spitting Fountains

Officially they’re the Crown Fountains, but my family has called them “The Spitting Fountains” ever since our first visit when Millennium Park opened. The tall sculptures are great examples of interactive video art. Children of all ages play in the zero-depth pool surrounding the sculptures and shriek when the fountains spit out streams of water from pursed lips.

Chicago Shakespeare Theater

Chicago Shakespeare Theater, located at the far end of Navy Pier, is known for innovative and dynamic productions. *Nell Gwynn* was premiered at London’s Globe Theater and made its American debut this October at Chicago Shakespeare Theater.

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Save Your Spine! Don't Delay, Get Started Today

Your choice of equipment—and how you use it—will either extend your career or cut it short. Here's why you're at risk for injury, how to address risk factors, and the questions to ask when shopping in the exhibit hall.

As an ophthalmologist, you are at particular risk of musculoskeletal disorders (MSDs), said Jeffrey L. Marx, MD, who cochairs an annual session on ergonomics, with this year's event taking place on Monday afternoon (see "Wellness Events," on page 18).

Dr. Marx, a vitreoretinal specialist in Massachusetts, noted that interest in ergonomics is growing, particularly among young ophthalmologists (YOs): "Last year, we had more YOs at our session than ever before—and I think that is both good and bad."

The good news is that they're actively interested in trying to keep themselves healthy throughout their career, he said. "But the bad news is that even the younger ophthalmologists are being affected by the significant burdens that we see in our clinical lives—seeing more and more patients and perhaps being at greater risk over time because of those increased burdens of everyday practice."

Why Ophthalmologists Are at Increased Risk for Injury
Ophthalmologists are facing a "perfect storm" of risk factors. Ergonomics experts agree that a long list of MSDs of the back, shoulders, neck, and upper extremities can develop when there is a perfect storm of occupational risk factors. Some to consider:

- Repetitive tasks, especially under stressful circumstances.
- Tasks that require fine motor control and close visual focus. These raise muscle tension in the head, neck, and upper extremities.
- Prolonged maintenance of awkward body positions while working.

This set of risk factors "pretty much defines almost everything ophthalmologists do every day," said Martin Wand, MD, a Farmington, Conn., ophthalmologist, now retired, whose focus was glaucoma and cataract.

Many ophthalmic tasks can result in fatigue and inflammation. Tasks that can potentially put you at risk for MSDs include use of a slit lamp, especially if it is necessary to hold a contact lens against a patient's eye; all laser procedures; and all surgery requiring an operating micro-

scope. Prolonged stretching or compression during these tasks causes fatigued and overexerted muscles. Non-neutral postures can pull and stretch tendons, blood vessels, and nerves over ligaments or bone, pinching, restricting, and inflaming them.

There are multiple pathways to injury. Some of the injury pathways toward MSDs of the trunk and extremities include the following:

Back. Maintaining an unbalanced posture for long periods of time produces static loading of the soft tissues and ischemic accumulation of metabolites in them. This can accelerate disk degeneration and lead to disk herniation.

Neck. Repeated flexion or extension of the neck while at the slit lamp, operating microscope, or computer terminal can cause chronic pain and severe spasms.

Arms and shoulders. Extended periods of holding bent arms too high, too low, or unsupported while with a patient, or while entering data into a computer, can produce shoulder pain, swelling of tendons and ligaments in the carpal tunnel, and tingling and numbness of the fingers and hands from tendinitis and tenosynovitis.

Arms. Repeatedly resting the elbows or forearms on a hard surface during procedures, or on malpositioned armrests, can lead to ulnar neuropathy.

Frequently, those pathways interact. Those interactions can lead to a complex collection of symptoms that can worsen and/or become chronic over time. Your symptoms can vary from day to day, depending on the work activity.

Injuries can sneak up on you. An absence of apparent symptoms today is no guarantee of what tomorrow will bring, experts in ergonomics say. MSDs are multifactorial, potentiated by everything from lifestyle and psychological stress to small changes in the way the office or surgical suite is arranged. Often, people say they were fine until their normal routines changed because of a new job, new equipment, or expanded duties. Some studies have linked MSDs to personal factors—such as gender, height and genetic predisposition—but others have not.



BEFORE YOU BUY, ASK ABOUT ERGONOMICS. With hundreds of companies exhibiting under 1 roof, AAO 2018 provides the perfect opportunity to shop for your practice—but make sure you consider the ergonomic impact of any prospective purchase (see "In the Exhibit Hall: Here's What to Ask Vendors," page 18) and beware of unofficial vendors who might try to approach you off the exhibit floor (see "Make Sure You Are Talking to a Legitimate Vendor," page 19).

FIND VENDORS FAST. Use the Exhibitor Guide in your registration bag, use the Mobile Meeting Guide (aao.org/mobile), or visit the Exhibitor Locator (Booth 3400).

Consider All Aspects of Your Operating Room

"My concern is ergonomics in the operating room," said Kenneth L. Cohen, MD, a cornea specialist. "The issue is microsurgery, which limits movements and causes awkward postures and movements for fixed and repetitive periods of time."

- Dr. Cohen listed several problems:
- restricted freedom of movement
 - static posture
 - minimal muscle activity
 - lack of body balance caused by using foot pedals while also using the microscope to view the operative field
 - mismatch between the height and design of the operative bed and the surgeon's height, compounded by issues with the support and comfort of the surgeon's chair
 - the combined positioning of the surgeon's chair, microscope base, and foot pedals, along with the design of the operating table, inhibits proper positioning for comfortable and safe access to the operating field
 - tripping hazards caused by cables
- "All of these issues lead to occupational musculoskeletal injuries, due to restricted movement, minimal muscle activity, and awkward positions result-

ing in muscle fatigue and injury," said Dr. Cohen, who is the Sterling A. Barrett Distinguished Professor of Ophthalmology at the University of North Carolina in Chapel Hill. "In my opinion, there is need to make ergonomic improvements to operating room design, instrument design, and equipment design to minimize the nonergonomic, repetitive position of our bodies during microsurgery, which limits muscular movements and places us in unnatural positions."

Know the Risk Factors, and the Solutions

Work-related MSDs have a multifactorial nature and variable presentation, which means it might not be obvious which combination of possible solutions will halt, or prevent, the pain cycle for an individual ophthalmologist. Some of the major risk factors for ophthalmologists are described below.

Avoid Neck Injuries

Risk factor—the slit lamp. In other occupations, especially those involving data entry, neck pain is caused by improper posture and/or improperly adjusted equipment. The head, neck, and torso should be aligned vertically in a

EVOLVING CONCEPTS IN EYE CARE

Expert Lecture Series



AT ALLERGAN BOOTH I308

Saturday, October 27, 2018

9:30 AM
You'll Never Believe What Happened to Me in the OR Today! Pearls for Mastering Complicated Cases
Lisa Nijm, MD

10:00 AM
Multifactorial Approaches to DME and RVO
David Callanan, MD

10:30 AM
A Minimally Invasive Approach to IOP Control: Introduction to the Technology and Outcomes
Arsham Sheybani, MD

11:00 AM
The Science Behind Neurostimulation and Ophthalmology
Preeya Gupta, MD

11:30 AM
Multifactorial Approaches to DME and RVO
Brian Chan-Kai, MD

12:00 PM
Advances for Complex Cataracts
David Chang, MD

12:30 PM
Nasty Cataracts: Prevention and Management of Complications
Robert Osher, MD

1:00 PM
A Minimally Invasive Approach to IOP Control: Introduction to the Technology and Outcomes
Davinder Grover, MD

1:30 PM
New Techniques and Technologies in Cataract Surgery
Eric Donnenfeld, MD, FACS

2:00 PM
Multifactorial Approaches to DME and RVO
Jeremy Wolfe, MD

2:30 PM
A Minimally Invasive Approach to IOP Control: Introduction to the Technology and Outcomes
Manjool Shah, MD

3:00 PM
70th Anniversary Toast

3:30 PM
The Key Elements of Effective Gel Stent Reimbursement
Sharon DeCanio, MD

Sunday, October 28, 2018

9:30 AM
Multifactorial Approaches to DME and RVO
David Lally, MD

10:00 AM
A Minimally Invasive Approach to IOP Control: Introduction to the Technology and Outcomes
Nathan Radcliffe, MD

10:30 AM
IOL Exchange From Mundane to Insane
Brandon Ayres, MD

11:00 AM
Multifactorial Approaches to DME and RVO
John Huang, MD, MBA, CPE

11:30 AM
A Minimally Invasive Approach to IOP Control: Introduction to the Technology and Outcomes
Steven Sarkisian, MD

12:00 PM
Techniques for Your Surgical Presbyopic Patient
George Waring IV, MD

12:30 PM
The Key Elements of Effective Intravitreal Injection Reimbursement
Dave Baczewski, MD

1:00 PM
The Key Elements of Effective Gel Stent Reimbursement
Sharon DeCanio, MD

1:30 PM
Mastering DALK: Top 10 Surgical Pearls
Neda Shamie, MD

2:00 PM
Multifactorial Approaches to DME and RVO
Robert Kwun, MD

2:30 PM
A Minimally Invasive Approach to IOP Control: Introduction to the Technology and Outcomes
Inder Paul Singh, MD

3:00 PM
The Science Behind Neurostimulation and Ophthalmology
John Sheppard, MD, MMSc

3:30 PM
The Key Elements of Effective Intravitreal Injection Reimbursement
Dave Baczewski, MD

Visit Booth 1308

AAO 2018

WELLNESS EVENTS ART + SCIENCE

Sunday

Physician Wellness: Movement, Yoga, and Mindfulness at Work.

Presenter: Camille Palma, MD. Repetitive movements related to patient care can lead to muscle fatigue and chronic injury. Avoid MSDs by incorporating stretch and strength into your daily routine. Dr. Palma, a retina specialist and certified yoga instructor, will walk you through several short, suit-friendly yoga sequences. These yoga flows target specific problem spots, including the arm/shoulder, hips, and spine. Between each 5-minute sequence, she will lead brief discussions on posture, breathing, ergonomics, and meditation. **When:** 8:00-9:00 a.m. **Where:** YO Lounge (Grand Concourse, Level 3, Lobby). **Access:** Ophthalmologists who are in training or in their first 5 years of access.



Dr. Palma

Monday

A Proficiency-Based Virtual Reality Cataract Surgery Course for Residents (event code 413).

Senior instructor: Alfred A. Paul Jr., MD. This course showcases a simulation training program for resident eye surgeons. The program's goal is to bridge the gaps between the classroom, the wet lab, and the operating room. Along the way, it includes instruction on ergonomics, phacodynamics, and mental-skills training. **When:** 9:00-10:00 a.m. **Where:** Room S501a. **Access:** Academy Plus course pass.



Dr. Paul

Extinguishing Burnout and Reigniting Joy in Medicine (459).

Senior instructor: Susan E. Connolly, MD. Physician burnout has reached epidemic proportions in the United States, with more than half of U.S. physicians exhibiting signs of burnout. How can you reduce burnout and increase joy in the workplace? The presenters of this course have studied the prevalence of physician burnout at the Palo Alto Medical Foundation, a large multispecialty group of more than 1,500 physicians in Northern California. They have determined factors associated with greater or lesser degrees of burnout and have implemented interventions to minimize burnout and maximize physician well-being. **When:** 11:30 a.m.-12:30 p.m. **Where:** Room N427d. **Access:** Academy Plus course pass.



Dr. Connolly

Ergonomics/Musculoskeletal Disorders in Ophthalmologists (Spe29).

Presenters: Jeffrey L. Marx, MD, Scott E. Olitsky, MD, and Max Whiting, PT, DPT. An ergonomics specialist will focus on practical recommendations to minimize injury and optimize patient care in clinical settings. In addition, a physical therapist will demonstrate exercises and stretching routines that can be performed during the day at work and home. **When:** 12:45-1:45 p.m. **Where:** Room S403a. **Access:** Free.



Dr. Marx



Dr. Olitsky

Physician Wellness for the Busy Ophthalmologist: Practical Tips You Can Implement Today (Sym39).

Chairs: Erin M. Shriver, MD, and Lisa Nijm, MD, JD. What can practices and individual ophthalmologists do to reduce physician burnout? This symposium will discuss the steps that can be taken to boost physician wellness, improve practice efficiency, and enhance personal resilience. The 6 panelists include an ergonomics specialist.



Dr. Shriver



Dr. Nijm

- Blue Light: Hype or Harmful? (*Karen Marie Gehrs, MD*)
 - Ergonomics for the Ophthalmologist (*Allison L. Jones, MD, MS*)
 - Physician Heal Thyself (*Femida Kherani, MD*)
 - What Makes Doctors Happy? (*Michael Tutty, PHD, MHA*)
 - Time Management to Optimize Work-Life Harmony (*Kathryn A Colby, MD, PhD*)
 - Without Darth Vader, There's No Luke Skywalker: The Role of Antagonists in Your Life Story (*Tamara R. Fountain, MD*)
- This symposium is cosponsored by Women in Ophthalmology (WIO). **When:** 12:15-1:45 p.m. **Where:** Room E350. **Access:** Free.

neutral posture, without the neck pushed forward or the head tilted down or up to view the monitor. In the office, slit lamps commonly are positioned on the exam table in such a way that the ophthalmologist must lean toward the instrument, pushing the neck out of alignment and into extension repeatedly.

Solution. Modify the table to move the slit lamp closer to the examiner than to the patient, said Dr. Wand, who suffered a prolapsed spinal disc that he attributes to awkward postures during surgery. "The patient will be a little uncomfortable for 2 minutes, once a year, instead of the physician being in that awkward position many times every day," he said. "Furthermore, you can now buy oculars for the slit lamp, and for the operating microscope, that permit viewing without flexing the neck."

Risk factor—the biomicroscope.

Operating biomicroscopes are not always equipped with eyepieces that can be tilted for comfort. Even if seating and table heights can be adjusted optimally, the stationary eyepiece forces the neck into awkward flexion or extension for the duration of the surgery. Nurses and technicians who assist during surgery also are at risk. (Eventually, the awkward posture also can damage the lower back.)

Solution. An adjustable eyepiece, when used correctly, can prevent neck pain and reduce the risk of more serious spinal complications later.

Risk factor—the computer. The neck and shoulders can become strained when the head is tilted back to view a monitor (e.g., with bifocal eyeglasses) or if the arm is lifted away from the body to reach the mouse.

Solution. Do not wear bifocals that require extension of the neck to read through the lower segment. Instead, get a bifocal where the upper segment is focused at the computer distance and the lower segment focused for the closer work on your desk. Place the mouse so that there is no need to lift your arm to reach it.

Avoid Back Injuries

Risk factor—improperly adjusted equipment in the OR. Surgeons sometimes neglect to adjust the chair and table to the proper height, said Wayne E. Fung, MD, a retired retina specialist, a life fellow of the Academy, and former president of the Retina Society. The higher the seat, the more the back muscles must work. During a series of surgeries, prolonged maintenance of the body in an awkward position further magnifies the strain on the spinal muscles and tendons. This leads to overfatigued tissues, discomfort, and inflammation. A debilitating back spasm could occur at any time.

Solution. Do not commence surgery without first adjusting the seating, the table, and the equipment so that you can maintain a neutral spine, with normal

curvature, throughout the procedure. If you experience muscle fatigue symptoms (dull ache, tightness, stiffness, "knot" formation, or pressure), stretch the muscles to relax them. The best all-around stretch for the lower back is the pelvic tilt. (For tips on stretching, see "Save Your Spine, Part 2" in the next edition of *AAO 2018 News*, which will be available at McCormick Place on Sunday.)

Risk factor—the pedal. Seated surgeons increase their risk of injury if they cannot reach the foot pedal without angling their thighs toward the floor. This makes it harder for the musculature to stabilize the spine.

Solution. If possible, lower the seat and table so that you can keep knees bent at 90 degrees, feet flat on the floor, and thighs parallel to the floor. This is the least stressful position for the lower back, according to Dr. Fung. If you cannot use the foot pedal without inclining the thighs, elevate the pedal(s) by putting it (or them) on a sturdy rise.

Avoid Arm and Hand Injuries

Risk factor—use of the keyboard. With the high prevalence of electronic health records, physicians might be spending more time typing on a computer keyboard. In addition to the risks from repetitive use of the keyboard, certain tasks require the exertion of concentrated force, during which hand and arm muscles must work continually (e.g., when the mouse is so sensitive that the pointer is hard to control).

Solution. With every new terminal you encounter, adjust the chair, table, monitor, keyboard, and mouse to provide the best posture with the least amount of muscle strain. You also can modify the sensitivity of your mouse.

Risk factor—contact stress. Contact stress can cause tingling and numbness if a tendon, nerve, or blood vessel is stretched over a bone or tendon. Tendons can be damaged when repeated finger motions are performed with a bent wrist. The external version of this occurs when the forearms or wrists/palms come into contact with sharp edges on a table or wrist rest.

Solution. Do not lean your forearms or elbows on unpadded surfaces. Keep your palms, wrists, and forearms in a straight line, roughly parallel to the floor. Watch for sharp edges on accessories like wrist rests.

In the Exhibit Hall: Here's What to Ask Vendors

Make sure you schedule time for the exhibit hall, where you can meet with ophthalmology's full range of vendors, request hands-on demos, and compare competing products.

Caveat emptor—safeguard your long-term health. Before you get your wallet out, consider the ergonomic impact of any prospective purchase—

will it help extend your working life or cut it short?

Q. Ask the vendor to describe any ergo-friendly features. Dr. Marx urges you to ask whether ergonomic features were incorporated into the design and manufacture of the equipment. For example, does the design give careful attention to elbow support? Will the physician have to overreach? As an ophthalmologist, you are very familiar with the ergonomic limitations of your current equipment, and “you should let vendors know that you won’t buy equipment unless it is attempting to address those problems,” said Scott. E. Olitsky, professor of ophthalmology at the University of Missouri–Kansas City School of Medicine. Issues you might consider include the following:

Indirect ophthalmoscopes. Where is the center of gravity? With some products, said Dr. Olitsky, “the weight is being placed forward and causing neck problems. Manufacturers could have the design analyzed to look at the loading forces placed on the neck.”

Loupes. What is the declination angle of the loupes? What is the angle of flexion users must have at their necks to place their hands in a comfortable and balanced position? “If the manufacturer does not know, you could have someone take a photograph [of you at the loupe] and measure your neck angle with a goniometer app that is easy to use on a phone,” said Dr. Olitsky. “Doing this will also let the manufacturers know that ophthalmologists are aware of this issue and will measure the angle before we purchase.” (Note: On Sunday, 12:45-1:45 p.m., visit the Scientific Posters area in Hall A, where Donny Who Suh, MD, will be on hand to chat about Poster Po183, Surgical Loupe Customization to Improve Ergonomics Among Ocular Surgeons. Also on Sunday, at 2:00 p.m., he will deliver the opening talk at the Poster Theater’s pediatric ophthalmology session.)

Slit lamps. Has the front end of the slit lamp been shortened so that the doctor does not need to lean forward? Does the stool have legs that stick out and hit the footrest of the exam chair, preventing the doctor from getting close to the patients without leaning forward?

Table-mounted devices. Equipment

such as lasers and biometry-measuring devices are frequently mounted on tables that “are not designed for patients who have protruding abdomens and chests,” said Dr. Cohen. This can make treatment and examination difficult for both physician and patient. “Comfortable positioning for the ophthalmologist is impossible, and a third party is needed to push and keep the patient in position against the headrest so accurate focusing is possible,” said Dr. Cohen. “The ophthalmologist must apply constant forward pressure against the patient’s abdomen and chest. This causes undue discomfort to the ophthalmologist and patient.” What can be done to address this?

Q. Did the vendor take ergonomics into consideration? Were ergonomic specialists consulted in the equipment design and/or in recommending how the equipment should be set up in offices? If so, ask for a copy of the specialist’s report. “We ask for safety reports about cars before we buy them,” said Dr. Olitsky. “We should be asking about the safety of the equipment we buy.”

Q. If a product claims to be ergonomic, where’s the evidence? “What I see is that many chairs, etc., are labeled as ergonomic with absolutely no data to back that claim,” said Dr. Olitsky. If a product is labeled as being ergonomic or advertises ergonomic features, the manufacturer should be able to provide detailed information to justify that claim, including data provided by specific testing.

Q. Will the vendor teach you how to use its product ergonomically? Find out what, if any, service the vendor provides. For example, does it help practices set up equipment and plan the workflow in a way that reduces risk factors for injury? If it has been helping practices set up their offices and work lanes, ask if you can talk to one of those practices.

Q. What is the vendor’s return policy? Will you be able to return equipment if ergonomic issues develop? Similarly, if the purchase is being made to address existing ergonomic issues, can you return the equipment if those issues aren’t resolved?

Make Sure You Are Talking to a Legitimate Vendor

When you do business at a convention, follow these precautions.

- Beware of individuals who approach you outside of an exhibit booth. Exhibitors are not permitted to canvas outside their exhibit area.
- Obtain business cards from individu-

PHYSICIAN WELLNESS SUPPORT ART + SCIENCE

AAO 2018

From Saturday through Monday, join the Walking Challenge. Download the Heka Walk app from the Apple App Store or Google Play Store. Follow the app’s instructions to register (activation code: AAO2018), and then pair the app with your own step-tracking device. Prizes will be raffled off each day, and after 3 days, the 25 participants with the most steps have a chance to win the grand prize: a hotel room for AAO 2019.

Visit the EyePlay Experience.

Take a time out to recharge your batteries—both yours and your phone’s.

5 ways to relax and de-stress.

At the EyePlayExperience, you can:

- enjoy a seated massage,
- play Ping-Pong,
- relax with therapy animals (during set times),
- watch football (10:00 a.m.-5:00 p.m. on Saturday and Sunday), and
- assemble hygiene kits for charity (during set times).

Note: Check the Mobile Meeting Guide (aao.org/mobile) for the Fun Zone, pet therapy, beer, popcorn, and hygiene kit assembly schedules.

Get tech help, Internet access,

and more. While at the EyePlay Experience, you also can:

- visit the Tech Bar to get technical assistance with the Mobile Meeting Guide or any other technology-related question,
- use your own device to access Wi-Fi,
- use one of the available computers to go online, and
- use the concierge service to recharge your mobile device.

When: Exhibit hall hours: Saturday-Monday, 9:00 a.m.-5:00 p.m.; Tuesday: 9:00 a.m.-1:00 p.m. **Where:** Booth 2581. **Access:** Free.

Wellness Corner at the Young Ophthalmologist (YO) Lounge. Unwind with a massage. **When:** Saturday-Monday, 8:00 a.m.-5:00 p.m.; Tuesday, 8:00 a.m.-1:00 p.m. **Where:** YO Lounge (Grand Concourse, Level 3, Lobby). **Access:** Ophthalmologists who are in training or in their first 5 years of access.

Friends of Bill W. Don’t lapse this week. Visit this nonthreatening space where you can enjoy mutual support and candid exchange. **When:** Saturday-Monday, 12:45-1:45 p.m. **Where:** Room S501d. **Access:** Free.



als with whom you do business.

- For any business transaction, get a receipt, complete with vendor name, address, phone number, email, and the representative’s name.
- If there is any question of an individual’s validity as a legitimate exhibitor, contact Academy staff at the Academy Exhibitor Services Counter, located in the Exhibitor Service Center (Hall A).

Dr. Cohen is the Sterling A. Barrett Distinguished Professor of Ophthalmology at the University of North Carolina in Chapel Hill, N.C.

Dr. Fung is a retired retina specialist and former president of the Retina Society.

Dr. Marx is a vitreoretinal specialist at Lahey Medical Center in Burlington, Mass.

Dr. Olitsky is professor of ophthalmology at the University of Missouri–Kansas City (UMKC) School of Medicine.

Dr. Wand is a retired glaucoma and cataract specialist.

Financial disclosures: Drs. Cohen, Fung, Marx, Olitsky, and Wand: None.

This article includes excerpts from 3 *EyeNet* articles written by Linda Roach: “Ophthalmic Ergonomics: Continuing Challenges and New Insights” (Practice Perfect, April 2018), “Seven Risk Factors for Injury, and Seven Solutions” (Practice Perfect, September 2009), and “Is the Job You Love a Pain in the Neck?” (Practice Perfect, July/August 2009).

PHYSICIAN WELLNESS AT AAO.ORG

From handy apps to articles in the peer-reviewed literature, what resources are available to help safeguard physician well-being?

Visit aao.org/wellness for 2 lists of resources—the first focuses on what the individual can do, the second focuses on what can be done at the practice level.

Winning Photography Is on Display

The photos shown here were selected from among the First Place winners—in both the print and stereo categories—at the 2017 Ophthalmic Photographers' Society (OPS) Scientific Exhibit during AAO 2017 in New Orleans. To see this year's winners, stop by the 2018 OPS Scientific Exhibit (Booth 2556), and enter the raffle. Prizes include: 1 mounted print, 2 1-year OPS memberships, which includes 2 certification-oriented webinars (the CRA and

OCT-C*), and 3 2019 OPS calendars.

Calendars will also be for sale for \$15 at the booth. Proceeds help fund the OPS scholarship program to assist photographers in getting started in the field by funding part of their travel to and registration for the OPS annual meeting, which takes place simultaneously with the Academy's annual meeting.

Learn more about the OPS at opsweb.org.



2017 OPS Exhibit Winners.

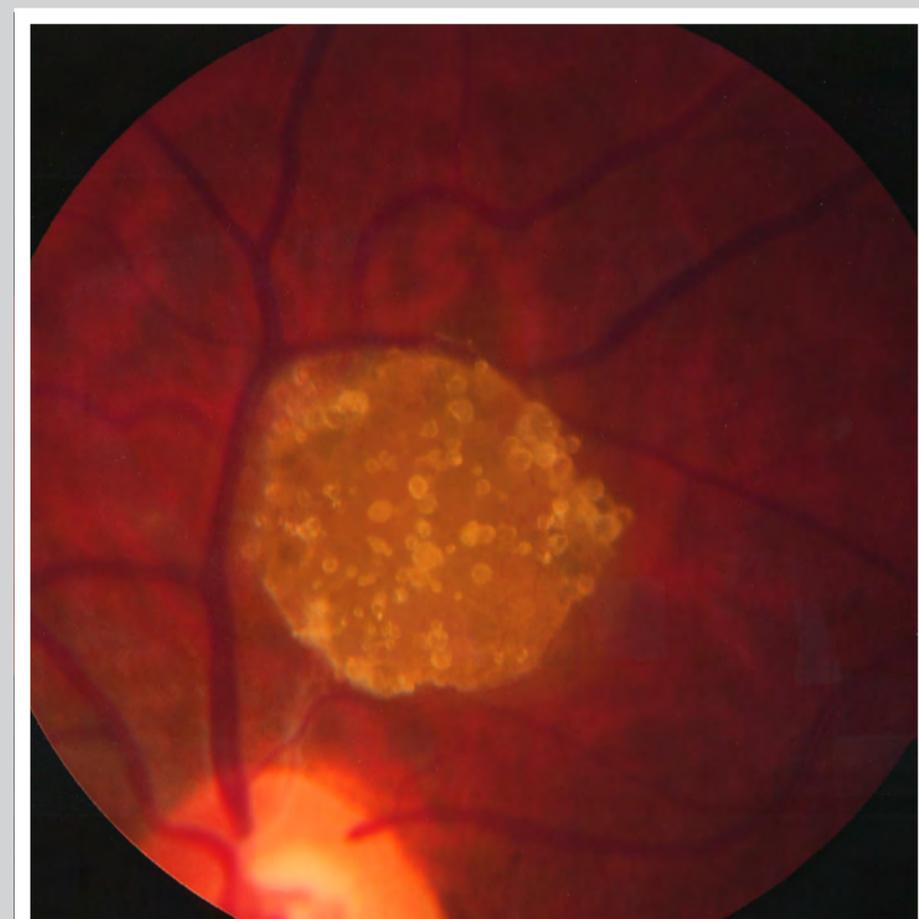
From left to right, and top to bottom.

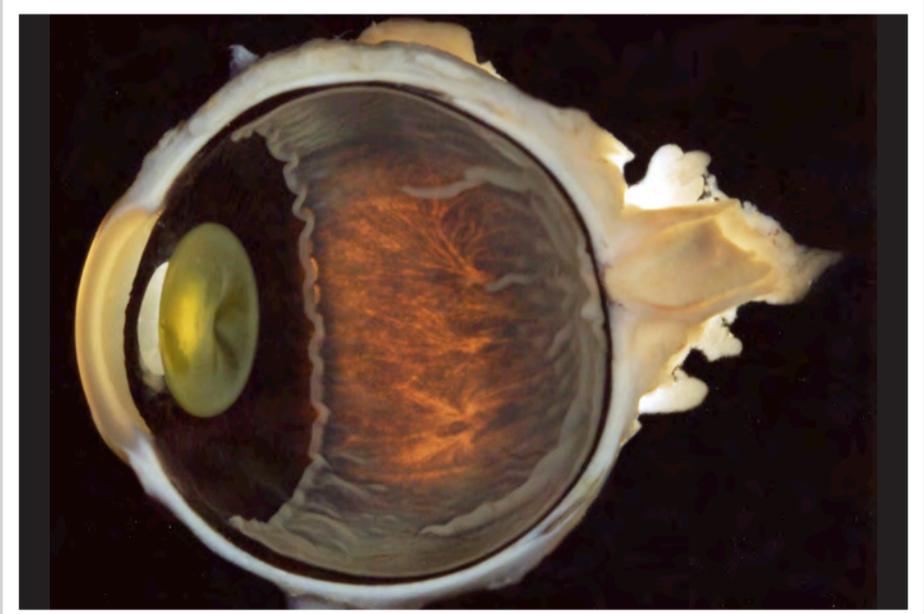
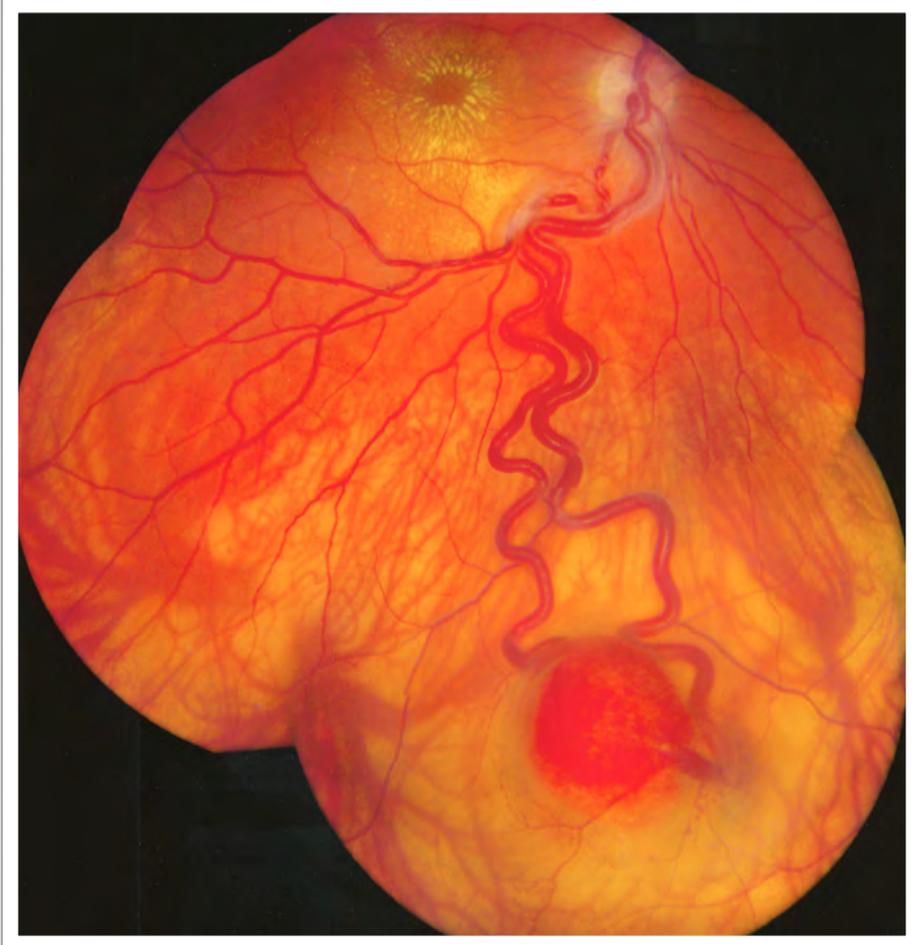
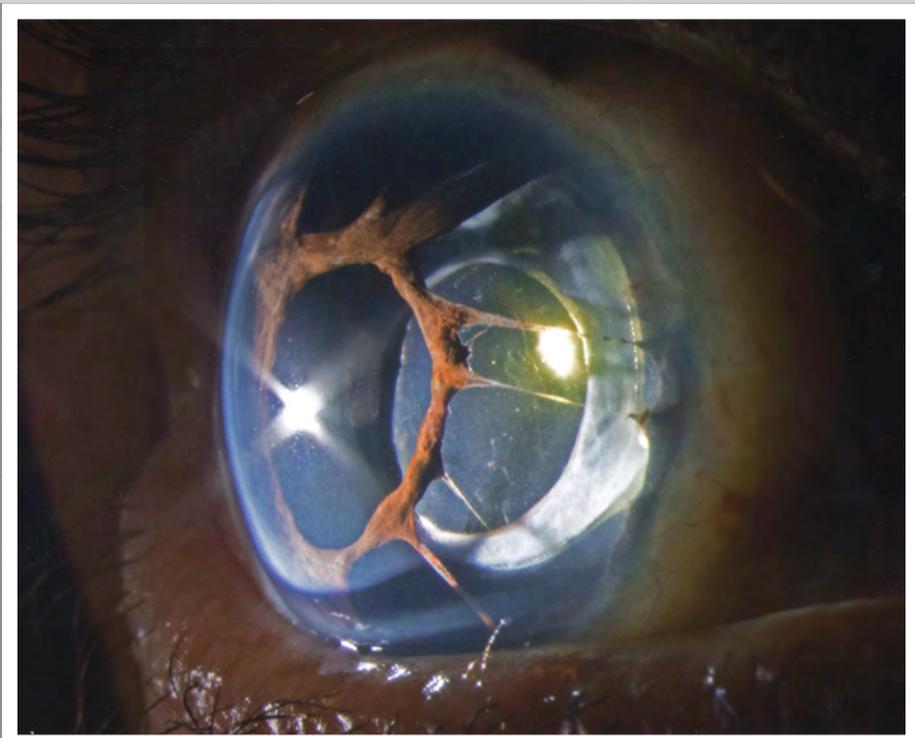
Slit Lamp Photography, Uveitic Pupil. Kit Morehead, CRA, University of Michigan Kellogg Eye Center.

Fundus Photography, High Magnification, Retinal Hamartoma. Noelle Pensec, CRA, Columbia University Medical Center.

Fluorescein Angiography, Print, Diabetes. Sonya Cosby, University of Michigan Kellogg Eye Center.

*Certified Retinal Angiographer and Optical Coherence Tomographer-Certified.





Slit Lamp Photography. *Advanced Irido-Endothelial Corneal Syndrome.* Angela Chappell, CRA, OCT-C, Flinders Medical Centre.

Composite Image. *Retinal Capillary Hemangioma.* Matthew S. Atkinson, CRA, National Eye Institute.

Ultra-Widefield Imaging. *Melanoma.* Mark Clark, CRA, Wake Forest University Eye Center.

Gross Specimen Photography. *Untitled.* Lisa Belanger Neal, CRA, OCT-C, University of Michigan Kellogg Eye Center.

New Thinking in Ophthalmology

10 Honorary Lecturers Preview Their Presentations

The honorary lectures are easy to fit into your schedule, as they are free and usually between 15 and 35 minutes long. Preview the highlights of these lectures below, and in the Sunday AAO 2018 News.

FRIDAY, Oct. 26

RETINA

Charles L. Schepens, MD, Lecture: Developing Therapies for AMD: The Art and Science of Problem-Solving, presented by Joan W. Miller, MD.

When: Friday, 9:24-9:44 a.m., during Retina Subspecialty Day 2018.

Where: Arie Crown.

“Innovative solutions to problems often seem intuitively obvious in hindsight, yet we frequently find current problems insurmountable. In the 1990s, age-related macular degeneration (AMD) was an ugly problem, with only destructive therapies for advanced disease. Now, we can complain about treatment bur-



den, and we are even more frustrated by the lack of therapies for early AMD and geographic atrophy. In this lecture, we will revisit the pathway to past successes, and then explore the hurdles and potential strategies needed to develop a new generation of therapies.”

Retina Subspecialty Day 2018: The Art + Science of Retina + Vitreous (Friday, 8:00 a.m.-5:36 p.m., and Saturday, 8:00 a.m.-5:29 p.m.) is organized in conjunction with the American Society of Retina Specialists, the Macula Society, the Retina Society, and Club Jules Gonin.

REFRACTIVE SURGERY

Troutman Award: Histological and MicroRNA Signatures of Corneal Epithelium in Keratoconus, presented by Yumeng Wang, MD, PhD.

When: Friday, 4:00-4:15 p.m., during Refractive Surgery Subspecialty Day 2018.

Where: Room E354.

“Keratoconus has long been described as a corneal stromal disease. However, in vivo confocal images have shown abnormal features in every layer of the cornea, including abnormal epithelial keratocytes. This leads us to ask: What is the histological structure of keratoconic corneal epithelia? What mechanism leads to corneal epithelial thinning? How does one collect epithelium from keratoconus patients in



addition to the surgical specimens? Does a novel, nonsurgical method of collecting epithelium from keratoconus patients have potential for clinical practice? This lecture aims to throw light on these questions through the lens of our novel findings on histopathology of keratoconic corneal epithelia and its miRNA regulation.”

Refractive Surgery Subspecialty Day 2018: Better Together—Lens- and Cornea-Based Surgery (Friday, 7:15 a.m.-5:20 p.m.) is the annual meeting of the International Society of Refractive Surgery.

SATURDAY, Oct. 27

GLAUCOMA

The American Glaucoma Society Subspecialty Day Lecture: The Future of Sensors in the Diagnosis and Monitoring of Glaucoma, presented by Marlene R. Moster, MD.

When: Saturday, 11:43 a.m.-12:13 p.m., during Glaucoma Subspecialty Day 2018.

Where: Room E354.

“The MIGS (minimally invasive glaucoma surgery) revolution is now playing a positive role in allowing us to treat glaucoma at earlier stages, as the surgery may afford less risk with acceptable efficacy. However, even with easier access to these miniature shunts or devices, it is still difficult to know what the patient’s pressure is at different times of the day. What happens to the intraocular pressure (IOP) at night, with exercise, and with different medications? One answer to this dilemma is to surgically place an intraocular sensor in the eye to monitor the IOP. This lecture will focus on the evolution of IOP monitoring and how sensors will affect the way we practice ophthalmology.”



Glaucoma Subspecialty Day 2018: A New Renaissance (Saturday, 8:00 a.m.-5:33 p.m.) is organized in conjunction with the American Glaucoma Society.

SUNDAY, Oct. 28

RETINA

Jackson Memorial Lecture: Lessons Learned From Avastin and OCT: The Great, the Good, the Bad, and the Ugly, presented by Philip J. Rosenfeld, MD, PhD.

When: Sunday, 9:33-9:58 a.m., during the Opening Session.

Where: Room E354.

“Optical coherence tomography (OCT) and anti-VEGF therapy have been great, revolutionary developments for diag-

nosing and managing neovascular and exudative eye diseases, particularly for age-related macular degeneration. During the introduction and evolution of these imaging and treatment strategies, many good, admirable individuals and organizations contributed to the overall acceptance and success of these technologies. At the same time, other individuals attempted to block access to Avastin and prevent its widespread use in the United States and abroad. Even when the situation grew ugly, our profession and government preserved access to this low-cost, effective therapy that has prevented blindness worldwide. Together, OCT and Avastin have saved Medicare and patients over \$50 billion since 2006.”



The Opening Session (8:30-10:00 a.m.).

CORNEA

Whitney G. Sampson Lecture: Rethinking Fuchs Dystrophy in the Era of Successful Descemet Stripping, presented by Kathryn A. Colby, MD, PhD.

When: Sunday, 11:18-11:43 a.m., during Sym12, Hot Topics of the Ocular Surface.

Where: Room S406a.

“Fuchs endothelial corneal dystrophy (FECD) is the most common indication for corneal transplantation, and it affects up to 4% of ophthalmology patients in the United States. First described over 100 years ago, FECD remains an enigmatic disease. The revolution in surgical treatment of FECD over the past 15 years, including the recent demonstration that Descemet stripping only (DSO) can be used as



CENTURION® VISION SYSTEM IMPORTANT PRODUCT INFORMATION

CAUTION:

Federal (USA) law restricts this device to sale by, or on the order of, a physician. As part of a properly maintained surgical environment, it is recommended that a backup IOL Injector be made available in the event the AutoSert® IOL Injector Handpiece does not perform as expected.

INDICATION:

The Centurion® Vision System is indicated for emulsification, separation, irrigation, and aspiration of cataracts, residual cortical material and lens epithelial cells, vitreous aspiration and cutting associated with anterior vitrectomy, bipolar coagulation, and intraocular lens injection. The AutoSert® IOL Injector Handpiece is intended to deliver qualified AcrySof® intraocular lenses into the eye following cataract removal. The AutoSert® IOL Injector Handpiece achieves the functionality of injection of intraocular lenses. The AutoSert® IOL Injector Handpiece is indicated for use with the AcrySof® lenses SN60WF, SN6AD1, SN6AT3 through SN6AT9, as well as approved AcrySof® lenses that are specifically indicated for use with this inserter, as indicated in the approved labeling of those lenses.

WARNINGS:

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AES/COMPLICATIONS:

Inadvertent actuation of Prime or Tune while a handpiece is in the eye can create a hazardous condition that may result in patient injury. During any ultrasonic procedure, metal particles may result from inadvertent touching of the ultrasonic tip with a second instrument. Another potential source of metal particles resulting from any ultrasonic handpiece may be the result of ultrasonic energy causing micro abrasion of the ultrasonic tip.

ATTENTION:

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PROGRAM
NAMED LECTURES

a treatment in certain FECD patients, has led to renewed interest in this common corneal condition. This talk will present a framework to tease apart the cause(s) of FECD, as well as review the current state of endothelial keratoplasty and DSO, and look at the future for nongraft therapies.”

Hot Topics of the Ocular Surface (10:15-11:45 a.m.) is cosponsored by the Contact Lens Association

of Ophthalmologists and the Eye and Contact Lens Association.

REFRACTIVE SURGERY

Barraquer Lecture: Lenticular Implantation and Refractive Eye Banking as a New Frontier in Refractive Surgery, presented by Ronald R. Krueger, MD.

When: Sunday, 11:23-11:43 a.m., dur-

ing Sym25, The Era of Femtosecond Lasers.

Where: Room E450.

“Jose I. Barraquer, MD, is known as the father of modern-day refractive surgery. Dr. Barraquer’s earliest procedures and his first publication in 1949 involved refractive keratoplasty as a tissue addition approach. The advent of small-incision

lenticular extraction (SMILE) over the past 9-10 years has reintroduced the possibility of tissue addition in refractive surgery by reimplanting the precision laser-shaped lenticules that are extracted. So far, lenticular implantation has been proposed for the correction of hyperopia, presbyopia, and keratoconus.



“Reimplanting SMILE lenticules into a pocket (in femtosecond intrastromal lenticular implantation) or mechanically-shaped donor lenticules under a flap (in lenticular implantation keratoplasty) offers correction of higher hyperopia with greater stability and natural asphericity than the tissue subtraction in hyperopic LASIK.

“Central implantation of small, 1- to 3-mm-diameter alloplastic lenticules, shaped with a femtosecond laser (in PrEsbyopic Allogenic Refractive Lenticule, or PEARL) or with an excimer laser (by Allotex), offers a safer, more biocompatible solution to presbyopia than the synthetic implantation of corneal inlays.

“Sutureless lenticular implantation in keratoconus offers the possibility of enhancing the biomechanical instability and irregular refractive shape of keratoconus in a manner safer than penetrating keratoplasty and quicker than deep anterior lamellar keratoplasty.

“With each of these indications, the well-regulated environment of an eye bank offers surgeons safe and reliable access to refractive-shaped lenticules, creating not only a new frontier in refractive surgery but also an exciting new dimension in the area of refractive eye banking.”

The Era of Femtosecond Lasers (10:15-11:45 a.m.) is cosponsored by the International Society of Refractive Surgery.

OCULOPLASTICS/PROSTHETICS

Ruedemann Lecture: Choosing the Ideal Implant Size, an Ocularist’s Perspective, presented by Joseph A. LeGrand Jr., BCO.

When: Sunday, 11:29-11:44 a.m., during Sym11, Moving Target: Advances in Prosthetic Eyes and Motility.

Where: Room E350.

“I have seen a trend toward bigger implants being used for enucleation and evisceration surgery. This is a positive development, as larger implants help to reduce problems of superior sulcus depression and enophthalmos. However, very large implants can also create fitting and fabrication challenges for the ocularist. In a survey, members of the American Society of Ocularists were asked, ‘What is the ideal thickness of a prosthetic eye?’ The results indicate a wide range of preferences. I will discuss implant size from an ocularist’s perspective.”



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Moving Target: Advances in Prosthetic Eyes and Motility (10:15-11:45 a.m.) is cosponsored by the American Society of Ocularists.

UVEITIS AND IMMUNOLOGY
C. Stephen and Frances Foster Lecture on Uveitis and Immunology: The Eye Fights Back: Immune Defense in a Dangerous World, presented by Janet L. Davis, MD.

When: Sunday, 12:50-1:45 p.m., during Sym15, C. Stephen and Frances Foster Lecture on Uveitis and Immunology.

Where: Room S406a.

“Uveitis is usually categorized as being due to either infection or autoimmunity. The reality is more complicated than that. The immune defenses of the eye

are not only highly regulated but also highly responsive to any perceived threat, including both endogenous and exogenous antigens. Regaining the null point of no inflammation requires a better

understanding of both the inciting event and immune mechanisms. We see uveitis as a bad thing, but the immune system is often just doing its job. Modulating and ultimately stopping destructive processes, whether infectious, autoinflammatory, or autoimmune in etiology, is the key to preserving sight.”

C. Stephen and Frances Foster Lecture on Uveitis and Immunology (12:45-1:45 p.m.).



GLAUCOMA

Robert N. Shaffer Lecture: At the Technological Confluence of Glaucoma Clinical Care and Research, presented by Sayoko E. Moroi, MD, PhD.

When: Sunday, 3:01-3:26 p.m., during Sym19, Practical Guides to the Dilemma of Managing Cataract in Glaucoma Patients.

Where: Room E450.

“We are amidst a confluence of great advances in knowledge about clinical risk factors, glaucoma genes, new drugs, novel surgical approaches, biological pathways, biomechanics, augmented reality for vision and visual field testing, data

science analytics, and population health. Currently, glaucoma management is predominantly an event-based endeavor. However, under this approach, some patients progress to blindness. In order to

change glaucoma care from event-based management to precision-based prevention of glaucoma-related blindness, we need to overcome barriers; in order to embrace precision-based prevention of glaucoma-related blindness, we need to identify and validate biomarkers.”

Practical Guides to the Dilemma of Managing Cataract in Glaucoma Patients (2:00-3:30 p.m.) is cosponsored by Prevent Blindness.



OCULOPLASTICS

Wendell L. Hughes Lecture: The Evolution and Revolution of Oculofacial Plastic Surgery, presented by Don O. Kikkawa, MD.

When: Sunday, 4:48-5:10 p.m., during Sym24, The Nuances of the Lower Eyelid and How to Treat Malposition.



Where: Grand Ballroom S100c.

“Oculofacial plastic surgery is a specialty in its infancy. The field evolved out of need for reconstructive surgeons trained to protect sight and knowledgeable about the intricate structure and function of the surrounding regions of the orbit and face. Within the

last decade, there have been revolutionary advances placing oculofacial plastic surgery at the forefront of precision medicine. This lecture will highlight recent advances and historical perspectives.”

The Nuances of the Lower Eyelid and How to Treat Malposition (3:45-5:15 p.m.) is cosponsored by the American Society of Ophthalmic Plastic and Reconstructive Surgery.



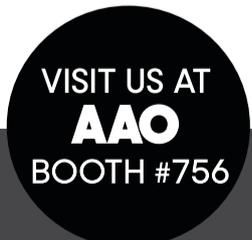
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Best-Read Journal Highlights Don't Miss These Hot Topics

Each month, *EyeNet's* Journal Highlights section provides a snapshot of current clinical literature. Here's an edited selection of some popular synopses, drawn from the first half of 2018. (Note: Date of publication in *EyeNet* is at the end of each synopsis.)

Ophthalmology

Selected by Stephen D. McLeod, MD

Treat-and-Extend for Wet AMD Earns More Support

January 2018

Monthly injections of ranibizumab can improve best-corrected visual acuity (BCVA) outcomes in patients with neovascular age-related macular degeneration (AMD), but the frequency of dosing can be inconvenient. **Silva et al.** compared monthly and treat-and-extend (T&E) protocols in patients with wet AMD and concluded that T&E was statistically noninferior and clinically comparable to monthly treatment for improving visual acuity.

The main objective of this 12-month phase 3 trial was to demonstrate non-inferiority of ranibizumab T&E, as measured by change in BCVA from baseline to study endpoint. Secondary outcome measures were safety, treatment exposure, and changes in retinal central subfield thickness (CSFT).

Patients ≥ 50 years of age (mean age, 75.2 years; 55.4% women; 91.8% white) with newly diagnosed wet AMD were assigned to receive ranibizumab 0.5 mg either according to a T&E regimen ($n = 323$) or monthly ($n = 327$). Demographics and baseline ocular characteristics were similar for the study groups.

Approximately 90% of each group completed the study. At 12 months, the least-squares mean BCVA change from baseline reflected improvement of 6.2 letters with T&E and 8.1 letters with the monthly regimen. Both groups had rapid gains in BCVA, primarily during the first 6 months, which continued throughout the study. Mean changes in CSFT were similar: 169.2 μm in the T&E group and 173.3 μm in the monthly group.

The mean number of ranibizumab injections was lower in the T&E group (8.7, vs. 11.1 for those treated monthly), as was the mean number of postbaseline visits (8.9 vs. 11.2, respectively). Types and rates of adverse events were similar.

The authors concluded that the T&E approach is not inferior to the monthly regimen. (*This originally appeared in the January 2018 issue.*)

Generating Personalized Target IOPs for Patients With OAG

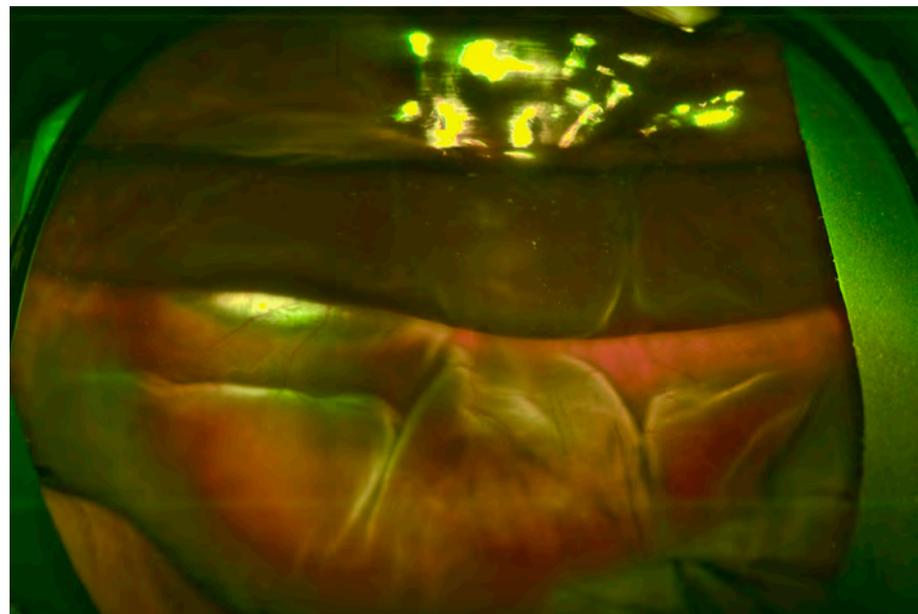
April 2018

In secondary analyses of longitudinal data from 2 randomized controlled trials, **Kazemian et al.** forecasted the progression of open-angle glaucoma (OAG) at different levels of intraocular pressure (IOP) to help establish personalized IOP goals for patients. The tool they derived from real-world experience may improve clinical decision-making.

For their study, the authors developed and validated Kalman filter (KF) models for fast-, slow-, and nonprogressing disease among participants with moderate or advanced OAG in the Collaborative Initial Glaucoma Treatment Study (CIGTS) or the Advanced Glaucoma Intervention Study (AGIS). The KF can generate personalized and dynamically updated forecasts of OAG progression for different IOP targets. For each participant, the authors determined the expected change in mean deviation (MD) if the patient were to maintain IOP at 1 of 7 levels (6, 9, 12, 15, 18, 21, or 24 mm Hg) for 5 years. In addition, the authors modeled and predicted MD changes for the same time frame if IOP were increased or decreased by 3, 6, and 9 mm Hg from the level attained in the trials. Main outcomes were personalized estimates of the change in MD under the various target IOP levels.

Among the 571 participants (mean age, 64.2 years; mean follow-up, 6.5 years), the model predicted that, on average, fast disease progression would result in an MD loss of 2.1, 6.7, and 11.2 dB under IOP targets of 6, 15, and 24 mm Hg (respectively) over 5 years. Using the same time frame and IOP targets, the MD loss for slow disease progression would be 0.8, 2.1, and 4.1 dB (respectively). When the tool was used to quantify OAG progression dynamics for all 571 patients, there were no significant differences in progression during the 5-year period between blacks and whites, males and females, or CIGTS and AGIS participants for the IOP levels studied.

To the authors' knowledge, this is the first clinical decision-making tool that generates personalized forecasts of the trajectory of OAG progression for different IOP targets. Thus, it may help clinicians determine appropriate IOP targets for patients with OAG. They also are expanding their approach into a method that enables uploading of patients' tonometric and perimetric data. (*This originally appeared in the April 2018 issue.*)



DISPLACED HEMORRHAGE. This widefield image taken on post-op day 1 shows an inferiorly displaced SMH, with partial gas fill in the vitreous cavity to prevent the subretinal air from migrating superiorly.

Primary Tube or Trabeculectomy for Glaucoma: 1-Year Outcomes

May 2018

Gedde et al. reviewed 1-year treatment outcomes of the primary tube versus trabeculectomy (PTVT) study and found that trabeculectomy plus mitomycin C (MMC) achieved greater success than did tube-shunt surgery.

This multicenter randomized study included 242 patients (242 eyes) with medically uncontrolled glaucoma and no previous incisional ocular surgery. Patients were enrolled at 1 of 16 centers and were assigned randomly to receive a tube shunt (350- μm^2 Baerveldt glaucoma implant; $n = 125$) or trabeculectomy and MMC (0.4 mg/mL for 2 minutes; $n = 117$). Outcome measures were intraocular pressure (IOP), number of glaucoma medications, visual acuity, visual field findings, surgical complications, and treatment failure. Failure was defined as any of the following: IOP > 21 mm Hg or reduced by 20% or less from baseline on 2 consecutive follow-up visits after 3 months; IOP ≤ 5 mm Hg on 2 consecutive follow-up visits after 3 months; reoperation for glaucoma; or loss of light-perception vision.

The cumulative probability of failure in the year of follow-up was 17.3% for the tube group and 7.9% for the trabeculectomy group. At 1 year, the mean (\pm standard deviation [SD]) IOP was 13.8 (4.1) mm Hg for those with a tube shunt and 12.4 (4.4) mm Hg for those with trabeculectomy. The number of glaucoma medications (\pm SD) at 1 year was 2.1 (1.4) in the tube group and 0.9 (1.4) in the trabeculectomy group.

Postoperative complications occurred

in 29% of tube recipients and 41% of trabeculectomy cases. Serious complications resulting in reoperation or a loss of at least 2 Snellen lines occurred in 1 patient ($< 1\%$) in the tube group and 8 (7%) in the trabeculectomy group.

The authors stressed that selecting a suitable glaucoma operation involves considering risk/benefit profiles on a case-by-case basis. (*This originally appeared in the May 2018 issue.*)

Ophthalmology Retina

Selected by Andrew P. Schachat, MD

Subretinal Air and tPA for Submacular Hemorrhage: First U.S. Results

March 2018

At present, there is no consensus on the optimal management of submacular hemorrhage (SMH), which is a rare but potentially devastating complication of choroidal neovascularization. **Sharma and Kumar et al.** set out to determine whether massive SMHs can be managed with subretinal injections of tPA (tissue plasminogen activator) and air. They found that the combination was successful, resulting in consistent displacement of SMH out of the fovea as well as improved visual acuity (VA) and retinal thickness.

This retrospective interventional case series included 24 patients with SMH from 5 sites in the United States. The patients' mean age was 79.1 years (range, 62-92 years). The underlying cause of SMH was polypoidal choroidal vasculopathy ($n = 4$) and age-related macular degeneration ($n = 20$). In addition,

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13 (54%) of the patients were on anti-coagulation therapy for stroke prevention (n = 9), stroke history (n = 3), or atrial fibrillation (n = 1). Main outcome measures included frequency and extent of SMH displacement and postoperative VA, retinal thickness, and complications.

Based on image review, SMH was considered subretinal in 5 patients, sub-RPE (retinal pigment epithelium) in 2, and both subretinal and sub-RPE in 17. Hemorrhage size was small (not reaching arcades) in 6 patients, large (extending to the arcades) in 2, extensive (extending past the arcades) in 9, and massive (extending to 2 quadrants and/or past the equator) in 7. With regard to retinal thickness, the hemorrhages were < 500 μ m in 7 patients and > 500 μ m in 17.

All patients underwent pars plana vitrectomy (with induction of a posterior vitreous detachment, if necessary), followed by subretinal injection of tPA and filtered air. Most (n = 23) of the patients also received bevacizumab as part of the surgery or treatment. They were then followed for an average of 12.5 months (range, 3-28 months).

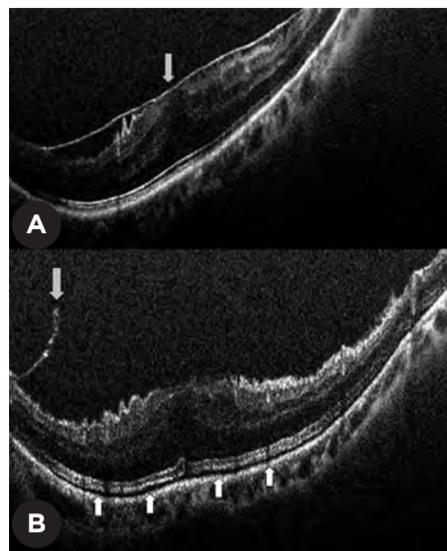
At 3 months postoperatively, there was complete displacement of SMH in all eyes. Although 13 eyes experienced no complications, 5 had a recurrent subretinal SMH that was successfully displaced with the same treatment. The remaining 6 eyes had a nonclearing vitreous hemorrhage (n = 3), retinal detachments (n = 2), or macular hole (n = 1). Mean retinal thickness improved from 463.7 μ m preoperatively to 311.3 μ m postoperatively, and VA improved in 23 eyes and remained stable in 1. (This originally appeared in the March 2018 issue.)

Intraoperative OCT for Epiretinal Membrane Surgery

April 2018

The PIONEER study examined the feasibility and utility of intraoperative optical coherence tomography (iOCT) imaging during ophthalmic surgery. In this analysis, Ehlers et al. evaluated eyes that were treated via iOCT-guided epiretinal membrane (ERM) surgery during PIONEER. They found iOCT-assisted ERM peeling resulted in improved visual acuity (VA), reduction in macular thickness, and low recurrence rates. They also found that iOCT guidance minimized unnecessary surgical maneuvers and allowed for assessment of retinal architectural details.

The authors identified 100 eyes that had undergone iOCT-guided ERM peeling with 3-port small-gauge pars plana vitrectomy. Of these, 24 eyes were excluded because of insufficient iOCT image quality. In the remaining 76 cases, the mean preoperative VA was 20/63 (range, 20/25-20/2000). Postoperatively, mean VA was 20/41 (range, 20/20-20/400) at 3 months, 20/37 (range, 20/15-20/500) at 6 months, and 20/34 (range, 20/15-



OCT GUIDANCE. (A) Before peeling surgery, ERM is evident on iOCT (arrow). (B) After, iOCT shows occult residual membrane (down arrow) and increased subretinal hyporeflectance (up arrows).

20/200) at 12 months. Similarly, mean central subfield thickness (CST) was 434 μ m preoperatively (range, 283-649) and improved postoperatively to 377 μ m (range, 209-559) at 3 months, 367 μ m (range, 211-592) at 6 months, and 359 μ m (range, 215-531) at 12 months.

In 12% of the cases, iOCT revealed residual membranes that required additional peeling. In addition, in 9% of cases, iOCT images confirmed peel completion, directly contradicting the surgeons' clinical impressions. Significant recurrent ERM was noted in 2 eyes, and reoperation was performed in 1 eye. (This originally appeared in the April 2018 issue.)

American Journal of Ophthalmology

Selected by Richard K. Parrish, MD

Do Normal Eyes Follow the ISNT Rule?

January 2018

Poon et al. sought to determine the percentage of normal eyes that follow the ISNT rule and found that, contrary to traditional teaching, the rule applies to less than 45% of rim assessments and RNFL measurements.

The authors' cross-sectional study included 110 normal eyes (110 participants). Neuroretinal rim assessments were made from disc photographs, and measurements of RNFL thickness were obtained from spectral-domain optical coherence tomography. The main outcomes were the percentages of eyes that obeyed the ISNT rule and its variants.

The researchers found that the ISNT rule was valid for only 37% of rim assessments and 43.8% of RNFL measurements. For both types of assessments, variance of the nasal sector from the expected ISNT pattern was a major reason for deviation. Nasal rims were wider than inferior rims in 11% of subjects and wider than superior rims in 29%. Nasal rims were narrower than temporal rims

in 15%. RNFL thickness was greater in the nasal quadrant than the temporal quadrant in 43%. Exclusion of the nasal quadrant from the ISNT rule significantly increased validity of the ISNT variants: 71% and 76% of disc photographs followed the IST rule and the IS rule, respectively. For RNFL thickness, 71% and 72% coincided with IST and IS rules, respectively.

As a result of these findings, the authors advocate use of IST and IS rules for distinguishing glaucomatous from nonglaucomatous eyes. (This originally appeared in the January 2018 issue.)

POAG Progression and Diabetes

May 2018

There is long-standing debate on the role of type 2 diabetes mellitus (DM) in primary open-angle glaucoma (POAG). With this in mind, Hou et al. compared rates of visual field (VF) loss and retinal nerve fiber layer (RNFL) thinning for patients with POAG and found no difference in VF progression between patients without type 2 DM and those who had type 2 DM with undetectable diabetic retinopathy. They also found that treated

DM was linked to significantly slower loss of RNFL thickness.

This study included 197 eyes. The POAG/DM group consisted of 55 eyes (32 patients) and the POAG-only group included 142 eyes (111 age-matched patients). Participants with type 2 DM were identified by self-reporting a history of DM and use of medication for diabetes. Univariate and multivariable mixed-effects models were applied to compare rates of VF loss and RNFL loss between the study groups. Median follow-up time was 5.7 years.

Results showed that the mean rate of global RNFL loss was 2-fold slower in the POAG/DM group (-0.40 vs. -0.83 μ m per year; p = .01). The POAG/DM group also had slower rates of VF mean deviation and pattern standard deviation loss, but the between-group differences were not significant.

The global and sectoral RNFL thinning rates for metformin users and nonusers in the POAG/DM group were compared to determine whether metformin could have a protective effect, but no significant difference was observed. Most subjects in the POAG/DM group (84.4%) were taking metformin

References

- Alcon Data on File (Jul 2016).
- AcrySof® IQ ReSTOR® +2.5 D Multifocal Toric IOL Directions for Use.
- Vega F, Alba-Bueno F, Millán MS, Varon C, Gil MA, Buil JA. Halo and through-focus performance of four diffractive multifocal intraocular lenses. *Invest Ophthalmol Vis Sci.* 2015;56(6):3967-3975 (study conducted with corneal model eye with 0.28 μ spherical aberration).
- Wirtitsch MG, Findl O, Menapace R, et al. Effect of haptic design on change in axial lens position after cataract surgery. *J Cataract Refract Surg.* 2004;30(1):45-51
- Visser N, Bauer NJ, Nuijts RM. Toric intraocular lenses: historical overview, patient selection, IOL calculation, surgical techniques, clinical outcomes, and complications. *J Cataract Refract Surg.* 2013;39(4):624-637.
- Potvin R, Kramer BA, Hardten DR, Berdahl JP. Toric intraocular lens orientation and residual refractive astigmatism: an analysis. *Clin Ophthalmol.* 2016;10:1829-1836.

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(solo or combined), so the subanalysis is limited by the small sample of nonusers. (This originally appeared in the May 2018 issue.)

JAMA Ophthalmology

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

Risk of Intraocular Bleeding With Novel Antithrombotics

February 2018

Uyhazi et al. compared the risk of intraocular hemorrhage between novel and traditional antithrombotic agents and found that bleeding rates were no worse with the newer medications.

The authors utilized a large national insurance claims database to generate 2 parallel analyses. First, incident use of dabigatran etexilate or rivaroxaban was compared with incident use of warfarin sodium. For the second analysis, new use of prasugrel hydrochloride was compared with new use of clopidogrel bisulfate. Patients with previous intraocular hemorrhage or a prescription for the comparator drug were excluded from the study.

The main outcome measure was the incidence of intraocular hemorrhage within 90 days and 365 days.

Data were compared for 146,137 patients who took warfarin (mean age, 69.8 years) and 64,291 patients who took dabigatran or rivaroxaban (mean age, 67.6 years). The hazard ratio for hemorrhage development was lower with dabigatran or rivaroxaban versus warfarin at 365 days (0.75) but not at 90 days (0.73). Data for the 103,796 patients taking clopidogrel (mean age, 68.0 years) and the 8,386 patients taking prasugrel (mean age, 61.0 years) did not show a greater risk of intraocular hemorrhage with prasugrel at either 90 or 365 days.

The findings suggest that the risk of intraocular hemorrhage is lower with dabigatran etexilate and rivaroxaban than with warfarin and is similar for prasugrel hydrochloride and clopidogrel bisulfate. (This originally appeared in the March 2018 issue.)

Treating Persistent DME: Comparison of 3 Anti-VEGF Drugs

March 2018

Treatment of diabetic macular edema (DME) with anti-vascular endothelial growth factors has improved visual acuity and retinal thickness but not the persistent DME (pDME) or chronic persistent DME (cpDME) that some patients experience. Bressler et al. analyzed data from a DRRCR.net trial and found that pDME was more common with bevacizumab than with aflibercept or ranibizumab at 24 weeks—and that cpDME was more likely to occur in eyes that received

Introducing Ophthalmology Glaucoma

Meet the newest member of the *Ophthalmology* journal family: *Ophthalmology Glaucoma*.

“The goal of *Ophthalmology Glaucoma* is to publish the highest quality research specifically targeted to the glaucoma community,” said Editor-in-Chief Henry D. Jampel, MD, MHS, at Wilmer Eye Institute in Baltimore. “The articles published may not be of broad enough interest for the highly diverse audience for the parent journal *Ophthalmology*, but they should meet the same rigorous standards for acceptance.”

Ophthalmology Glaucoma, which is being published in collaboration with the American Glaucoma Society, will be published on a bimonthly basis. For information, contact aaojournal@aao.org.

Ophthalmology Glaucoma

Selected by Henry D. Jampel, MD, MHS

Artificial Intelligence and Glaucoma Detection

July/August 2018

Using monoscopic fundus photos, Liu et al. developed a deep learning-based algorithm to detect glaucomatous optic discs. They found that their artificial intelligence (AI) algorithm was highly accurate in identifying glaucomatous discs. In addition, they concluded that, as it is relatively easy to obtain monoscopic images, the algorithm has potential in screening large populations.

For this database study, the researchers obtained fundus photos ($n = 3,768$) from several previous clinical studies and images from publically available online databases ($n = 626$), including the High-Resolution Fundus (HRF) database. They then merged the databases, with

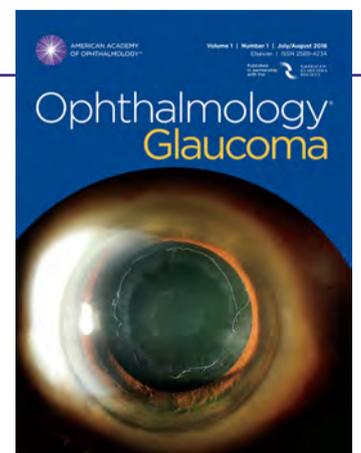
the exception of the HRF database, and divided the images into a training set that comprised 80% of all cases and a testing set that comprised 20% of all cases. The HRF images were used as an additional testing set.

Both healthy and glaucomatous eyes were represented in all datasets.

The researchers tested their AI model and found that its accuracy was 92.7% and that it achieved 89.3% sensitivity and 97.1% specificity. When the HRF dataset was used for additional testing, the AI model again was highly accurate and achieved 86.7% in both sensitivity and specificity.

In order to compare the AI model's accuracy with the diagnostic skill of experienced clinicians, the researchers randomly selected a series of monoscopic images and submitted them to a panel of 18 ophthalmologists. They also submitted the HRF images to 3 of the 18 ophthalmologists for evaluation. The clinicians' overall accuracy rate was 65%; those who evaluated the HRF images achieved a higher level of accuracy (77%).

In previous studies, clinician accuracy has been found to be higher when stereoscopic fundus images are used, and the authors noted that stereoscopic images tend to provide better inter- and intraobserver reproducibility. The monoscopic images used in this study varied in terms of quality and resolution, and the testing set included a considerable number of images of anomalous optic discs. (This originally appeared in the August 2018 issue.)



bevacizumab than in those that received aflibercept.

They also noted that the risk of vision loss was minimal regardless of the agent used or whether there was chronic persistence of DME.

This analysis was based on data for 546 eyes in the DRRCR.net Protocol T trial. All treated eyes had central-involved DME and a best-corrected visual acuity letter score of 24 to 78. They received up to 6 injections monthly of aflibercept, bevacizumab, or ranibizumab. Additional injections or focal/grid laser sessions were administered to achieve stability.

Through week 24, the rate of pDME was higher with 1.25-mg bevacizumab (118 of 180 eyes; 65.6%) than with 2-mg aflibercept (60 of 190 eyes; 31.6%) or 0.3-mg ranibizumab (73 of 176 eyes; 41.5%). At 1 year, 98 eyes treated with bevacizumab had cpDME, versus 59 of those treated with ranibizumab and 47 treated with aflibercept. At 2 years, the number of eyes with cpDME were as follows: 70 bevacizumab eyes, 38 ranibizumab eyes, and 29 aflibercept eyes.

Among eyes with pDME at 24 weeks, the proportion with gains of 10 or more letters from baseline to 2 years did not differ significantly by the presence or absence of cpDME: 51%, 62%, and 44% of eyes with cpDME that received bev-

acizumab, aflibercept, and ranibizumab (respectively) gained 10 or more letters, as did 54.8%, 63.3%, and 65.5% (respectively) of those without cpDME. Only 3 eyes with cpDME lost ≥ 10 letters.

This research indicates that aflibercept and ranibizumab are better than bevacizumab at preventing pDME through 24 weeks and that aflibercept is superior to bevacizumab for resolving cpDME by 2 years. (This originally appeared in the April 2018 issue.)

OTHER JOURNALS

Selected by Deepak P. Edward, MD

Visual Structure and Function of Athletes in Collision Sports

Journal of Neuro-Ophthalmology
Published online Sept. 6, 2017

In a comparison study of athletes in collision sports and matched controls, Leong et al. noted substantial retinal axonal and neuronal loss in the athletes, along with reduced visual function and quality of life (QOL). Patterns were similar to those of several neurologic diseases, including Alzheimer disease, multiple sclerosis, and Parkinson disease.

In their cross-sectional study, the authors compared 46 professional ath-

letes (active or retired) with 104 age/race-matched healthy controls who had not participated in collision sports. All study participants received spectral-domain optical coherence tomography to measure thickness of the peripapillary retinal nerve fiber layer (RNFL) and the macular ganglion cell complex. High-contrast visual acuity (100% level) and low-contrast letter acuity (1.25% and 2.5% levels) were determined, and the King-Devick test of rapid number naming was administered. Vision-specific measures of QOL also were assessed.

On average, the RNFL of athletes (14 boxers, 29 football players, and 3 ice hockey players) was 4.8 μm thinner than that of controls. RNFL thinning was highest for boxers (10.8 μm vs. controls). Binocular and monocular low-contrast letter acuity at 2.5% contrast, as well as vision-specific QOL, differed significantly between athletes and controls. Performance time for rapid number naming was similar for the study groups. (This originally appeared in the March 2018 issue.)

Summaries for *Ophthalmology*, *American Journal of Ophthalmology*, *JAMA Ophthalmology*, and *Roundup of Other Journals* written by Lynda Seminara. Summaries for *Ophthalmology Glaucoma* and *Ophthalmology Retina* written by Jean Shaw.

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